ISBN: 979-8-98798-39-1-1

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MCW 2023 Invention & Innovation

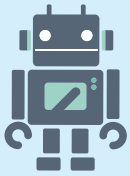
Proceedings of

INTERNATIONAL CONFERENCE ON INTELLIGENT COMPUTING AND NETWORKING - 2023

IC-ICN - 2023

Organized by:

Department of Information Technology
Department of Computer Engineering
Department of Artificial Intelligence & Data Science
Department of Artificial Intelligence & Machine Learning



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THAKUR COLLEGE OF ENGINEERING & TECHNOLOGY

Autonomous College Affiliated to University of Mumbai

Approved by All India Council for Technical Education(AICTE) and Government of Maharashtra

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PREFACE

We are very privileged to present the proceedings of the INTERNATIONAL CONFERENCE ON INTELLIGENT COMPUTING AND NETWORKING (IC-ICN 2023) scheduled during Feb.24-25, 2023.

It is the fourteenth event in the series of international conferences organized by TCET under the auspices of MULTICON since the first event ICWET 2010.

The purpose of this event is to provide a forum for the discussion of problems, opportunities, presentation skills, knowledge and challenges while also fostering a research culture among the key participants, including students, teachers, and industry. Additionally, in order to encourage creative thinking, study in the fields of communication and intelligent systems is of critical importance because it has the potential to enhance connectivity and security while also making life simpler.

The 14th Annual International Conference, IC-ICN 2023, is affiliated with prestigious publications including the Scopus Indexed Journal for Intelligent Systems, the top publishing company Springer, the SN Springer Nature Journal, and the Conference Proceedings with an ISBN number. It provides a foremost forum for academics, researchers, and professionals in the pertinent engineering disciplines and domains to highlight their efforts to study and exchange ideas.

We are hopeful and upbeat about attending the Conference sessions. This publication will give the reader a thorough rundown of the most recent findings in the fields of Intelligent Systems and Communication Engineering, and it will serve as a useful starting point for additional investigation.

As TCET strongly believes in quality and relationship building, great care has been taken to brand the event, find resources, determine the logistical support needed for the event, compile and print conference proceedings, and create souvenirs, among other things.

We believe that without the moral support, steadfast conviction, and intermittent motivation from Thakur Educational Group management, the current endeavor would not have been feasible.

This time IC-ICN 2023 proceeding consist of four tracks as Intelligent Computing Information Security and Privacy, Network Technology, Software Technology.

The two-day event featured 478 talks from researchers and industry professionals at across the globe, as well as idea presentations with discussion by delegates and resource people.

In order to show our admiration and gratitude, we would like to thank each reviewer for their insightful advice of the submitted papers. We also want to express our gratitude to the organizing team members for all of their effort. We anticipate expanding our partnership and attending upcoming TCET activities.

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IC-ICN-2023

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Department of Artificial Intelligence and Data Science

Inteligent Computing

A Review on Assessing Malaria Using Machine Learning Algorithm

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Abstract—**Plasmodium, the harmful parasite that causes malaria, is spread by mosquito bites (Female Anopheles). The appropriate time and speedy diagnosis of malaria pathogens are essential. In developing nations, pathologists frequently utilise conventional microscopy to identify malaria parasites by studying the slide under a light microscope. Traditional microscopy, on the other hand, needs more time and careful analysis. An approach based on computer vision has been suggested by some researchers to diagnose malaria. The purpose of the review is to use computer software to review, analyze, classify and report the latest progress in the diagnosis of malaria parasites. The malaria parasite diagnosis includes a preprocessing, segmentation, extracting descriptors and classification stage, which is discussed in detail in this article. At the end of this article, the existing problems and probable research outlooks are examined**.

Keywords: Classifier, Malaria disease, Giemsa-stained smears, Segmentation, Plasmodium, Red blood cell.

I. INTRODUCTION

Red blood cells, or erythrocytes, are the most popular type of cell present in the human body and are responsible for transporting oxygen to all of the body's tissues. Malaria can also result from abnormal erythrocytes, which might alter their physical characteristics or limit their lifespan. As per the "World Malaria Report 2021" issued by the "W.H.O.", between 2000 and 2020, an estimated 1.7 billion malaria cases and 10.6 million malaria deaths were averted globally [1]. In 2020, 241 million malaria cases were reported in 85 malaria-endemic countries (including French Guiana's territory), up from 227 million in 2019 [1]. A parasite that dwells in the liver or bloodstream is what causes malaria. Plasmodium falciparum, Plasmodium ovale, Plasmodium vivax, and Plasmodium malariae are all Plasmodium species that causes malaria in humans. Early trophozoites, adult trophozoites, gametocytes, and schizoites are all several life stages of Plasmodium species that infect erythrocytes of human. Examples of several species of Plasmodium life stages are shown in Fig.1.

In Table I, malaria parasite appearances at various stages and species, as seen under a microscope, are reported [2]. For Plasmodium falciparum, only, gametocytes and trophozoites (initial, circular) in peripheral blood vessels may appear. Adult trophozoites or schizonts in blood smears are therefore uncommon because they are normally found in body tissues.

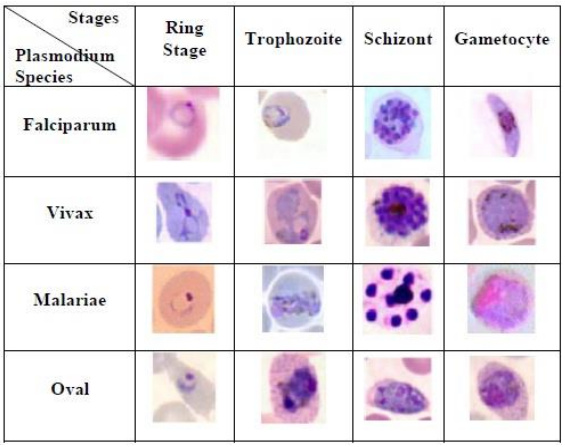

Fig. 1. Different species and stages of Plasmodium [3]

TABLE I. CHARACTERISTICS OF SPECIES AND STAGES OF PLASMODIUM [2]

Species Parameters	P.Falciparum	P.Vivax	P.Malariae	P.Oval
Red cell inflammation	No	Yes	No	Oval formed
Speckling	No	Schueffner	No	Schueffner
Circle form	Small	Large	Small	Large
Tropozoite	Not seen	Amoeboid	Band form	Oval
Schizont	Not seen	Large	Small	Small
Number of merozoites	16 to 24	14 to 20	8 to 10	6 to 12
Stain particle	Grainy grouped	Fine distributed	Grainy ample	Fine
Gametocyte	Crescent shaped	Round to oval large	Round to oval small	Round to oval small

Red blood cells that are infected typically contain multiple parasite types and do not swell. There are a number of benefits to microscopic diagnostics, including the ability to differentiate between species, determine the stage of the parasites, and calculate parasitemia [2]. Additionally, it has a high sensitivity and specificity for identifying different Plasmodium species at different stages. The classification of parasites and their types is very useful for study into the characteristics of malaria, as well as for prevention and diagnosis. However, this is a time-consuming and difficult task, and the skills and knowledge of qualified experts greatly contribute to the accuracy of the diagnosis. Designing a computerised, automatic system that enables pathologists to identify the kind of malaria parasite and its stages is therefore crucial. The development of an automated malaria diagnosis system requires the separation of the infected erythrocytes from the RBC smear and the subsequent removal of parasites (type and stage) from infected erythrocytes.

II. SIGNIFICANCE OF THIS STUDY

Computational diagnosis and malaria parasite identification have opened up a new field for rapid malaria screening, demonstrating the ability to tackle the shortcomings of traditional techniques. The objective of this review is to describe the present study of a number of experts in the field of computer-assisted malaria detection. This review article offers a good foundation for aspiring researchers to study computational methods for diagnosing malaria. This article outlines and analyzes computer vision and image analysis research, aiming to automatically diagnose malaria based on giemsa stained smear images and provide required assisting functions.

III. DIFFERENT TECHNIQUES FOR DIAGNOSIS OF MALARIA

There are many methods for diagnosing malaria. These approaches can be divided into two classes based on their effectiveness and cost. These are both expensive and cheap methods. Polymerase chain reaction (PCR) is a method depending on the detection of precise nucleic acid sequences [4] and the visualization of third harmonic generation (THG) are the cost-intensive methods. A THG imaging microscope was used to detect Plasmodium in untreated blood smears [5]. This method can provide high specificity and sensitivity for malaria detection; however, in evolving countries where the disease is more predominant, they are rarely used due to the need for specialized infrastructure and the difficulty of dealing with the disease. The rapid diagnostic test (RDT) can detect Plasmodium and some common microorganisms in the lysed blood [6]. And traditional microscopes [7] [8] is in the lower cost category. RDT can diagnose malaria relatively quickly and can be performed by less trained personnel, but the outcomes may be untrustworthy [8]. Also, RDT kits that are commercially available are specific to one species of Plasmodium parasite and different kits should be used when a patient is infected with several species of Plasmodium, which will increase the diagnostic cost of the disease. The key to effective dealing of malaria disease is a fast and precise analysis of the disease.

A. *Microscopic analysis of malaria*

Traditional microscopy is the golden rule for diagnosing malaria. During this process, blood is drawn from the diseased patient and smeared on a glass slide. The smears are then stained with chemicals called games. Staining helps distinguish the plasmodium from red blood cells. The most serious limitation of this method is that it takes a long time, the results are difficult to reproduce, and the testers must be trained. The last challenge may be that where the disease is endemic or whose skilled human capacity is limited.

B. *Diagnosis of malaria by computer*

Computers are essential in the medical sector; without them, competency and productivity would suffer significantly. Computerized diagnosis of malaria is a microscopic diagnostic technique using computer vision and machine learning techniques. This technique replaces manual microscopy examination. Machine-controlled parasite (malaria) diagnostic methods can be presented by the diagnostic information from the hematologist and demonstrating it using image processing algorithms. These techniques have been extensively studied to ensure premature and precise recognition of malaria parasites. A computerized malaria identification system must be able to differentiate between healthy and infected erythrocytes. Image acquisition, pre-processing, segmentation, feature extraction, and classification are the main phases in inspecting a microscopic image. Figure 2. shows the broad design of the automatic identification of malaria disease

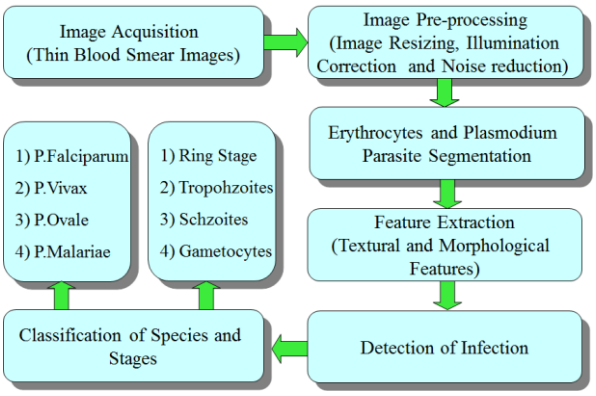

Fig. 2. Broad design of the automatic identification of malaria disease

C. *Image acquisition*

The majority of research on malaria screening focuses on thin images of blood smears, hence thick blood smear images are rarely used. To capture images of thin stained slides, Ross N. E. et al. [9] employed a light microscope at 1000 magnifications along with a charge-coupled device (CCD) camera. Camera was set at maximum resolution of 2048x1536 pixels (i.e. 3.2 megapixels camera) to captures images in JPEG format. The resolution of a photograph is measured in pixels. The width and height of a sensor in pixels are multiplied to get the photo resolution. Images in [10] were taken with a JVC 3-CCD colour video camera attached to an Olympus BX60 microscope. This microscope was having100x objective lens (oil immersion). The same approach was observed in other experiments, in which images were obtained with a charge-coupled device camera (CCD) attached to the microscope. However, images of blood smears are easily accessible on websites. Gitonga et al. [11] used the Kenya Medical Research Institute (KEMRI) and Center for Disease Control (CDC) sources to get thin blood smear images.

D. *Preprocessing*

The foremost goal of the preprocessing phase is to create blood images having low-noise as well as high-contrast, for further processing. Changing the color of the blood smear and adjusting the camera will change the brightness of the microscopic image. This problem brings difficulties to blood cell classification, because it is difficult to correctly segment objects of the same color. Different

researches have proposed several methods to solve preprocessing problems such as lighting and reduction of noise. A mixture of several filters can be utilized to decrease the lighting effects on the microscope and camera. However, the lighting problem can be overcome in some way, but human factors are still involved in the creating blood smear slides. Researchers have proposed a variety of strategies to tackle the noise issues and image enhancement in computerized malaria identification.

Devi, S. S. et. al. in [12] corrected illumination using adapted gray world normalization method for enhancing quality of the image. Sanjay Nag and S. K. Bandyopadhyay in [13] proposed an approach that eliminated impulse noise using median filter with a 3x3 kernel window. S. L. Varma and S. S. Chavan used a simple pixel replacement strategy employed to remove label artifacts [14]. Damandeep Kaur and Gurjot Kaur Walia proposed an approach to detect and classify malaria parasites [15]. To retain the edges of the malaria-infected microscopic images, spatial filtering is used initially, followed by Ant Colony Optimization. Lorenzo et al. in [16] converted images to HSI (Hue, Saturation, and Intensity) color space and then the intensity component was filtered using [3x3] median filter to remove noise. Also, a morphological top-hat operation was used to adjust illumination balance. Sadiq et al. proposed the selection of appropriate features with Z-score for the detection of malaria-infected erythrocytes using supervised learning [17]. The combination of median and Gaussian filter was used as a preprocessing step to remove noise reflected by overlapping and impulse noise. In addition to that, canny filters were used to maintain continuous edges of RBCs. Kanojia et al. identified that a 5x5 kernel of nonlinear median filter gives the best noise reduction in grayscale images [18]. Penas and P. T. Rivera used the saturation channel of HSV color space for preprocessing [19]. Image opening and closing was performed on the saturation component of image. This step confirms that impulse noise was removed. The problem of illumination was corrected by Devi et al. in [20] by using the grey world normalization method. The normalized image was then treated by an adaptive filter to remove noise. Ghosh et al. used a Laplacian filter on microscopic images [21]. This makes the cell boundaries sharp. After that, the stained regions were identified by converting the sharpened image to HSI (hue, saturation, and intensity) format. Devi et al. first obtained the normalized image by gray world normalization technique which rectifies the problem of illumination [22]. The author then used the standard median filter with a window size of 5x5 to decrease the noise from the image. Somasekar et al. suggested a method to segment infected-erythrocytes for the detection of malaria [23]. The author used an adaptive median filter followed by illumination correction. In this algorithm, the window size used was 3x3, and the maximum window size used was 7. Arco et al. proposed an approach to automatically detect malaria-infected erythrocyte using morphological operations [24]. They had used spatial filtering and adaptive histogram equalization as a pre-processing stage. To minimize the noise, Gaussian low pass filter was applied. This process makes the image brighter than the original image. Tsai et al. utilized a mean filter to eliminate image noise in [25]. Hung et al. in [26] used the mean filter to remove impulse noise in the image. Tomari et al. proposed a method to classify the red blood cell as normal and malaria-infected in blood smear images [27]. Here author used three methods as morphological operations, Connected Component Labelling (CCL), and bounding box filter to clear away the redundant items. A sequence performing twice of Erosion, twice of Dilation, and contour filling algorithm is used to decrease the small noise and holes inside the cell. Chen et al in [26] utilized mathematical morphology to remove noise and smooth the edges of the object. Gitonga et al. in [11] used median filter with kernel size of 5x5 to enhance the noisy image. Das et al. suggested a machine-based investigative method for automated malaria parasite by means of light microscopic images [28]. Here geometric mean filter was applied on the illumination corrected gray image. S.S.Savkare and S.P.Narote used a median filter of size 3x3 to eliminate unwanted pixels [29] [30]. Smoothening and edge enhancement were done by employing a Laplacian filter with second-order derivative on grayscale images. Xiong et al. in [31] first represented the image in the HSV color space. The inverse of the value channel was then applied to the median filter to remove noise. Ross et al. used a 5x5 median filter, and morphological area closing filter to reduce impulse noise in the image [9].Authors in [32] used Based-on Pixel Density Filter (BPDF). This filter first detect corrupted pixel and replace that pixel value that repeats mostly inside the window. In Progressive Switching Median Filter (PSMF), iterative method was used to detect impulse and filter it. The noise pixels treated in the current iteration are used to find new pixel value to replace other noisy pixels in the further iterations [33]. Authors in [32] used Modified Decision-Based Unsymmetric Trimmed Median Filter (MDBUTMF) to replace corrupted pixels. Corrupted pixels are eliminated from the window with the help of median filter [34]. The Noise Adaptive Fuzzy Switching Median Filter (NAFSMF) detects noise pixels using an adaptive window size. Two thresholds T1=10 and T2=30 and Fuzzy method are used to replace noisy pixel with new pixel value [35]. . Morphological operations are very useful for analyzing biological and medical images, and are a powerful tool for extracting elements from images. These elements are very useful for displaying the size, shape, and color of target elements. Table II summarizes the preprocessing strategies employed by several researchers during automated malaria diagnosis.

TABLE II. TECHNIQUES FOR PREPROCESSING

Reference papers	Techniques for preprocessing	Observations
Sanjay Nag and S. K. Bandyopadhyay [13], Lorenzo–et al. in [16] Sadiq et al. [17], Kanojia et al [18], Devi et al. [22], Somasekar et al [23] . Gitonga et al. [11], S.S.Savkare and S.P.Narote [29] [30], Xiong et al. [31], Ross et al [9]	Median filter	It has the capacity to reduce noise while maintaining sharp edges.
Tsai et al. [25], Hung et al. [26]	Mean Filter	It has the capacity to reduce noise with a cost of blurred edges.
Lorenzo-et al. in [16], Penas and P. T. Rivera [19], Tomari et al. [27], Chen et al [26]	Morphological Filter	Remove undesired artifacts. Used for thinning, thickening, holes filling and splitting.
Devi, S. S. et. al. [12], Devi et al. [20], Devi et al. [22], Arco et al. [24]	Histogram Equalization	For low-resolution images, it works well.
Ghosh et al. [21], Savkare S. S. and NaroteS. P. [29] [30].	Laplacian filter	Used to sharpen the image's edges.
Das et al [28]	geometric mean filter	It has the capacity to reduce Gaussian noise while maintaining edges.
Sadiq et al. [17], Arco et al. [24]	Gaussian filter (Low pass)	It has the capacity to reduce Gaussian noise.

E. *Segmentation*

Segmentation is a crucial procedure in both computer vision and image processing. It means subdividing an image into various discrete, non-overlapping parts that come together to form the whole image. The most important and difficult stage is identifying the various cell types, such as red blood cells, white blood cells, plasmodium, etc., in a blood smear image. The two types of blood cells are distinguished from the background using image features including clusters of healthy and infected blood cells. Effective detection and classification of malaria parasites may be possible using properly segmented images.

Recent studies have suggested a number of blood cell segmentation techniques. Several factors were examined by S. S. Devi et al. [12] to identify malaria-infected erythrocytes. In this study, Otsu's segmentation technique was used to divide up the stained portions. Area thresholding and morphological filtering were then used to get rid of any remaining artefacts or stains. Finally, the overlapping blood cells are separated using a technique called marker-controlled watershed segmentation. Malaria parasites in a thin blood smear picture were identified by S. K. Nag et al. using machine intelligence [13]. A transition was made to the L*a*b* colour space here. Then, unsupervised K-means clustering was used to divide the total number of pixels in an image into three groups. While the foreground shows the cells (the region of interest), the background shows the irregular coloration. The first two groups represent the foreground of the picture, while the third group represents the background. The third cluster's colour pixels were all changed to black. In order to categorise malaria parasites, D. Kaur and G. K. Walia devised a hybrid form of ACO-SVM (Ant Colony Optimization - Support Vector Machine) [15]. In this study, author proposed using a simple ant colony optimization algorithm for malaria image segmentation. Digital image processing was utilised by J. V. Lorenzo-Ginori et al. in [16] to categorise erythrocytes infected with Plasmodium. Segmentation occurred in a two-stage procedure. As a first step, Otsu's technique was used to perform a rough segmentation on the image's intensity factor. Next, author used a marker-controlled watershed transform to identify overlapping cells and separate them. The idea of using microscopic blood pictures to diagnose malaria was introduced by G. Madhu [36]. To extract a section of the contaminated blood cell from microscopic blood smear images, the author employed an Einstein t-conorm segmentation technique and an unique fuzzy type membership function. A method for categorizing malaria parasites was proposed by Pragya et al. [37] using the Chan-Vese Method for segmentation and SVM as a classifier. The Chan-Vese algorithm is widely recommended for segmenting malaria parasite images because it is the only method that can reliably separate the parasite from its background. D. Dawale and T. Baraskar created a malaria detection method [38] using regional descriptors and the PSO-SVM (Particle Swarm Optimization - Support Vector Machine) classifier. In this study, region-based and Otsu thresholding were used to separate different types of blood cells. Separating RBCs from the background was accomplished by K. Manning et al. in [39] using a marker-based watershed segmentation technique. In [40], S. Hartati et al. automatically determined the threshold using Otsu's thresholding method. The hole in the diseased cell was then covered off and the undesirable artefacts were eliminated by performing the morphological closing and opening. Local binary pattern was employed by S. L. Varma and S. S. Chavan to identify malaria parasites in both thick and thin blood smear pictures [14]. In order to divide the data into distinct groups, the authors here employed Otsu thresholding. Sobel and Prewitt masks were employed for the purpose of edge detection. When utilising supervised learning to look for malaria-infected erythrocytes, Sadiq et al. recommended picking the best

features using the Z-score [17]. With the help of Canny edge detection, authors were able to extract the relevant data and drastically cut down on the amount of information we needed. Segmentation was carried on on images using the Otsu global thresholding and watershed approach by M. Kanojia et al. in [18]. Otsu's thresholding method was used to segment erythrocytes and artefacts by S. S. Devi et al. in [20]. Next, a morphological filter was used to remove any unwanted coloured components from the erythrocyte. The marker-controlled watershed method was then used to separate the clumped erythrocytes. A hybrid classifier was used by S. S. Devi et al. in [22] to categorise erythrocytes infected with malaria. The authors used marker-controlled watershed segmentation to separate clumps of erythrocytes into their component cells. In order to distinguish infected from healthy red blood cells in blood smear images, Hany A. Elsalamony trained neural networks [3]. The segmentation procedure made advantage of watershed and morphological functions. Parasites in stained blood smears were categorised using an MP (Malaria Parasite) detector by Y. W. Hung et al. [41]. In this study, author used Otsu's threshing technique to determine the threshold for classifying all pixels as parasites or backgrounds. Malaria-infected cells in blood smear pictures were extracted using the Fuzzy C-means (FCM) method by J. Somasekar et al. in [23]. Tsai et al. [25] suggested a strategy for identifying malaria-infected erythrocytes and then dividing them into individual parasitized cells. In this case, a threshold value was chosen using Otsu's thresholding to separate parasites from backgrounds.

Different research use various methods of segmentation, which are summarised in Table III. According to the review, Otsu's algorithm is widely used to separate erythrocytes and malaria parasites. The histogram's between-class variance is maximised to determine the threshold value in the Otsu technique. If the histogram has a bimodal or multimodal distribution, this method is useful for choosing a threshold value. Comparably, other researchers used marker-controlled watershed and watershed algorithms to segment overlapping cells during the segmentation step

TABLE III. TECHNIQUES FOR SEGMENTATION

Reference papers	**Various Segmentation Methods**	**Observations**
Lorenzo-Ginori et al. in [16], Hartati et al. in [40], Varma et al. in [14], Arco et al. in [24], Tsai et al. in [25], Devi et al. in [12], Hung et al. [41], Ghosh et al. [21], Tomari et al. in [27], Ross et al. [9], D. Dawale and T. Baraskar [38]	Otsu thresholding	Determines the best threshold value for classifying the pixels in foreground and background.
Nag et al. [13], Sadiq et al. [17]	K-Mean clustering algorithm	There are more identical regions found by this method.
Arco et al. [24], Somasekar et al. [23]	Histogram threshold	The threshold must be carefully chosen; a poor choice could result in over or under segmentation.
Tek et al. [42], Sio et al. [10]	Morphological operation	In non-uniform lighting conditions, this is useful.
Pragya et al. [37]	Chan-Vese algorithm	This method is ineffective when the cells are overlapped on each other.
Sadiq et al. [17]	Canny Edge detection	Suitable for images having better object contrast
Kanojia et al. in [18], Devi et al. in [20], Lorenzo-Ginori et al. in [16], Manning et al. in [39], Devi et al. in [22], Elsalamony et al. in [3]	Marker controlled watershed	It works well for overlapping cell segmentation but not for greatly overlapping cell segmentation. Over segmentation.

F. Features extraction

This is a significant transition from graphical to numeric representation of data, a prerequisite for the processing of the vast majority of images and computer vision solutions. Other parts of a stain, such as parasites, are malleable objects of a wide range of sizes and forms. While colour information is useful, it is not alone sufficient to differentiate between, say, various species of malaria parasites. A set of features is a collection of characteristics that can be used to identify diseased cells from healthy ones. Table IV provides a summary of the many features employed by researchers.

TABLE IV. DIFFERENT FEATURES APPLIED BY DIFFERENT INVESTIGATORS IN DIFFERENT STUDIES

Reference papers	Features set	Name of Features
Hartati et al. in [40], Sadiq et al. in [17], Kanojia et al. in [18], Devi et al. in [12], Devi et al. in [22].	Gray Level Co-occurrence Matrix (GLCM).	Contrast, correlation, energy and Homogeneity
Madhu G. in [36], Sadiq et al. in [17], Kanojia et al. in [18], Devi et al. in [12], Tomari et al. in [27], Das D.K. in [28].	Hu moments.	There are seven values that remain constant regardless of the size, location, or orientation of an object.
Sadiq et al. in [17], Devi et al. in [22], Das D.K. in [28], Devi et al. in [12].	Linear Binary Pattern (LBP).	59 LBP features.
Pragya et al. in [37], Manning et al. in [39], Hartati et al. in [40], Nag et al. in [13], Kanojia et al. in [18], Ghosh et al. in [21], Tomari et al. in [27], Das et al. in [28], Tek et al. in [42], Ross N. E. in [9].	Shape Descriptors.	Size, Aspect Ratio, Density, Extent, Periphery, Convexity, Solidity, Major Axis, Fill, Diameter, Minor Axis, Roundness and N (no. of connected objects) are all dimensions.
Lorenzo-Ginori et al. in [16], Manning et al. in [39], Kanojia et al. in [18], Nag et al. in [13], Devi et al. in [20], Ghosh et al. in [21], Pragya et al. in [37], Tek et al. in [42], Ross N. E. in [9].	Texture and Colour Descriptors.	Kurtosis and Skewness of RGB and HSV, mean, Gray level average, Third moment, Homogeneity, Smoothness, Standard deviation, and Entropy.

IV. CLASSIFICATION

Classification development is greatly facilitated by a high-quality feature extraction and segmentation technique. It is common practise in automatic malaria diagnosis to use the classification technique for two purposes: identifying the stage and species of the parasite that has infected the patient's erythrocytes.

Classifiers used in various research to categorise infected cells, phases of infection, and species are listed in Table V.

V. DISCUSSION

In this article, we systematically outline the automatic detection of malaria based from microscopic images. Malaria detection system should be able to perform imaging, preprocessing, segmentation, and classification functions. Malaria diagnostic systems need to be able to find the existence of parasites in blood samples via differentiating amongst non-parasitic substances (artifacts, lymphocytes, and erythrocytes) and malaria parasites. If the blood test is positive, it is necessary to recognize the species and the malaria parasite by distinguishing species and developmental stages. However, most imaging studies related to malaria did not meet the above necessities.

Median filter proved to be very accurate in decreasing the salt and pepper (impulse) noise from microscopic image. The local histogram method is often utilized to enhance the microscopic image of blood smears.

Segmentation is considered a vital step in automatic detection of malaria disease. Effective segmentation makes things easier in case of parasite detection and feature extraction. A review of the literature indicates that most researchers use the Otsu threshold to segment erythrocytes and malaria parasites. Otsu's threshold is based on the reduction of the criterion function to select an optimal threshold; however, the Otsu threshold cannot segment overlapped cells. To segment overlapped cells, Devi et al. [20] applied the watershed algorithm. Unless the object is flat or has at least one soft gray layer, it does not make sense to apply the watershed algorithm directly to the image. Therefore, marker-controlled watershed algorithm is usually preferred, which basically uses externally provided markers instead of regional minima [43]. The marked watershed algorithm is used to isolate overlapping cells. Similarly, some studies have used Morphological operations, K-Mean clustering, and Chanvese for segmentation.

For the classification of infected erythrocytes and the stage of malaria infection, texture, geometric shape, and color characteristics were evaluated. In most current approaches, investigators use a blend of texture and geometric features in the feature extraction phase. Several automated malaria diagnosis studies have shown that color and texture features can be utilized to classify diseased and healthy erythrocytes. Also, geometric features can be used to identify parasite species and life stages. From the review, SVM is utilized by maximum researchers. The essential benefit of SVM is that it has high-quality generalization functionality and extraordinarily influential learning rate. Numerous classifications had been suggested for the automated type of malaria parasites in existence of different marked substances in smear images. Though, those research does not often focus on classification of life phase. Finding the life phases of a parasite is beneficial and this could be answered with the aid of using a multi-class type in preference to a parasitic or non-parasitic binary type problem.

TABLE V. DIFFERENT METHODS OF CLASSIFYING THE INFECTED ERYTHROCYTES

Reference papers	**Techniques of Classification**	**Observations**
Madhu G. in [36]	Decision Tree	It predicts class membership using hierarchical relationships between input data.
Lorenzo-Ginori et al. in [16], Das D. K. in [28], Nag et al. in [13].	Naive Bayes	The naive Bayes classifier's key advantage is its quick training computation time.
Nag et al. in [13], Lorenzo-Ginori et al. in [16], Pragya et al. in [37], Kaur et al. in [15], Hartati et al. in [40], Sadiq et al. in [17], Devi et al. in [20], Das D. K. in [28].	Support Vector Machine.	SVMs are great for learning problems with a large number of features in comparison to the number of training cases.
Devi et al. in [20], Tek et al. in [42], Devi et al. in [22], Malihi et al. in [44], Lorenzo-Ginori et al. in [16].	K Nearest Neighbor	Unknown samples are classified simply by comparing them to previously recorded training data.
Sadiq et al. in [17]	Boosted Tree	There are numerous weak learners in this group, but only one strong learner emerges. In this situation, individual decision trees are poor learners. Each tree is connected to the previous one in a sequence, so that each reduces the error of the previous tree. Due to this consecutive connection, boosting algorithms are incredibly accurate but it's training process is often slow.
Lorenzo-Ginori et al. in [16], Ghosh et al. in [21]	Bagged Tree	It's the combination of several different versions of a predicted model. Each model is trained separately before being integrated through an averaging approach. Bagging's main goal is to achieve less variance than any particular model has.
Manning et al. in [39], Kanojia et al. in [18], Devi et al. in [20] [12], Tomari et al. in [27], Ross N. E. in [9], Lee et al. in [2], Gitonga et al. in [11].	Artificial Neural Network.	Employs a nonparametric strategy. The network structure and amount of inputs have an impact on classification performance and accuracy.

A. Probable guidelines for upcoming research

Automatic malaria parasite recognition and classification can support pathologists with malaria disease detection and medicine development. A lot of effort has been done on this topic, but there are still some problems that reduce the accuracy of malaria parasite detection. Therefore, improvements are needed to meet the pathologist's expectation that it may reduce the difficulty encountered in manual analysis. Literature reviews indicate that most studies are limited to detecting Plasmodium in blood smear images. Species identification and the life-cycle of the malaria parasite have proved useless in most researches.

However, investigators in [44] [11] [43] [25] have identified four malaria parasites, but they still haven't met the pathologists' expectations. Other factors, such as blood slides, microscope, noise, scale correction, and color standardization, can affect the accuracy of identifying malaria parasites. The main problem in segmenting the malaria parasite is to separate the infected erythrocyte from white blood cells and colored objects because they have the similar hue and intensity. The segmentation technology can be improved to effectively process blood smear images without removing noise or adjusting the contrast. Similarly, when measuring parasites, the exact number of non-infected erythrocytes and infected erythrocytes required to be calculated so that overlying cells give unreliable results, and appropriate algorithms can be used to correctly measure overlapping cells. This step required to be enhanced with the aim that you can further classify the infected erythrocytes and recognize the parasite and the parasite's life stage based on better features.

VI. CONCLUSION

This article offers a framework for investigators who wish to study the automatic detection of malaria from images (microscopic). The purpose of this article is to analyze, and classify the systems and methods used to detect malaria and determine existing restrictions. The problem of pathologists was also discussed. In the preprocessing, the problems of color change, illumination change, and noise in the microscopic image are discussed. Segmenting parasites form images is the next important phase in the classification of malaria parasites, which greatly affects the performance of the classifier. Color, texture and morphological features, are valuable information about features. In terms of classification, it could be advisable to add circumstantial information to the categorization of malaria parasites. This issue can be resolved by means of multi-class classification in place of the two class problems; Parasitic or non-parasitic. This review can help researchers analyze the best practices introduced in the past two decades and their restrictions. Since the automatic detection of malaria is performed not only by computer vision experts, but, it also requires the participation of pathologists.

VII. ACKNOWLEDGMENT

Sandip Institute of Technology and Research Center, Nashik, Maharashtra, India, supported this study.

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Plant Disease Detection using Convolutional Neural Networks and Deep Learning based Strategies

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Abstract - **The agricultural sector is considered to be as one of the major farming sectors wherein the process of automating plants on the basis of diseases can be performed upon. To monitor such an agricultural environment; it is necessary to keep a track of healthy and diseases plant leaves so that they can further be segregated to generate exponential crop yields and returns. For this purpose; various state-of-the-art technologies such as machine learning, deep learning and artificial intelligence have come together to categorise healthy plants from diseases ones using image classification techniques. On the other hand, the working theories of deep learning based models have been continuously evolving to precisely identify the presence of disease in plant leaves. This not only adds efficiency in the entire process of detection; but also adds time efficiency that increases the probability of identifying diseases at the right stage. For this purpose, we proposes the implementation of Convolutional Neural Network, ResNet-50, Efficient-B2 and VGG-16 to detect and validate the presence of plant diseases in the respective leaves. The execution of the paper occurs by gathering a dataset of 87k plant images from Kaggle repository. This repository consists of healthy and diseased plant images while executing on 38 varying categories. However, the final implementation takes place on a total of 250 images from every class. The entire dataset is trained, tested and validated for the same. The final evaluation of the proposed models occur using performance metrics such as accuracy and recall factors. On final comparison of the overall model; it was observed that Efficient-B2 generated optimized accuracy of 94 percent.**

Keywords: CNN, Efficient-B2, machine learning, deep learning, ResNet-50, VGG-16

I. INTRODUCTION

The primary resource and the origin of food has always been the agricultural sector and therefore serve the purpose of basic necessities acquired by the humans. Hence, this sector has been recognised as the survival centre of the world that is responsible for the lives of human beings [1]. This leads to a major fact; that the agricultural sector can further be declared as the most important and a centric pillar of any economy. It can be very well observed that 70 percent of the total world population depends on the agricultural sector for their livelihood. Hence, it can be concluded that the lives of individuals including their health is a major reflection of the agricultural sector [2]. Therefore, this sector must be carefully pondered upon and not neglected. An important aspect of the agricultural sector lies in the forests and the plants the trees might produce. It is important that the quality of such plants must be checked and monitored on regular intervals so as to avoid decaying of the same. This becomes one of the significant challenges in the agricultural sector to timely detect the presence of diseases in the plants so that the health of the plants and crops are maintained and not compromised upon. This occurrence of diseases in plants might occur due to various factors; such as; improper land, infertile land, amount of water and sunlight, number of pesticides etc. all such factors are in a way responsible to affect the growth of the plant and might create a hurdle in their growth; thereby leading to diseases in plant development growth and seedling growth [3]. When such a disease occurs in the plant; its growth is highly impacted and might change the morphological and biological changes in the same. The overall diseases in the plants that lead to such changes are majorly caused due to biotic stress and abiotic stress. Biotic stress includes; stress caused due to living creatures present in the soil such as bacteria and virus. Such creature tends to come in direct contact with the plant and negatively affects the overall growth of the seedling process [4]. On the other hand; abiotic stress is caused due to non-living creatures such as man-made or environmental factors [5]. Figure 1 below; represents a diagrammatic scheme of biotic and abiotic stress.

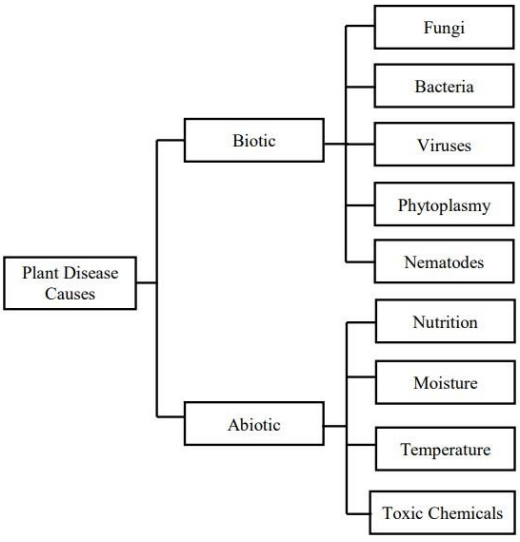


Figure 1: Schematic representation of diseases in plants [5]

However, a conventional method used by farmers is to manually inspect the presence of diseases in the plants. This manual inspection follows the process of gathering knowledge from people who have an expert

opinion on the same and can therefore contribute to identify the disease. A major disadvantage of this process; basically includes the time constraint attached to the process of manually detecting the same. Since the crops are distributed in large fields, its manual inspection and detection of the same becomes a tedious task [6]. In such a scenario, it is feasible to adapt to machine learning based techniques; in which the detection of the same can be performed through technical strategies with more precision. For this purpose, various approaches have been evolved that includes techniques of machine learning, deep learning, transfer learning and artificial intelligence. Advancement in such strategies and algorithms has proved to detect the presence of diseases in plants with highest possible accuracy in a minimal time frame. Hence, such techniques can be used on the concepts of image processing wherein; a specific part of the image is taken into consideration and algorithms are deployed on them; so as to observe a particular area of the leaf [7].

In addition to this, the depth of the plant leaf is also used which can help to detect the presence of diseases within itself. Using machine learning based algorithms of random forest, support vector machine; k-nearest-neighbour etc. this process of detection can be carried out effectively. Such algorithms tend to focus on specific features of the plant leaf such as it's; saturation colour, gradient orientation, RGB features etc. [8] hence, it can be concluded that machine learning, transfer learning and deep learning algorithms play a significant role in detecting the same and further classifying the plant leaf as healthy or diseased [9]. On the other hand, the working implementation of CNN is heavily based on the hidden layers present in the neural network. Such architecture can easily differentiate between various patterns of plants and further label them as healthy or diseased.

Hence, the primary aim of the research paper is to deploy and automate the process of disease detection amongst plant leaves using CNN and deep learning based models such as Efficient-B2, ResNet-50 and VGG-16. The added layers of deep learning models and the hidden layers of CNN tends to automate the process with less computational complexity and within a limited time frame. In addition to this, the process of fine tuning and usage of parameters for evaluation such as confusion matrix, accuracy, precision, loss graph etc. generates high levels of accuracy. For this purpose, we have collected the plant disease dataset from Kaggle repository comprising of 250 images of both health and diseased plant images from each of 38 different classes.

The contributions of the proposed study can be summarised as follows: Uploading plant disease dataset from Kaggle repository and working on images of various healthy and diseased plant leaves. Implementing CNN and deep learning based algorithms through labelling process Comparing the results thus obtained and defining the algorithm with best possible accuracy

II. RELATED WORKS

Multiple research scholars have worked upon the conceptual theory of detecting plant diseased through their leaves. An extended amount of research work has gone into detecting the same using machine learning algorithms. This section of the thesis, describes the research work performed by various authors in the same domain.

In a research work conducted by author Ashwin et al. in [10] he proposed the detection of Soybean plants wherein he incorporated the physiological features of the leaf along with its morphological features. This process helped to detect and differentiate between healthy and diseased leaves of the plants. The author used a dataset consisting of 2500 images and selected various features from it which could further be used for image classification purpose. The author implemented the model using 21 features from the acquired dataset. Such features included the evaluation of stem length, length if the root, pods present in every plant and the number of seeds sowed for the same. The entire implementation of the system occurred using six machine learning algorithms such as random forest, gradient boosting, logistic regression, SVM, KNN and naïve Bayes. In addition to this; a ten-fold cross validation as also performed on the same and the model was evaluated using confusion matrix and accuracy factors. On execution, it was observed that the gradient boosting model generated highest result of accuracy and a precision factor of 92.56 percent.

In a similar research work proposed by Bedi et al. in [11] represented a hybrid model based on the concepts of CNN and CAE (convolutional auto encoder). The model was implemented peach plant leaves and was further used to detect the presence of the disease by detecting a specific spot on the respective leaf. The author acquired the dataset from GitHub repository that consisted of 2160 diseased leaves and 2267 healthy leaves. A total of 70 percent of the acquired dataset was further used for the testing purpose and 30 percent was used for training purpose. Once the dataset was gathered; pre-processing was performed on it. On this stage; steps of labelling the data, categorising it and further splitting it was taken place. The next step; however included the process of applying respective algorithms of CNN and CAE. During the testing phase; leaf images were given as input to the algorithm and a ten-fold cross validation was performed. In the implementation phase of CNN, 14 hidden layers of the neural network were used and 17 layers of CAE were used. In addition to this; Adam was used as the optimizer and rmse values were evaluated. On execution; it was observed that the CNN generated less error loss of 0.607 and was therefore declared as the optimized model.

Jeyalakshmi et al. in [12] proposed the detection of diseases in potato leaves depending on the image thus obtained from the repository. The author worked on the Plant Village dataset that comprised of 1000

diseased leaves and 3270 healthy leaves. The dataset also had plant images of grape. In addition to this; there were different categories and sub-sets of potato plant leaves and grape plant leaves. In the initial stage; every RGB image from the dataset was acquired and its respective background was removed through the filtering process using Grab Cut algorithm. In the next stage; various features from the leaf were selected, depending upon the intensity of RGB images with respect to red, blue and green colours. Other features; such as its contrast, entropy and gradients were also determined. Three machine learning classifiers were used to evaluate the system model and thus included; the implementation of KNN, SVM and Naïve Bayes. A total of

13 features were selected from each subset as a category of grape and potato plant leaves. On execution it was observed that KNN generated an accuracy of 91 percent and was observed to be as the optimized model.

Author Xian et al. in [13] proposed the implementation of machine learning algorithm that was coined to be as an Extreme Learning Machine (ELM). The algorithm was used to detect the presence of disease in a tomato plant. The entire dataset was obtained from Kaggle repository that comprised of a Plant Village dataset. The dataset had 1000 images of healthy plants and 1245 images of diseased plants. The implementation of ELM was further combined with CNN. The neural networks present in the CNN comprised of multiple hidden layers that enabled to connect internal nodes and helped to resize the image of a tomato

plant. In addition to resizing of the image; leaf features such as its segmentation, colour, and saturation were also taken into consideration. In the later stages; a scatter plot was determined that highlighted only the relevant features of the plant image. 70 percent of the dataset was used for training purpose; whereas 30 percent of the dataset was used for testing purpose. On evaluation, it was observed that the ELM model generated better results in comparison to the CNN model and produced an accuracy of 93.65 percent.

It can be observed throughout the literature survey; that multiple authors focused on detecting the presence of disease in plant leaves. Table 1 below gives a comparison of the used literature survey of the research paper. A major disadvantage can be concluded that this detection was grouped through the classification of only one type of a disease in only one type of plant leave. Since farmers, in the agricultural sector tends to grow more than one crop; adapting to this detection becomes a tedious task. Hence, the primary aims of the proposed research work; is to build a model that can be used by multiple farmers who tend to grow and produce various crops. For this reason, we have proposed a research work; wherein various plants together and further train them for respective disease detection. In the next stage; we implement various deep learning based models along with CNN. The deep learning models includes the implementation of VGG-16, ResNet-50 and Efficent-B2.

Table1: Comparison of surveys

Research	**Year**	**Crop**	**Dataset**	**Technique**
Ashwin et al. [10]	2021	Soybean	Real samples	random forest, gradient boosting, logistic regression, SVM, KNN and naïve Bayes
Xian et al. [13]	2021	Tomato	Plant village	ELM, CNN
Bedi et al. [11]	2021	Peach	Plant village	CAE, CNN
evalakshmi et al. [12]	2020	Potato and grape	Plant village	KNN, SVM and Naïve Bayes

III. METHODOLOGIES USED

This section of the research study highlights the algorithms used to implement the detection of disease in plant leaves. For this purpose; deep learning based CNN is used and deep learning based ResNet-50, VGG-16 and Efficient-B2 are used.

The primary finding of the definition of DL is that it is the addition of a multilayer network for feature extraction to the ML framework. In DL architecture, the term "deep" refers to the layer thickness. The concept's classification process is as follows: The manually labelled dataset is split into testing and training samples for the DL structure, the dataset is normalised for quality improvement using image pre-processing techniques, and the pre-processed images are then fed into the DL design for feature extraction and ultimately classification. Each layer in DL architecture operates the output of the layer below as its input, passes it to the layer above, and repeats this process. Transfer learning, on the other hand, refers to a concept in which the data gathered and put to use on one dataset can be applied to another dataset with a much smaller population to train providing that both datasets function on a similar CNN architecture objective. This technique is carried out in a traditional CNN by training the initial parameters on huge datasets. A specific model is chosen for deep learning based on a CNN's ability to extract features. This process is termed as feature extraction. The main goal of this approach is to keep both the neuron weights and the architectural framework of a CNN model. This idea is typically applied to offset the computational expense associated with creating a neural network from scratch. The second tactic entails choosing from among the several transfer learning-based variation models available, such as

Alexnet, Densenet, Mobilenet, Inception, and VGG-16, then modifying the model's parameters to get the best results. Following are the methodologies used for the purpose of implementation of the proposed thesis: CNN: The working implementation of CNN takes in input images, extracts characteristics, and then categorises them according to predetermined standards. These networks are under the category of neural networks; therefore they have all the characteristics that identify a neural network. Its execution is split into two blocks, the first of which is charged with feature extraction and the second of which uses ML techniques to classify data. CNN employs two operations—pooling and convolution—across a number of layers to carry out these blocks [14]. The first block, or feature extraction, is carried out by the first two layers of the network architecture, and the fully connected layer creates the final output by mapping the features that have been extracted from the earlier levels. Typically, this final outcome makes up the second block of execution, or classification. The convolutional layer, which is the first layer in the network, is essential to the entire implementation of the work since it performs all of the mathematical operations in the network. Additionally, the entire CNN procedure is carried out in a grid pattern. In the grid parameters of this grid pattern, which are two-dimensional arrays known as kernels, the pixels of images are stored. The real feature extractors for the model are performed by these kernels, which is what gives CNNs their high level of image processing effectiveness. All the levels in this network have a tendency to gradually raise their level of complexity since the output from one layer is supplied as the yield input to the following layer. The process of parameter optimization used in kernels to lessen the disparity between output values and input labels is known as training. Algorithms for back-propagation optimization are applied in this procedure

ResNet-50: One of the often used CNN models based on deep learning is ResNet50.

Convolutional models with 50 layers are stacked on top of one another. A crucial component of ResNet50 is how it gets around the vanishing gradient problem. Additionally, the architecture contains short links, or "skips," that frequently avoid various execution steps while iterating the model with essential and required execution stages. Efficient-B2: A version of EfficientB2 that has been enhanced and enlarged is a part of the deep learning architecture. The model usually uses a scaling technique that requires consistency for its dimensional elements, such as depth and width, at all sizes. To modify the resolution of the input dimensional image, they additionally use a compound coefficient in addition to dimensional variables. In contrast to how a standard CNN operates, which relies on scaling factors to prevent

distortion in the image's final resolution, EfficientB2's implementation employs scaling coefficients. For instance, if the computational resource to be employed is magnified to 2N times, the network's overall depth grows by N, while its width increases by N. VGG-16: The VGG-16 is a deep learning-based open-source model. The 13 levels of the VGG-16 design are separated into five groups and followed by a max-pooling layer. This feature vector is then applied to the three connected layers, all of which have the same configurations. The information is subsequently created and classified using the Softmax layer.

IV. IMPLEMENTATION OF THE MODEL

The primary aim of the research is to detect the presence of disease in plant leaves by collecting a dataset from Kaggle repository. The implementation begins by collecting a dataset and pre-processing it using labelling and resizing. After this stage, the model undergoes data visualization in which all the selected classes from the repository are used to represent the same. A total of 38 classes are chosen from the repository. After this stage; the dataset is further split into training, testing and validation phases wherein a total of 60 percent, 20 percent and 20 percent respectively is used in the subsequent stages. Once the data is split; the model undergoes the phase of testing using four algorithms including; CNN, Efficeint-B2, ResNet-50 and VGG-16. After the process of testing the dataset using four algorithms, the system undergoes the process of evaluation; wherein parameters such as accuracy, precision etc. are taken into consideration while deciding the optimized model. Once the parameters are evaluated; the models are compared on the basis of accuracy thus generated. The entire workflow of the proposed model is depicted in figure

4.1 wherein we use CNN and three deep learning based algorithms to detect features in plant leaves

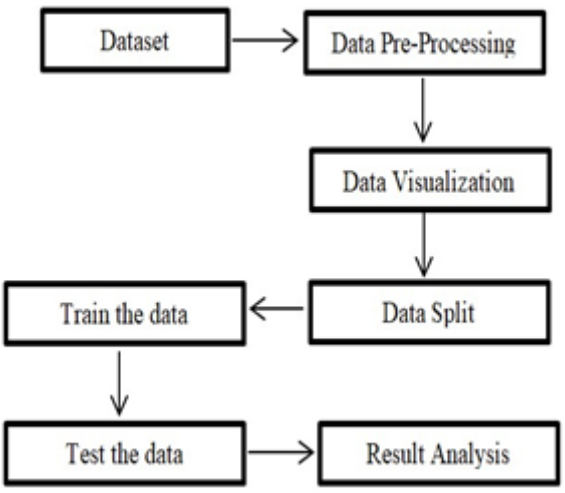


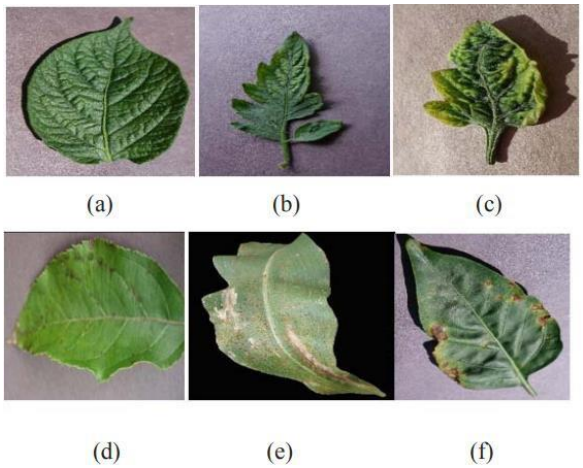
Figure 4.1: Workflow of the Proposed Methodology

A. Dataset Used

The implementation of the system model occurs

by

gathering the dataset from Kaggle repository. This repository contains images of plant leaves from 38 different classes with each class resembling a disease and further comprises of 87k RGB based images. However, the classes and images of plant leaves do not overlap each other. These images of plant leaves contains of 250 images of various different plants having both healthy and diseased images and are further used by multiple algorithms to conduct the process of training and testing phase. Figure 4.2 below



represents a sample from the dataset that consists of 38 classes.

Figure 4.2: (a) Apple scab (b) Raspberry (c) Tomato (d) Soybean (e) Blueberry (f) Cherry

In the next stages, the system is heavily trained so that all the features of the plant images can be determined and further distinguished as either healthy or diseased.

B. Data Pre-Processing

This is an important stage of the system model; wherein the

dataset undergoes a series of process to filter redundant data so that the final implementation can be executed on relevant data. This is done so as to increase the overall efficiency of the model with less time consumption and high accuracy. The step in data pre-processing majorly includes:

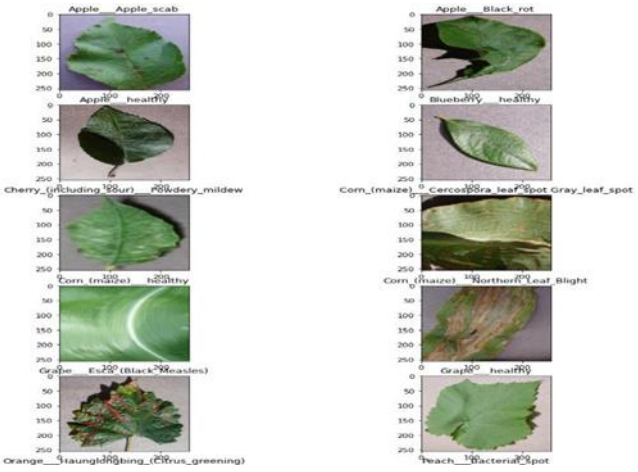
- Labelling the data
- Resizing the image

This tends to increase the resolution thus required for the process of image classification to be performed efficiently. For the purpose of implementation of the proposed thesis; the dataset images of the plant leaves are reduced to a pixel size of 128*128. This is done so as to maintain the overall resolution of all the images thus involved.

C. Data Visualization

The data visualisation method assists in the understanding

of trends by removing historical data from the dataset. Additional details about each attribute of the dataset are frequently provided through bar graphs, pie charts, and other visual representations of this data. Images of the leaves from 38 types of plants are used to visually represent the data for the suggested research. The visualisation of



plant leaves divided into all classes is shown in Figure 4.3 below.

Figure 4.3: Data Visualization of images from each class from the dataset

This process of data visualization can further be depicted using the count plot. The implementation of count plot helps to deduce all the 38 categories of classes by representing it through a bar graph. Figure 4.4 below illustrates a bar graph with 38 classes of plant leaves obtained from the dataset.

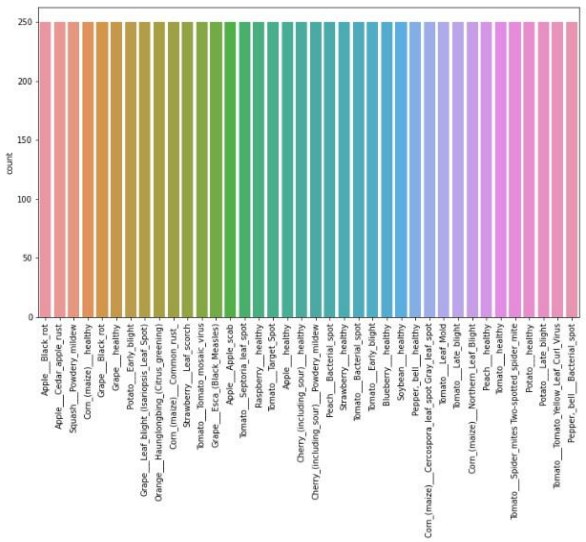


Figure 4.4: Data Visualization of 38 classes using count plot

D. Data Split

Once the process of visualizing the dataset is observed; the

system model thus undergoes the process of data split; wherein the dataset is split into ratios of training, testing and validation phases. For the purpose of implementation of the proposed thesis; the ratio is divided to be as 60 percent, 20 percent and 20 percent respectively. After this split; the system model is then sent for testing purpose onfour predetermined algorithms of CNN, Efficient-B2, ResNet-50 and VGG-16.

V. EXPERIMENTAL ANALYSIS AND RESULTS

For the purpose of evaluation; multiple parameters such as confusion matrix, classification table, sensitivity and specificity are taken into consideration and further employed on four deep learning based algorithms. The definition of the used parameters is as follows:

- Confusion matrix: it is a visual representation of the values so obtained and can further be represented by comparing the actual values with that of the predicted values. Four terms are determined while evaluating a confusion matrix.
  - TP: indicates when the actual values matches with respect to the predicted values
  - FP: indicates when the actual values predicted does not match with that of the real values
  - TN: indicates when the actual values does not matches with respect to the predicted values
  - FN: indicates when the actual values predicted matches with that of the real values
- Classification Table: a classification table consists information on the accuracy so produced; it also provides the values thus obtained from precision, recall and F1-factor. The terms associated with a classification table can be calculated as follows:

Accuracy	$Accuracy = \frac{(TP+TN)}{(TP+FP+FN+TN)}$
Precision	$Precision = \frac{TP}{TP+FP}$
Recall	$Recall = \frac{TP}{TP+FN}$
F1 Score	$\frac{2*precision*recall}{precision+recall}$

Sensitivity: Sensitivity is a ratio that informs the user of the positive values that have been obtained in relation to all instances of negative occurrence in the fraction at hand. It can be calculated using the formula below:

$$\text{Sensitivity} = \frac{TP}{TP+FN}$$

Specificity: A ratio called specificity tells us how often there are negative values compared to positive values in the fraction that is now present. It can be calculated using the formula below:

5.1 Results of algorithms using Confusion Matrix

$$\text{Specificity} = \frac{TN}{TN+FP}$$

The confusion matrix generated by all four algorithms is depicted in figure 5.1 below:

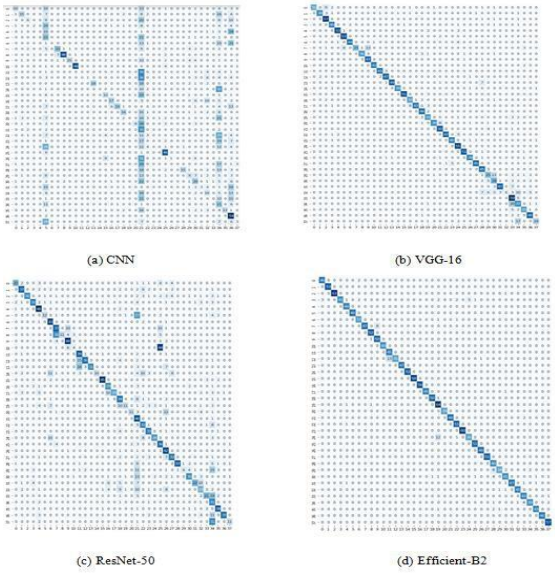


Figure 5.1: Confusion Matrix

A conventional representation of a confusion matrix is usually represented through a block diagram consisting of four blocks with four trained parameters as mentioned previously. However, for the purpose of implementation in the proposed thesis; all the 38 classes thus selected from the dataset are used to represent the same using a confusion matrix.

5.2 Results of algorithms using Accuracy and Loss graphs

A visual representation of the accuracy generated in relation to the error loss is the accuracy vs loss graph. An ideal model is one that exhibits the greatest accuracy with the least amount of error loss. Figure 5.2 below displays the accuracy and loss that were as a result attained through the implementation of various algorithms.

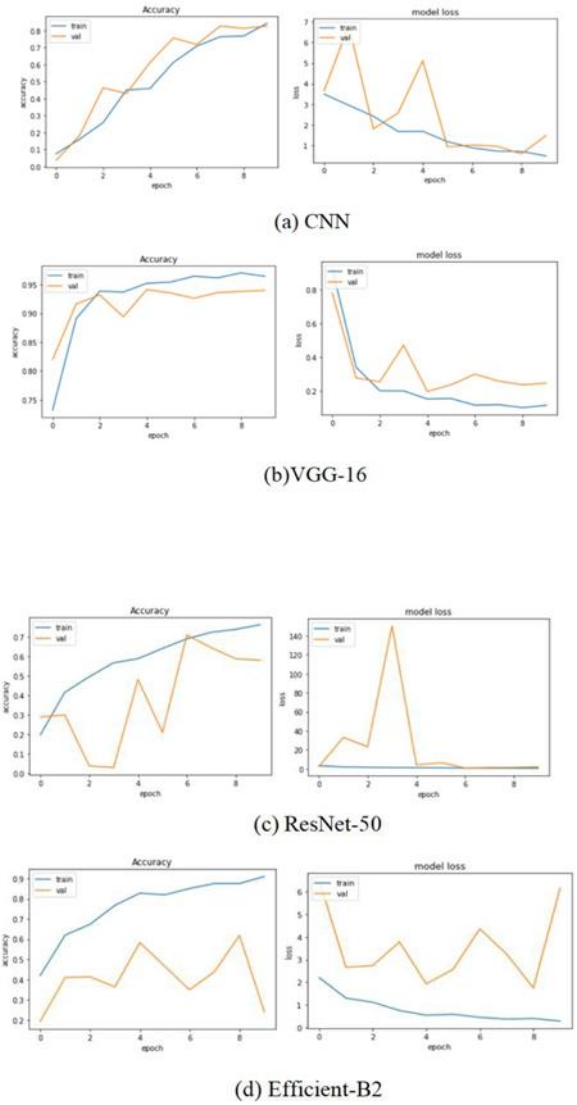


Figure 5.2: Accuracy vs Loss graphs

The graphs above were made using Adam as the optimizer, and each epoch was run ten times. A rise in validation accuracy and a corresponding decline in error loss can be seen in the graph above. However, the dataset that was utilised included images of the plant's leaves.

5.3 Results obtained using Classification Table

A classification report provides in-depth details on the precision, recall, F1 factor, and support values.

Table2: Classification Table

CNN	
Validation_Accuracy	61.78
Validation_Loss	1.7432
VGG-16	
Validation_Accuracy	82.70
Validation_Loss	1.4811
ResNet-50	
Validation_Accuracy	70.99
Validation_Loss	1.0110
Efficient-B2	
Validation_Accuracy	**94.14**
Validation_Loss	0.1954

As observed through the classification table above, it can be deduced that Efficeint-B2 generates highest accuracy of 94 percent in comparison to other algorithms thus experimented. The table above also gives information on the validation accuracy and loss error thus produced. It finally gives the values of precision through which the final accuracy of the model can be declared.

5.4 Results obtained using sensitivity and specificity

The values of sensitivity and specificity generated by all four algorithms are depicted in figure 5.4 below

	class	sensitivity	specificity
0	0	0.997849	0.550000
1	1	0.993489	0.649123
2	2	0.999458	0.545455
3	3	0.995130	0.615385
4	4	0.984873	0.938776
5	5	0.998918	0.230769
6	6	0.981112	0.914894
7	7	0.976113	0.637931
8	8	1.000000	0.207547
9	9	0.988089	0.830189
10	10	0.997832	0.072727
11	11	0.979515	0.866667
12	12	0.996196	0.600000
13	13	1.000000	0.500000
14	14	0.999459	0.188679
15	15	0.997835	0.865385
16	16	0.987097	0.725000
17	17	1.000000	0.500000
18	18	0.976216	0.680000
19	19	0.998380	0.229167
20	20	0.998929	0.343750
21	21	0.929494	0.952381
22	22	0.981612	0.627451
23	23	0.989790	0.846154
24	24	0.996218	0.571429
25	25	0.961144	0.765957
26	26	0.971953	0.913043
27	27	0.989735	0.673469
28	28	0.999457	0.627119
29	29	0.999460	0.122449
30	30	0.994035	0.535714
31	31	0.997830	0.385965
32	32	0.981502	0.370968
33	33	0.995676	0.420000
34	34	0.936695	0.861111
35	35	0.992992	0.844444
36	36	0.999458	0.636364
37	37	0.997844	0.244444

(c) ResNet-50

	class	sensitivity	specificity
0	0	0.998380	0.958333
1	1	1.000000	1.000000
2	2	1.000000	0.984375
3	3	1.000000	0.706897
4	4	0.997845	1.000000
5	5	1.000000	1.000000
6	6	0.997851	0.948718
7	7	1.000000	0.854545
8	8	0.998377	1.000000
9	9	0.995673	0.980392
10	10	1.000000	1.000000
11	11	0.992992	1.000000
12	12	1.000000	0.714286
13	13	0.999460	1.000000
14	14	1.000000	1.000000
15	15	1.000000	1.000000
16	16	1.000000	1.000000
17	17	1.000000	0.978261
18	18	0.999459	0.961538
19	19	0.990185	0.969697
20	20	1.000000	0.972222
21	21	0.999459	0.960000
22	22	0.997835	0.980769
23	23	1.000000	1.000000
24	24	0.997299	0.734694
25	25	0.998378	1.000000
26	26	0.999459	0.960784
27	27	1.000000	1.000000
28	28	0.991398	1.000000
29	29	0.998921	0.739130
30	30	0.996755	0.803922
31	31	1.000000	0.921569
32	32	0.999460	0.937500
33	33	0.996228	0.977273
34	34	0.998921	0.829787
35	35	0.998921	0.914894
36	36	1.000000	1.000000
37	37	0.996744	1.000000

(d) Efficient-B2

	class	sensitivity	specificity
0	0	0.997849	0.550000
1	1	0.993489	0.649123
2	2	0.999458	0.545455
3	3	0.995130	0.615385
4	4	0.984873	0.938776
5	5	0.998918	0.230769
6	6	0.981112	0.914894
7	7	0.976113	0.637931
8	8	1.000000	0.207547
9	9	0.988089	0.830189
10	10	0.997832	0.072727
11	11	0.979515	0.866667
12	12	0.996196	0.600000
13	13	1.000000	0.500000
14	14	0.999459	0.188679
15	15	0.997835	0.865385
16	16	0.987097	0.725000
17	17	1.000000	0.500000
18	18	0.976216	0.680000
19	19	0.998380	0.229167
20	20	0.998929	0.343750
21	21	0.929494	0.952381
22	22	0.981612	0.627451
23	23	0.989790	0.846154
24	24	0.996218	0.571429
25	25	0.961144	0.765957
26	26	0.971953	0.913043
27	27	0.989735	0.673469
28	28	0.999457	0.627119
29	29	0.999460	0.122449
30	30	0.994035	0.535714
31	31	0.997830	0.385965
32	32	0.981502	0.370968
33	33	0.995676	0.420000
34	34	0.936695	0.861111
35	35	0.992992	0.844444
36	36	0.999458	0.636364
37	37	0.997844	0.244444

(c) ResNet-50

	class	sensitivity	specificity
0	0	0.998380	0.958333
1	1	1.000000	1.000000
2	2	1.000000	0.984375
3	3	1.000000	0.706897
4	4	0.997845	1.000000
5	5	1.000000	1.000000
6	6	0.997851	0.948718
7	7	1.000000	0.854545
8	8	0.998377	1.000000
9	9	0.995673	0.980392
10	10	1.000000	1.000000
11	11	0.992992	1.000000
12	12	1.000000	0.714286
13	13	0.999460	1.000000
14	14	1.000000	1.000000
15	15	1.000000	1.000000
16	16	1.000000	1.000000
17	17	1.000000	0.978261
18	18	0.999459	0.961538
19	19	0.990185	0.969697
20	20	1.000000	0.972222
21	21	0.999459	0.960000
22	22	0.997835	0.980769
23	23	1.000000	1.000000
24	24	0.997299	0.734694
25	25	0.998378	1.000000
26	26	0.999459	0.960784
27	27	1.000000	1.000000
28	28	0.991398	1.000000
29	29	0.998921	0.739130
30	30	0.996755	0.803922
31	31	1.000000	0.921569
32	32	0.999460	0.937500
33	33	0.996228	0.977273
34	34	0.998921	0.829787
35	35	0.998921	0.914894
36	36	1.000000	1.000000
37	37	0.996744	1.000000

(d) Efficient-B2

Figure 5.4: Sensitivity and Specificity

For the purpose of implementation in the proposed thesis; all the 38 classes thus selected from the dataset are used to generate values for sensitivity and specificity.

VI. CONCLUSIONS AND FUTURE SCOPE

The primary aim of the research is to detect the presence of disease in plant leaves. For this purpose, we have gathered a dataset of plant images from Kaggle repository and conducted a process of labelling and resizing the image using data pre-processing techniques. In the next stage; the dataset is expected to be split into a ratio of 60, 20 and 20 for the purpose of training, testing and validating respectively. The final implementation of the trained dataset is deployed on four deep learning based algorithm; including the implementation of CNN. The rest three algorithms include VGG-16, ResNet-50 and Efficeint-B2. However, a thorough investigation revealed that CNNs do have some shortcomings and are subject to certain restrictions. The goal of the research is to identify plant infections and further categorise them as normal or infected. This goal is accomplished by doing the research study in two parts, comparing the four models, and determining which model performs better and produces higher efficiency. To fulfil this purpose; evaluation parameters such as confusion matrix, accuracy vs loss graph, sensitivity values, specificity values, precision, f1 score and recall factors were taken into consideration. On experimentation of the proposed research; it was observed that the execution of Efficient-B2 generated an accuracy of 94 percent; which was considered to be as the highest amongst the implementation of the rest three. Hence, the model was declared to be as the optimised model.

On the other hand, a little training dataset might not yield accurate results that are satisfactory. The techniques of augmentation and the use of weak learning algorithms to obtain trained data can be used to further solve this issue. In addition to this, using a Generative Adversarial Network (GAN) for training generation enables the ML architecture to be trained with more distinctive characteristics and more robustness. Hence, this can be concluded to be as the extended study for future scope.

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Study of different algorithms for Book Recommendation System

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Abstract –**As the number of online book readers are exponentially increasing due to online teaching and growing internet-based technology, finding relevant books from a vast e-book space becomes a tremendous challenge for users. Now a days the amount of information on the internet grows very rapidly and people need some relevant tools to find and access appropriate information. One such tool is the recommendation system. Recommendation systems help to navigate quickly and receive necessary information based on the inputs given. The proposed Book Recommendation system would recommend the user books based on their interest or based on the books they have read previously. Also, a feature in the system where a user can get the summary of a page in a book without Reading the whole book.**

Recommender systems are classified according to the techniques used to make a recommendation: Content-based systems, Collaborative Filtering (CF) or Hybrid. Here we elaborate on all the techniques given above and some other machine learning techniques like KNN to make the best recommendation system. With the help of this system one can quickly search for books relevant for the user.

Key Terms - Recommendation System, Machine Learning, Collaborative-Filtering, Content-Based, Hybrid.

I. INTRODUCTION

Any system that automatically suggests information to website visitors is referred to as a recommendation system. These apps are the outcome of intelligent algorithms that may provide consumers recommendations as results. They need a powerful computer system that can conduct computations in less than half a second and a sizable database. So far today, proposals have been made for a variety of solutions. The performance of recommendation algorithms has increased thanks to machine learning, which also offers several options to do so. For the purpose of learning hierarchical representations of data, machine learning techniques employ many processing layers. A personalized recommendation system helps users find books, news, movies, music, online courses, and research articles. Recommender systems are tools that, designed for interacting with large and complex information spaces and prioritizing items that are likely to be interest to the user. An important part of many on-line e-commerce applications like Amazon.com, Netflix, and Pandora is personalized recommendations. Briefly, Recommendation Systems are based on the informational components like: information about user, purchasing or any other similar action. To implement the functions of Recommendation System, identify the items that are preferential to the user a made recommendations based on such preferences. For this, the system has to be able to predict the utility of some of them, or at least compare the utility of some items and decide what items to recommend based on this comparison.

The recommender systems are classifying according to the technique that are employed to made recommendation – collaborative, content-based, hybrid, cross-domain filtering algorithms. Firstly, collaborative filtering uses users' information and opinions to recommend products. It has narrow senses and general senses. It can make automatic predictions based on user preferences by collaborating information from many users in a narrow sense. For example, collaborative filtering could make predictions about a user that television shows a user like or dislike based on partial information of that user. In a general sense, collaborative filtering involves collaborating large volumes of multiple view-point, agents, and sources. It can be applied in mineral exploration, weather forecasting, e-commerce, and web applications where a massive volume of data needs to be processed to make the predictions. The drawback of collaborative filtering is that it needs a tremendous amount of user data, which is realistic for some applications where we do not use information. On the other hand, content-based filtering use objects information and recommendation are made based on object similarity. Generally, content-based filtering is useful when we do not have useful information. The Similarity among the products is considered while recommending. Both supervised and unsupervised machine learning algorithms are applied to measure the Similarity among products. The content can be structured, semi-structured, and unstructured, but it must be synchronized into a structured format to calculate the Similarity. A hybrid recommendation system combines two or more filtering techniques to produce the output. The performance of hybrid filtering is better comparing to collaborative and content-based filtering. Collaborative filtering does not consider domain dependencies, and content-based filtering does not consider people's preferences. A combined effort is required from both collaborative and content-based filtering techniques to make better predictions. The combined effort increases the common knowledge in collaborative filtering with content data and content-based filtering with user preferences. Cross-domain filtering algorithms can access information that belongs to different domains. Cross-domain filtering algorithms make predictions by exploring the source domain and increase the prediction in the target domain.

II. LITERATURE REVIEW

Ms. Praveena Mathew, Ms.bincy kuriakose and Mr. Vinayak hedge [1] proposed a Book Recommendation System (BRS) through the combined features of

content based filtering (CBF), collaborative filtering (CF) and association rule mining to produce efficient and effective recommendation. The existing systems lead to extraction of irrelevant information and lead to lack of user satisfaction. So, they proposing a hybrid algorithm, which combines two or more algorithms, to help the recommendation system to recommend the book based on the buyer's interest. They use association rule mining algorithm, ECLAT (Equivalence class clustering and bottom up lattice traversal). ECLAT will helps to find out the frequent item set. It uses depth first searching technique. In one scan, it will categorise. Cosine similarity is used for the similarity measuring in content and collaborative filtering. They use item-item filtering in collaborative filtering. The basic finding that achieved through this proposed work is to recommend the books based on the buyer's interest and increase the productivity and credibility. Using association rule mining algorithm to finds interesting association and relationship among large data set of books and provides an efficient recommendation for the book.

Yongen Liang and ShimingWan [2] proposed a method, which can mine products by understanding the user's preferences. It is a personalised technology with collaborative filtering. It is book recommendation system, which is for a university library. Here only provide the recommendation service to the registered users. The collaborative filtering uses both user-user filtering and item-item filtering. The important job of the collaborative filtering is to calculate the similarity of the books and users or reader then, recommend. Cosine similarity is using for the similarity measuring in collaborative filtering. Then find out or predict the rating for the particular book, which the targerted user may like or give. One of the most important problems of collaborative filtering is cold start. That is, when a new user joins then they have no data about that user. They have no previous purchase history or borrow history. Therefore, here they propose a solution that Expert and new book recommendation. Expert and new book recommendation module will recommend the books as if Best- selling, new books arrived, classical books... in short, it will recommend the books at the top rating or popular books.

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[3] proposed an efficient and best unique hybrid recommendation algorithm, by providing the recommendation more satisfying the user's desire. Here the hybrid recommendation is a combination of collaborative, content and context based recommendation algorithms. The main input of collaborative filtering is rating i.e, votes of so many people, content based data that is the information about the users like their interest, date of birth, priorities... and the context based data that is the behavioural datas like date, taste, mood, weather... Cosine similarity is using for the similarity measuring. There are subject priorities according to the user's previous history. If they purchase a book then check, the purchased book is different subject priority from the subject priority has already set? If yes, then reset the subject priority3 and then subject priority 2. The subject priority1 will not change. Based on calculations and results they concluded that the proposed Hybrid book recommendation algorithm is best among the others.

Ahmed.M. Omran [4] proposed a Hybrid Recommendation system that will answer for the questions like, which book to buy? Which financial service to choose? Which website to visit next? First phase, collaborative filtering that is based on user behaviour by calculating the statistical correlation between the internet users' profiles using pearson correlation Factor by considering the number of visits to varies websites for each user to estimate the type and the strength of correlation among users. Then, Second phase applies content based filtering according to the content of websites by computing the relative similarity between each pair of websites and build, a pairwise comparison matrix to find the most nearby websites to the most visited users' websites. In collaborative filtering, from the browsing history, collect the websites, which that user visited. Then make the user profile with this data and record how many times that particular user visited in each site. Also make neighbourhood that is, find the similar users to that particular user. Spearman statistical method is the way of finding the users that have a common behaviour. Content based filtering is the second phase. Here by using the text data mining technique that commonly used in content-based technique i.e, TF–representation filter the data to predict items to users determine the similarity between websites by counting the words of the main pages and applying one of the data mining techniques to find the category to which website belongs. There are five criteria to set the similarly of each couple of websites i.e, Category, Service, Language, Rating, and Interactive. The Eucliean distance is using for similarity measuring.

Adli Ihsan Hariadi, and Dade Nurjanah [5] proposed a hybrid- based method that combines attribute based and user personality based methods for book recommender system. In this paper, they are implementing the MSV MSL (Most Similar Visited Material to the Most Similar Learner) method, and they are saying that, it is the best method among hybrid attributes based methods. The personality factor is used to find the similarity between users when creating neighbourhood relationships. The hybrid attribute will calculates the recommendation scores of rated books from neighbours using the similarity scores between a target book and its neighbours and between the active user and that user's neighbours. The score of book b from user u, denoted as score_b. This is for finding the Most Similar Visited Material to the most Similar Learner. It uses the values from both content and collaborative. Then use the result of hybrid as recommendation. That is the Most Similar Visited Material to the most Similar Learner.

Anand Shanker Tewari, Abhay Kumar and Asim Gopal Barman [6] proposed a book recommendation system based on combined features of content filtering, collaborative filtering and association rule mining. When

a buyer search for a book, then it will be store as a purchase history or a search history. When the buyer is offline the recommendation perform some filtration for recommending to buyer and the results are stored in the buyers web profile. When the buyer comes online next time, the recommendations will be generated automatically. In content based filtering, web Usage Mining (WUM) is used to provide relevant information to the buyers. web Usage Mining (WUM) typically extracts knowledge by analyzing historical data such as web server access logs, browser caches, or proxy logs. It helps to possible to model user behaviour and, therefore, to forecast their future movements. web Usage Mining stores the user's behaviour on the internet and processes that data. Item based collaborative recommendation Algorithm is using and Cosine similarity is using for the similarity measuring. Intersect the results from the association rule mining and the content, collaborative filtering.

Binge Cui and Xin Chen [7] proposed a novel book recommendation system. The readers will be redirect to the recommendation pages when they cannot find the required book through the library bibliographic retrieval system. It is an online book recommendation system for a library and it is based on web service. After login, a user search for a book with keywords like a book title, or with author name... at that time bibliographic retrieval system will search for books with the same keywords. If found any result in the recommendation system, then send these keywords to web Books Retrieval Module. In web Books Retrieval Module, it search on the online bookstore based with keywords by creating accounts on these online book stores like amazon... by the librarian or the admin of the online book recommendation system. Therefore, when the keyword comes to the web retrieval module, it searches as user on these online bookstores by login in. The result getting from these online bookstores will give to the user as recommendation results. According to the recommendation from users, the statistic and analysis module will calculate the value of that particular book. Then according to this value of book, the Auto-Order Module will produce a book order automatically based on the analysis results. When the purchased books have shelved, Book Storage System will send a report to the Short Message and Email Notification Module. Then it will notify the readers that have recommended the purchased books using Message and Email server.

Kumari Priyanka, Anand Shanker Tewari and Asim Gopal Barman [8] Personalised Book Recommendation System Based On Opinion Mining Technique. An online book recommendation; especially consider the specific features of the book that a particular user already purchased. Here, not only consider the feature but also consider the reviews given by the user for the books. So, here uses the technique that opinion mining or sentiment analysis to classify the reviews or comments from the different users for different book into positive or negative. For this, naïve bayes algorithm will perform the text classification. The classification of the review will helps to identify the user's preference and the books rating.

III. PROPOSED SYSTEM

Existing recommendation services despite their powerfulness need a strong user profile information and history. User register to such systems, browse books, rate them, write their feedbacks, recommend to others, share, read appropriate information and etc. Based on such an information a system makes its recommendations. The examples of such services are whichbook.net, whatshouldireadnext.com, lazylibrary.com and etc. Instead our recommender system focuses on simplicity and speed. A user, using an intuitive search and filtering interface updates a database by rating the books and then gets appropriate recommendations. The recommendations in turn are calculated based on collaborative filtering method.

IV. METHODOLOGIES

Collaborative Filtering Technique: Collaborative filtering[CF] technique focuses on the relationship between users and items. It is a technique that can filter out items that a user might like on the basis of ratings given by the other users and recommends the top-n similar items to the item given by the user. The similarity of items is determined by the similarity of the ratings of those items by the users who have rated both items.

Item-based Collaborative Filtering Technique: Item-based collaborative filtering was developed by Amazon. In an existing system where there are more users than items, item-based filtering is faster and more stable than user-

based. This algorithm uses a similarity measure to find

similarity between items. Steps involved in this algorithm: Step 1: Develop a user-item interaction matrix from the merged dataset as shown in the fig.1 and generate vectors from it. Here the item refers to a book.

Step 2: Now construct a cosine matrix using cosine similarity from vectors.

Step 3: From cosine matrix find the books similar to the book given by the user

Step 4: Recommend the top 'n' similar books Suppose we have n users set[7] U={user1,user2,....,usern} and m Books set B={book1,book2,...,book m}.User-item matrix is mxn matrix and values will be the ratings. Vectors will be the book1,book2,..,book m. Similarity between the books is calculated.

Cosine Vector Similarity(CVS): Cosine similarity is the cosine of the angle between two vectors and it is used as a distance evaluation metric between two points in the plane. The cosine similarity measure operates entirely on the cosine principles where with the increase in distance the similarity of data points reduces.

Cosine similarity finds its major use for character types of data wherein with respect to machine learning cosine similarity can be used for various classification data and helps us to determine the nearest neighbors when used as an evaluation metric in the KNN algorithm.Cosine similarity in the recommendation system is used with the same principle of cosine angles, where even if the

similarity of the content is less similar it would be considered as the least recommended content, and for higher similarity of contents, the recommendations generated would be at the top.

Cosine Vector Similarity is the dot product of the two data points(vectors).It measures the cosine angle between the objects i.e vectors.

Where, A=book1(vector1) B=book2(vector2) Ai=rating

given to the book 'A' by a user 'i' Bi=rating given to the book 'B' by a user 'i' Where, A=book1(vector1) B=book2(vector2) Ai=rating given to the book 'A' by a user 'i' Bi=rating given to the book 'B' by a user 'i'

$$similarity(A,B) = \frac{A \cdot B}{\|A\| \times \|B\|} = \frac{\sum_{i=1}^{n} A_i \times B_i}{\sqrt{\sum_{i=1}^{n} A_i^2} \times \sqrt{\sum_{i=1}^{n} B_i^2}}$$

Where, A=book1(vector1) B=book2(vector2)

Ai=rating given to the book 'A' by a user 'i'

Bi=rating given to the book 'B' by a user 'i'

Recommendation systems in machine learning are one such algorithm that works based on the similarity of contents. There are various ways to measure the similarity between the two contents and recommendation systems basically use the similarity matrix to recommend the similar content to the user based on his accessing characteristics.

So any recommendation data can be acquired and the required features that would be useful for recommending the contents can be taken out from the data. Once the required textual data is available the textual data has to be vectorized using the CountVectorizer to obtain the similarity matrix. So once the similarity matrix is obtained the cosine similarity metrics of scikit learn can be used to recommend the user.

Euclidean Distance Similarity(EDS):The Euclidean distance between two points is the length of the line segments connecting them.Euclidean space in this particular case is the positive portion of the plane where the axes are the ranked items and the points represent the scores that a particular person gives to both items. Two people belong to a certain preference space if and only if, they have ranked the two items that defines the preference space. So define a preference space for each pair of distinct items, and the points in this preference space, are given by the people that ranked the two items.

Euclidean Distance Similarity(EDS) is based on the distance between two vectors. EDS measure compares absolute values and determines that the best variant of similar vectors is two absolute identical vectors with zero distance between them.

$$d(p, q) = \sqrt{\sum_{i=1}^{n} (q_i - p_i)^2}$$

Weighted-Average: Weighted average is a calculation that takes into account the varying degrees of importance of the numbers in a data set. In calculating a weighted average, each number in the data set is multiplied by a predetermined weight before the final calculation is made. A weighted average can be more accurate than a simple average in which all numbers in a data set are assigned an identical weight.

$$W = \frac{Rv+Cm}{v+m}$$

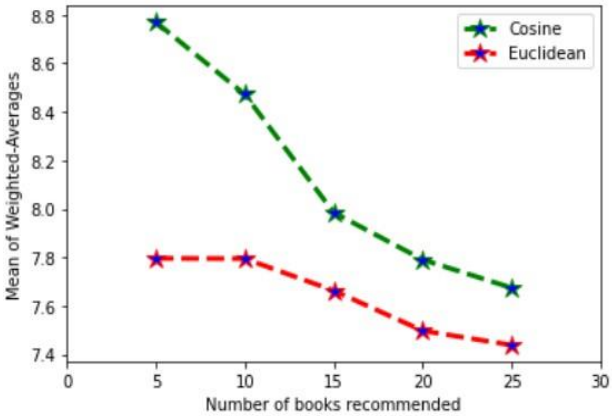
where, W=weighted-average score R=average rating for the book v=number of ratings for the book

C=the mean value of average-rating of all the books m=minimum ratings required to get recommend

V. RESULTS

Based on the information records of 278858 users, 242135 books, 1149780 ratings from the good read books Kaggle datasets, unsupervised machine learning model i.e. collaborative filtering technique .The following takes the book title "Harry Potter and the Sorcerer's Stone (Harry Potter (Paperback))" as an example input to show our proposed system recommended books as shown in the and also to compare the performance of similarity measures.

.Performance Comparison: The diagram below illustrates the performance of two similarity measures CVS and EDS in terms of weighted average of ratings with a varying number of recommendations. Same input book is given to both the measures and CVS is recommending the books with more rating than EDS and also as the size of the recommended books increases, weighted-average value for both similarity measures is decreasing. Finally, from the figure below, it is clear that the performance of collaborative filtering[CF] technique is better when CVS measure is used rather than EDS.



Evaluation Metric: Evaluation metrics are used to evaluate learning algorithms and form an important aspect of machine learning. In recommendation, we are predicting output, the error measures are fairly different here. As usual, the error metrics are obtained by comparing the predictions of the models with the real values of the target variables and calculating the average error.

Root Mean Square Error(RMSE): To compute the RMSE, we first take the square of the difference between the actual and predicted values of every record. We then take the average value of these squared errors. If the predicted value of the ith record is y(i) and the actual value is x(i), then the RMSE is:

$$\text{RMSE}=\sqrt{\frac{\sum_{i=1}^{N}(x(i)-y(i))^2}{N}}$$

Where, N=number of datapoints

The merged dataset is divided into 20% test data i.e.

206255 and 80% train data i.e. 825018, RMSE value is

7.9727.

VI. CONCLUSION

A Recommendation System is an act of trying to regulate the future work of the E-commerce industry. The prediction of user's interest of books or any other item could yield remarkable profit and change in the field of decision-making, retail business, hotel business, tourism, digital content, movie databases. From this literature survey, we found that, the most suitable algorithm for predict books for users by considering their preference and by avoiding cold start problem is, the item based collaborative filtering with opinion mining on reviews. This algorithms will be a great benefit for users as well as the owner.

As it is difficult for people to select the best books from a large set of books ,this paper provides a modern solution i.e. a book recommender system based on item-based collaborative filtering[CF] technique which provides relevant

recommendations. This paper also shows that using cosine

similarity as a similarity measure gives best results when compared to euclidean distance, as euclidean distance gives the similarity value even if there exists null values. The CSV gives the best results when the null values are not present in the dataset. RMSE score is 7.9727.

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Prevention and Prediction of Anemia disease using machine learning algorithms

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Abstract—**Anaemia is one of the common disorder based on Haematological by affecting humanity and it is usually seen in pregnant women and children. This disease has a negative impact on quality of life and sometimes in survival of patients. Mostly people don't know the nutritional food they are required what are the nutritional fruits and vegetables should have. The proposed work is a web application, intended to create awareness and predict anaemia in people and then recommending various methods and diet plans gathered from hospitals to prevent anaemia from happening ever again and as a precautionary element for other people who might get affected from anaemia in future. The prediction is done using 3 popular algorithms (Random Forest, Knn and Naïve bayes). Based on these 3 algorithms a hybrid system is created to predict most accurate prediction for anemia patients using CBC report. CBC report includes Gender, Haemoglobin, MCH, MCHC and MCV which are enough to predict anemia. This proposed work also helps in building the diet and helping in maintaining the diet.**

Keywords—Anaemia, CBC, Random Forest, Naïve Bayes Classifier, Anemia Prediction, Anaemia Disease Prediction, HealthCare website, AI based prediction, etc.

I.INTRODUCTION

Anaemia is highly prevalent in India. The third National Family Health Study (NFHS-3) conducted during 2005–6 found that amongst children aged 6 to 59 months, the prevalence of anaemia is 69.5%; in rural India, the prevalence is 71.5%. The prevalence is maximal amongst younger children (12–17 months – 84.5%, 18– 23 months 81.6%). The prevalence of anaemia in rural areas appeared to have risen since the previous NFHS (in 1998–9) [1]- [2]. Anaemia is one of the common disorder based on Haematological by affecting humanity and it is usually seen in pregnant women and children. This disease has a negative impact on quality of life and sometimes in survival of patients. Mostly people don't know the nutritional food they are required what are the nutritional fruits and vegetables should have [3]. The proposed work serves as platform where a user can get info of food which are rich in nutrition components. When a user visits the portal, they can select a particular food item categorized in different sections like protein, vitamins, carbohydrates etc. It also shows dishes related to that food like paneer dish is palak paneer which is rich in iron and protein. Proposed Work Portal also shows information related to anaemia disease through which user can gain the information needed to diagnose himself/herself.

Suggestions and nutritional tips will also be provided for better self-treatment. For an enhanced treatment at home tutorial videos for consuming nutritional food and quality talks from doctors around the world in the field of anaemia is also a part of the proposed work. Facility to book an appointment with a doctor from top hospitals around the world is being included to help user in contacting doctors researching widely in the field of anaemia. As an addon a feature called "talk to us" is being provided so that a user can express his/her thoughts or can interact directly with experts in the field of anaemia is mostly caused due to lack of iron deficiency in children 11- 14 years.

This proposed work also includes Prediction using machine learning which is most important feature of our project. The dataset is collected from Kaggle and various healthcare website to examine the performance of Naive Bayes, Random Forest, and KNN algorithms for predicting anemic disease. The dataset Includes more than 1.2 lakh records

II.LITERATURE SURVEY

Based on the survey we found some research paper [4]-[10] and found that there is no existing system for anaemia. There are some initiatives for the Anaemia projects, but the required system is not developed and there only research paper about the proposed work but no live system which helps user for guidance about anaemia and nutritional food.

Some Web apps are available for disease but the app is not specified to anaemia because it includes lots of disease. Similarly, some websites are there with old technologies which are not attractive and detailed about anaemia. So, after this survey we have taken initiative to develop an attractive and fully detailed and dynamic website for user regarding anaemia and nutritional food. Along with this we found many papers which provides algorithm for predicting anemia but they have not implemented it on any website. So, in our project we will implement these algorithms for anemia prediction. We are also making a hybrid system using various algorithm to make more accurate prediction.

III.METHODOLOGY

A. Reason to create this project

Based on research what we found that Anaemia is most common disorder but there is no website in existing system to aware the people about anaemia. So, to make people aware about anaemia and advising them about symptoms, diagnosis, prevention about anaemia and guidance about the diet we initiated an approach to solve all issue regarding anemia using our proposed work.

B. How we built this project

At first, we created a design of all the component of proposed work using figma.

After completion of design, we started implementation of proposed work using the MERN Stack. Here ReactJs

is used for frontend implementation with some extra technologies like bootstrap, Sass, CSS, html. ExpressJs and Nodes are used for backend implementation and MongoDb used for Database Management

Fig 1. Home page

The prediction part is executed using Python and

FastApi technology.

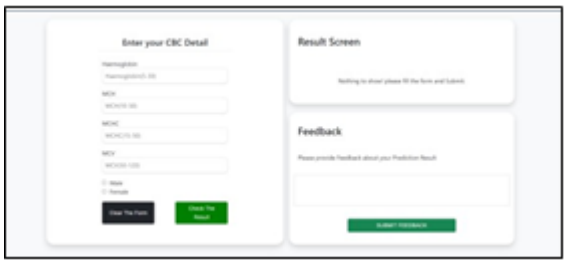


Fig 2. Input and output screen for Prediction

All propped work is divided into 4 members where

2 members are involved in fronted development and other 2 members in backend development.

Side by Side members are involved in research and documentation for proposed work.

After implementation of each component the testing conducted each time and at last after final testing of whole project, the proposed work is deployed on Heroku.

C. Features of proposed work includes

1) Anaemia details: This component includes all types of Anaemia disease along with the particular anaemia details, which includes symptoms, diagnosis, prevention, treatment etc. Along with this there is recommendation for food diet, which is recommended based on anaemia type.

2) Nutritional guide: This component includes all type of nutrients. Each nutrients contains many food items. Which contains all the details about the that food item. Which helps user to understand about nutrition diet.

3) *Hospital appointment:* This component includes list of many hospitals where a user can take appointment in nearby hospital.

4) Prediction: This component includes prediction using machine learning algorithm which helps in knowing if a particular user is suffering from anemia or not. The prediction done based on hybrid system and alterative pair average of result is taken to find most accurate prediction.

5) *Chatting system:* When user is in doubt and want to ask any query to other user then they can use chatting system to take advice from other users.

6) *Services and guidance:* Here we have shown services and also list of doctors which will be available for guidance if there is any query. A user can just call any doctor for is problems.

7) *Tutorials:* We have added some tutorial

about anaemia types with its all information and health Tips

8) *Parameters:* For prediction we have used CBC report which includes MCH, MCV MCHC, Haemoglobin and these parameters are also displayed in our proposed work with normal range.

9) *Suggestion for anemia positive patients:* When our system predicts anemia positive for entered CBC report then it also show suggestion to follow the path for treatment.

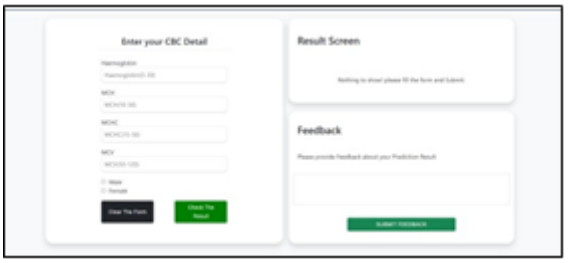
IV.DATASET

The following table contains 122k dataset for anemia patients.

G	Hb	MCH	MCHC	MCV	result
0	8.88	38.37	39.64	71.17	1
1	10.34	26.27	37.24	78.18	1
0	11.33	29.23	35.54	80.03	0
1	16.55	27.12	34.12	91.35	0
0	10.4	23.32	38.49	105.46	1
1	18.59	21.38	32.55	101.33	1
0	12.27	31.41	34.22	99.17	0
1	16.72	28.25	35.2	82.39	0
0	5.98	10.6	40.1	101.51	1

Table 1. Dataset of CBC report

A. Steps for creation of model



Data Collection

Pre-processsing

Training & Testing

Building Hybrid model

Predicting anemia Disease

more 1,22,000 records,

In the result column 1 indicates anemia positive and

0 indicates anemia negative.

V.OUTCOME

As part of eliminating anaemia, a prediction model is necessary as it would help users to know if they are suffering from anaemia or not thereby also reducing the cost of visiting a pathogen lab for specialized test of anaemia which costs around 10 times than normal blood test [11]. However, as anaemia is a disease which is caused due to decrease in the count of red blood cells (RBCs) or haemoglobin in the blood, it is required to have a blood report for the prediction model to work and predict the prevalence of this disease in a particular person [12].

When it comes to prediction model, there were three choices to choose from 1. Naïve Bayes Classifier 2. Random Forest 3. KNN Classifier, out of which, Random Forest yields the best result with the most accurate result among the three [7]. Since a prediction for anemia disease should be accurate so, we are not just using a single algorithm for prediction. In our project we are using hybrid algorithm based on above algorithms.

As far as data pre-processing is concerned, training data is collected from various pathogen labs, as a result training data is new and fresh as opposed to getting old and inaccurate data from a data repository. The dataset collected from Kaggle and various healthcare websites which contains CBC test data which gives overall data that is required for the prediction algorithm i.e., Gender, MCV, MCH, HGB, and MCHC.

These are the steps taken for the successful creation of machine learning model.

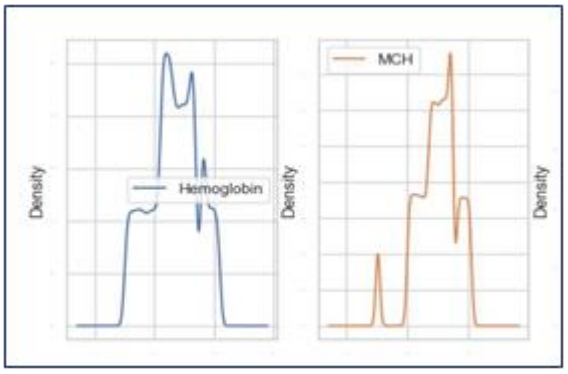


Fig 4. Data Distribution for Hb and MCH

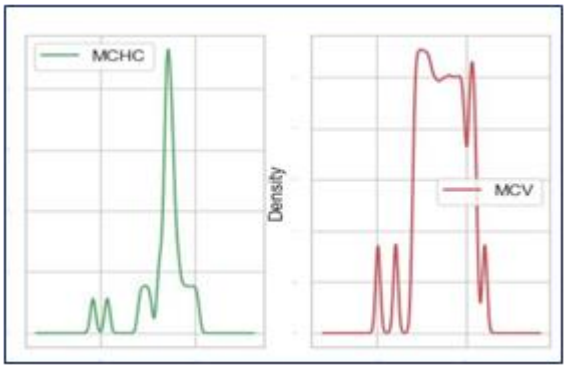


Fig 5. Data Distribution for MCHC and MCV

	Gender	Hemoglobin	MCH	MCHC	MCV	Predicted Result
0	0	6.9	28.1	32.5	94.6	1
1	1	11.8	16.3	30.9	78.7	1
2	1	11.0	26.0	32.2	98.9	1
3	1	11.0	25.2	30.9	83.2	1
4	0	10.7	21.3	29.1	78.7	1
5	1	16.2	17.2	32.2	78.4	1
6	1	15.0	30.0	34.0	90.0	0

Fig 6. Prediction of sample data

We show This result in our website Screen as seen below.

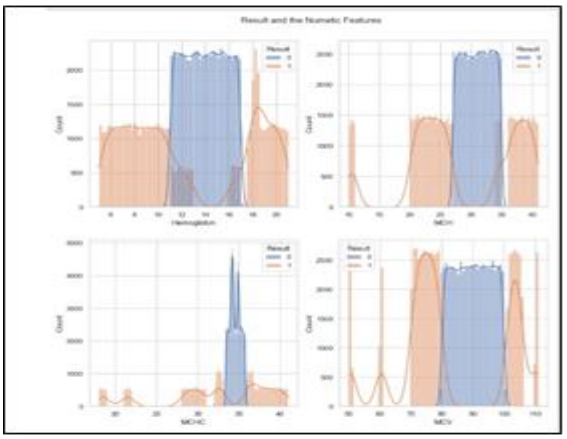


Fig 7. Finding relation between the Result and the numeric features

When user enters CBC report then we check the probability of all 3 algorithm for this input data.

Then we make pair of algorithms for prediction like (Knn, Random Forest), (Random Forest, Naive bayes) and (Knn, Naïve Bayes). After this we store prediction output separately for all pair. Along with this a combination all three algorithm is used for prediction.

```
# Loading up the all trained model
rf = pickle.load(open('../model/rf.pkl', 'rb'))
knn = pickle.load(open('../model/knn.pkl', 'rb'))
nb = pickle.load(open('../model/nb.pkl', 'rb'))

# storing prediction result for all algorithms
rfPred = rf.predict(sample).tolist()[0]
knnPred = knn.predict(sample).tolist()[0]
nbPred = nb.predict(sample).tolist()[0]

# stroing paired result of alogirthm to make hybrid alforithm
rfAndKnn=(rfPred+knnPred)/2;
rfAndNb=(rfPred+nbPred)/2;
knnAndNb=(knnPred+nbPred)/2;
rf_knn_nb=(rfAndKnn+knnAndNb+rfAndNb)/3

# taking avg of all paired output for final result
FinalPred=((rfAndNb+rfAndKnn+knnAndNb+rf_knn_nb)/4)*100;
```

Fig 8. Making Hybrid prediction

Finally, we have 4 results. We calculate the average of all result. If our result is 100% then report is anemia positive and when result is 0% then report is normal i.e., anemia negative. But as we are using hybrid algorithm with four results so percent can be in between 0-100%. So, while showing output in web screen, there is a condition, if result is greater than 50% then its anemia positive else anemia negative.

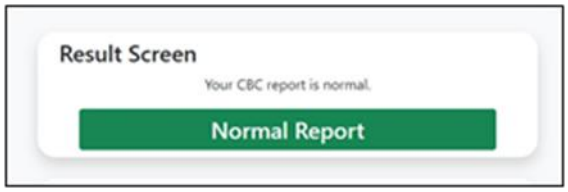


Fig 9.1 Data of patient's report

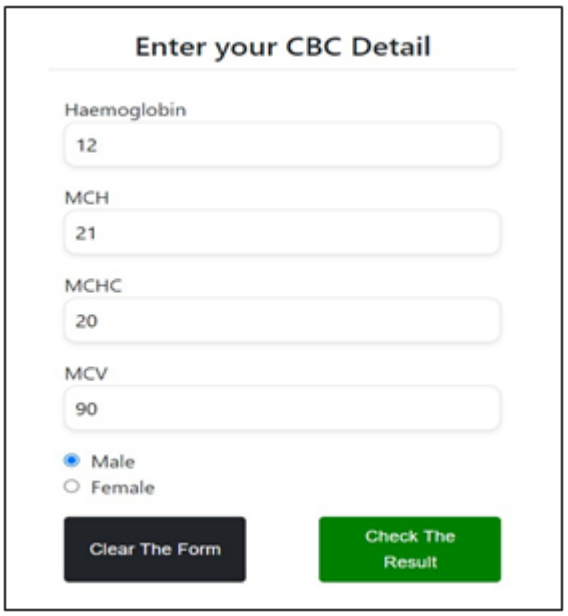


Fig 9.2 Showing Prediction for negative anemia

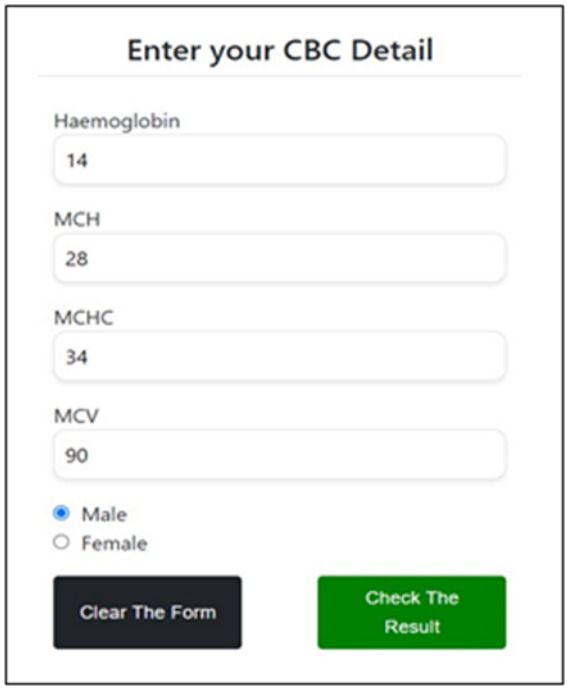


Fig 10.1 Data of new patient's report

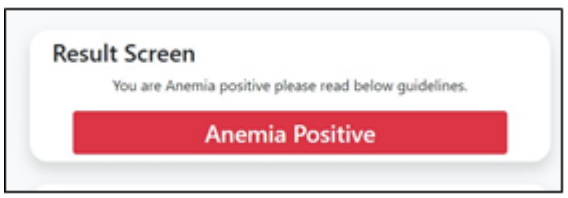


Fig 10.2 Showing Prediction for positive anemia

VI.RESULT

Our proposed work successfully predicts the accurate data for anemia disease. When CBC report is entered then combination of 3 algorithms used which are random Forest, Naïve Bayes and Knn algorithm. If one of them predicts wrong then output is 66.66% which mean anemia is positive. and if all algorithm predicts positive anemia, then output is

100%. When all predict anemia negative, then

output is 0% which mean anemia is negative. In some case when only 1 algorithm predict anemia positive and 2 algorithm predicts anemia negative then output is 33%, which means anemia is negative.

We have used combination of all algorithm which makes it Hybrid system. This hybrid System predicts more accurate result. User is allowed to provide the feedback about our hybrid system and this all feedbacks are listed on our project for making trust with users.

Along with this many features of our project helps in spreading anemia awareness. The Tutorials and Services are provided for user support and Doctor's contact are listed for 24/7 guidelines. Anemia Types and their details like symptoms, prevention, diagnosis, treatment and food item suggestion helps in getting knowledge about anemia. Nutrition food page helps user to aware about all the nutrients which exist and based on nutrients user can see food items rich in that selected specific nutrient. The Detail about each food item is also given for more clarification about food. Hospital appointment feature helps user to directly connect with hospitals and they can easily take appointments in hospitals.

The Technology used in projects successfully makes our project faster to response and quicker to load. The prediction time take only two second for showing results and recommendations.

VII.FUTURE SCOPE

Eliminating anaemia is the main motto of our project which is also the major problem in this world deficiency of nutrients in red blood cell leads to anaemia. This is because lack of awareness people doesn't know what to eat and when to eat it's really important so that people have important and also defeat this anaemia. We have learnt lots of things about anaemia and how to make an effective website which help others to grab information.

In future, proposed work will not only predict the anemia but also it will predict the type of anemia. The user will be able to store the all the result in their account. The user will also be able to take print of their report with all remarks and reasons for the prediction. Based on the type of anemia the food items will be recommended.

In future, proposed work is planned to be shaped in an android app which will be made using Android Studio. A constructive design is already in creation which is planned to take on Material UI concept with dynamic theming support as present in android 13's Material You concept. Data will be fed in using the same API created for the website. Volley API will be used to fetch data from the API and will be populated accordingly. MVC architecture will be followed for the same. For now, Android Studio is in consideration but according to

team's future decision Flutter might be used. If design of android app is not as we thought of then a switch to React Native will be required as designing is easier with React Native. An IOS app is also in consideration which will be made using X-Code. IOS app is still a decision which will require team's collective thinking and effort.

VIII.CONCLUSION

The proposed work is based on anemia awareness and anemia disease Prediction. For prediction we have compared various machine learning prediction model for predicting whether a patient has anemia or not. Out of which we found random forest, Knn and Naïve byes as fast and accurate models. We used all of three model appointment with a doctor from top hospitals around the world is being included to help user in contacting doctors researching extensively in the field of anaemia. As an add-on a feature called "talk to us" is being provided so that a user can express his/her thoughts or can interact directly with experts in the field of anaemia. Also, we are bringing the awareness among community to help understand the disease better and provide info regarding nutritional foods which plays a major role in applied field. Other additional features have been included in the proposed work to further improve the pace of eliminating this plaguing disease among the society.

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for making a hybrid model which make the prediction more accurate.

This proposed work also highlights Nutritional Food with specific nutrients. User is allowed top filter the nutrient, so that based on nutrients he can get foot items. This proposed work also helps in building their diet and helping in maintaining their diet for an enhanced treatment at home tutorial videos for consuming nutritional food and quality talks from doctors around the world in the field of anaemia is also a part of the proposed work. Facility to book an

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Assessing the Performance of Genetic Algorithm in Solving AC-DC Optimal Power Flow Problem

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Abstract- **In the past decades, electricity markets have significantly restructured in both developed and developing countries. In it, Optimal Power Flow (OPF) is emerging as the main function of power generation, operation and control. OPF is an optimization problem, in which the utility strives to minimize its generation costs while satisfying all its equality and inequality constraints, while the system is operating within its security limits.**

In recent years, the incorporation of subsets of transmission High Voltage Direct Current (HVDC) in AC transmission networks brought significant techno-commercial changes in the transmission of the electric power in developing countries. This paper aims at (1) presenting Genetic Algorithm approach to solve OPF, (2) problem formulation with incorporation of HVDC link in a AC transmission system, (3) demonstrating the proposed methodology for standard power system and (4) to assess the performance of GAOPF with the traditional OPF method. The paper concludes that the proposed scheme is effective for power systems.

Index Terms – Optimal Power Flow, Genetic Algorithms, HVDC transmission

I. INTRODUCTION

In electrical power systems, Optimal Power Flow (OPF) is a nonlinear programming problem, used to determine generation outputs, bus voltages and transformer tap with an objective to minimize total generation cost [1]. Presently, application of OPF is of much importance for power system operation and analysis. In a deregulated environment of electricity industry, OPF recently been used to assess the spatial variation of electricity prices and transmission congestion study etc [2].

In most of its general formulation, the OPF is a nonlinear, non-convex, large-scale, static optimization problem with both continuous and discrete control variables [3]. It is due to the presence of nonlinear power flow equality constraints. The presence of discrete control variables, such as switchable shunt devices, transformer tap positions, and phase shifters etc., complicates the solution [2]. However, they are not assured to converge to the global optimum of the general nonconvex OPF problem, although there exists some empirical evidence on the uniqueness of the OPF solution within the domain of interest [4].

Effective OPF is limited by the high dimensionality of power systems and the incomplete domain dependent knowledge of power system engineers. Numerical optimization procedures addressed the former one based on successive linearization using the first and the second derivatives of objective functions and their constraints as the search directions or by linear programming solutions to imprecise models [5-9]. The advantages of such methods are in their mathematical underpinnings, but disadvantages exist also in the sensitivity to problem formulation, algorithm selection and usually converge to a local minimum. The lateral one precludes also the reliable use of expert systems where rule completeness is not possible.

Since OPF was introduced in 1968 [10], several methods have been employed to solve this problem, e.g. *Gradient base, Linear programming* method [11] and *Quadratic programming* [12]. However, all these methods suffer from problems. First, they may not be able to provide optimal solution and usually get stuck at a local optimal. Some methods, instead of solving the original problem, solve the problem's Karush–Kuhn–Tucker (KKT) optimality conditions. For equality-constrained optimization problems, the KKT conditions are a set of nonlinear equations, which can be solved using a Newton-type algorithm. In Newton OPF [13], the inequality constraints have been added as quadratic penalty terms in the problem objective, multiplied by appropriate penalty multipliers. Interior Point (IP) method [14-16], convert the inequality constraints to equalities by the introduction of nonnegative slack variables. A logarithmic barrier function of the slack variables is added to the objective function, multiplied by a barrier parameter, which is gradually reduced to zero during the solution process. The unlimited point algorithm [17] uses a transformation of the slack and dual variables of the inequality constraints, converts the OPF problem KKT conditions to a set of nonlinear equations, thus avoiding the heuristic rules for barrier parameter reduction required by IP method. Recent attempts to overcome the limitations of these mathematical programming approaches include the application of simulated annealing-type methods [18-19], and genetic algorithms (GAs) etc., [20-21].

GAs are essentially search algorithm based on mechanics of nature and natural genetics [22]. They combine solution evaluation with randomized, structured exchanges of information between solutions to obtain optimality. GAs are a robust method because restrictions on solution space are not made during the process. The power of GAs stem from its ability to exploit historical information structures from previous solution guesses in

an attempt to increase performance of future solutions [23]. GAs have recently found extensive applications in solving global optimization searching problem when the closed form optimization technique cannot be applied. GAs are parallel and global search techniques that emulate natural genetic operators. The GA is more likely to converge toward the global solution because it, simultaneously, evaluates many points in the parameter space. It does not need to assume that the search space is differentiable or continuous [24]. In [25], the Genetic Algorithm Optimal Power Flow (GAOPF) problem is solved based on the use of a genetic algorithm load flow, and to accelerate the concepts, it is proposed to use the gradient information by the steepest decent method. The method is not sensitive to the starting points and capable to determining the global optimum solution to the OPF for a range of constraints and objective functions. In Genetic Algorithm approach, the control variables modeled are generator active power outputs and voltages, shunt devices, and transformer taps. Branch flow, reactive generation, and voltage magnitude constraints have treated as quadratic penalty terms in the GA Fitness Function (FF). In [21], GA is used to solve the optimal power dispatch problem for a multi-node auction market. The GA maximizes the total participants' welfare, subject to network flow and transport limitation constraints. The nodal real and reactive power injections that clear the market are selected as the problem control variables.

The GAOPF approach overcomes the limitations of the conventional approaches in the modeling of non-convex cost functions, discrete control variables, and prohibited unit-operating zones. However, they do not scale easily to larger problems, since the solution deteriorates with the increase of the chromosome length, i.e., the number of control variables.

In the coming years, power consumption in developing and transition countries is expected to more than double, whereas in developed countries, it will increase only for about 35-40%. In addition, many developing, and transition countries are facing the problems of infrastructure investment especially in transmission and distribution segment due to fewer investments made in the past. To reduce the gap between transmission capacity and power demand, the trend is to adopt HVDC transmission system in the existing AC networks to gain techno-economical advantages of the investment. In such scenario, it is obvious to address this trend to design optimal power flow scheme for a real network system. In this paper full ac-dc based GAOPF is developed. This methodology also discussed the redesign of fitness function by refining penalty scheme for system constraints to get faster convergence. This avoids the necessity to perform early load flows as reported in several literatures [1-3, 9, 22].

After this introduction, section II presents the ac-dc based optimal power flow formulation. The Genetic Algorithm methodology is explained in section III. The performance of AC-DC based GAOPF is assessed and demonstrated with the IEEE 6-Bus, IEEE14-Bus, IEEE 30-Bus test systems and a complex and real network power system of India in section IV. Finally, the conclusions are presented in section V.

II. II. AC-DC OPTIMAL POWER FLOW FORMULATION

Problem Formulation:

As has been discussed, the objective function considered in this paper is to minimize the total generation cost. OPF formulation consists of three main components: objective function, equality constraints, and inequality constraints. The methodology is as follows,

AC System Equations

Let P = (p_1,…..,p_n) and Q = (q_1,…..,q_n) for a n buses system, where p_i and q_i be active and reactive power demands of bus-i, respectively. The variables in power system operation to be X = (x_1,….,x_m), such as real and imaginary parts of each bus voltage. So the operational problem of a power system for given load (P, Q) can be formulated as OPF problem [26]

Minimize f (X, P, Q) for X (1)

Subject to S (X, P, Q) = 0 (2)

T (X, P, Q) $\leq$ 0 (3)

Where S (X) = (s_1(X, P, Q),…….,s_{n1} (X, P, Q))^T and T (X) = (t_1(X, P, Q),……., t_{n2}(X, P, Q))^T have n_1 and n_2 equations respectively, and are column vectors. Here A^T represents the transpose of vector A.

f (X, P, Q) is a scalar, short term operating cost, such as fuel cost. The generator cost function $f_i(P_{Gi})$ in \$/MWh is considered to have cost characteristics represented by,

$$f = \sum_{i=1}^{NG} a_i P_{Gi}^2 + b_i P_{Gi} + c_i \quad (4)$$

Where, P_{Gi} is the real power output; a_i, b_i and c_i represents the cost coefficient of the ith generator, NG represents the generation buses,

The various constraints to be satisfied during optimization are as follows,

(1) Vector of equality constraint such as power flow balance (i.e. Kirchoff's laws) is to be represented as:

S (X, P, Q) = 0 or

$$P_G = P_D + P_{DC} + P_L \text{ and } Q_G = Q_D + Q_{DC} + Q_L \quad (5)$$

Where suffix *D* represents the demand, *G* is the generation, *DC* represents dc terminal and *L* is the transmission loss.

(2) The vector, inequality constraints including limits of all variables i.e. all variables limits and function limits, such as upper and lower bounds of transmission lines, generation outputs, stability and security limits may be represented as,

$$T(X, P, Q) \leq 0 \text{ or} \tag{6}$$

(i) The maximum and minimum real and reactive power outputs of the generating sources are given by,

$$P_{Gi}^{\min} \leq P_{Gi} \leq P_{Gi}^{\max} \quad (i \in G_B) \text{ and } Q_{Gi}^{\min} \leq Q_{Gi} \leq Q_{Gi}^{\max} \quad (i \in G_B) \tag{7}$$

Where, $P_{Gi}^{\min}, P_{Gi}^{\max}$ are the minimum and maximum real power outputs of the generating sources and $Q_{Gi}^{\min}, Q_{Gi}^{\max}$ are the minimum and maximum reactive power outputs.

(ii) Voltage limits (Min/Max) signals the system bus voltages to remain within a narrow range. These limits may be denoted by the following constraints,

$$\left|V_i^{\min}\right| \leq |V_i| \leq \left|V_i^{\max}\right| \quad (i= 1,\ldots\ldots,N_B) \tag{8}$$

Where, N_B represents number of buses.

(iii) Power flow limits refer to the transmission line's thermal or stability limits capable of transmitting maximum power represented in terms of maximum MVA flow through the lines and it is expressed by the following constraints,

$$P_f^{\min} \leq P_f \leq P_f^{\max} \quad (f= 1,\ldots, Noele) \tag{9}$$

Where, *Noele* represents number of transmission lines connected to grid.

Thus, the operating condition of a combined ac-dc electric power system is described by the vector,

$$X = [\delta, V, x_c, x_d]^t \tag{10}$$

Where, δ and V are the vectors of the phases and magnitude of the phasor bus voltages; x_c is the vector of control variables and x_d is the vector of dc variables.

DC System Equations

The following relationship is for the dc variables. Using the per unit system [27], the average value of the dc voltage of a converter connected to bus 'i' is

$$V_{di} = a_i V_i \cos\alpha_i - r_{ci} I_{di} \tag{11}$$

Where, α_i is the gating delay angle for rectifier operation or the extinction advance angle for inverter operation; r_{ci} is the commutation resistance, and a_i is the converter transformer tap setting.

By assuming a lossless converter, the equation of the dc voltage is given by,

$$V_{di} = a_i V_i \cos\varphi_i \tag{12}$$

Where, $\varphi_i = \delta_i - \xi_i$, and φ is the angle by which the fundamental line current lags the line-to-neutral source voltage.

The real power flowing in or out of the dc network at terminal 'i' can be expressed as,

$$P_{di} = V_i I_i \cos\varphi_i \quad \text{or} \quad P_{di} = V_{di} I_{di} \tag{13}$$

The reactive power flow into the dc terminal is

$$Q_{di} = V_i I_i \sin\varphi_i \quad \text{or} \quad Q_{di} = V_i a I_i \sin\varphi_i \tag{14}$$

The equations (13) - (14) can be substituted into the equation (5) to form part of the equality constraints.

Based on these relationships, the operating condition of the dc system can be described by the vector,

$$X_d = [V_d, I_d, a, \cos\alpha, \varphi]^t \tag{15}$$

The dc currents and voltages are related by the dc network equations. As in the ac case, a reference bus is specified for each separate dc system; usually the bus of the voltage controlling dc terminal operating under constant voltage (or constant angle) control is chosen as the reference bus for that dc network equation.

Here (1) – (3) are an OPF problem for the demand (P, Q). There are many efficient approaches which can be used to get an optimal solution such as linear programming, Newton method, quadratic programming, nonlinear programming, interior point method, artificial intelligence (i.e. artificial neural network, fuzzy logic, genetic algorithm, evolutionary programming, ant colony optimization and particle swarm optimization etc.)

methods [26, 28].

III. III. GENETIC ALGORITHM IN OPTIMAL POWER FLOW PROBLEM

3.1 Genetic Algorithms

GAs operates on a population of candidate solutions encoded to finite bit string called chromosome. To attain optimality, each chromosome exchanges the information using operators borrowed from natural genetics to produce the better solution. GAs differs from other optimization and search procedures in four ways [24]: firstly, it works with a coding of the parameter set, not the parameters themselves. Therefore, GAs can easily handle integer or discrete variables. Secondly, it searches within a population of points, not a single point. Therefore, GAs can provide a globally optimal solution. Thirdly, GAs use only objective function information, not derivatives or another auxiliary knowledge. Therefore, it can deal with the non-smooth, non-continuous and non-differentiable functions that exist in a practical optimization problem. Finally, GAs use probabilistic transition rules, not deterministic rules, Although GAs seem to be a good method to solve optimization problems, sometimes the solution obtained from GAs is only a near global optimum solution.

3.2 GA applied to Optimal Power Flow

A simple Genetic Algorithm is an iterative procedure, which maintains a constant size population of candidate solutions. During each iteration step, (generation) three genetic operators (reproduction, crossover, and mutation) are performing to generate new populations (offspring), and the chromosomes of the new populations have evaluated via the value of the fitness, which is related to cost function. Based on these genetic operators and the evaluations, the better new populations of candidate solution are formed. If the search goal has not been achieved, again GA creates offspring strings through above three operators and the process is continued until the search goal is achieved. This paper now describes the details in employing the simple GA to solve the optimal power flow problem.

3.2.1 Coding and Decoding of Chromosome

GAs performs with a population of binary string instead the parameters themselves. This study used binary coding. Here the active generation power set of n-bus system (PG_1, PG_2, PG_3, ….PG_n) would be coded as binary string (0 and 1) with length L_1, L_2, ……,L_n. Each parameter PGi has upper bound $b_i(p_{G_i}^{\max})$ and lower bound $a_i(p_{G_i}^{\min})$. The choice of L_1, L_2, ……, Ln for the parameters is concerned with the resolution specified by the designer in the search space. In this method, the bit length B_i and the corresponding resolution R_i is associated by,

$$R_i = \frac{b_i - a_i}{2^{Li} - 1} \tag{16}$$

This transforms the PG_i set into a binary string called *chromosome* with length ΣL_i and then the search space has to be explored. The first step of any GA is to generate the initial population. A binary string of length L is associated to each member (individual) of the population. This string usually represents a solution of the problem. A sampling of this initial population creates an intermediate population.

3.2.2 Genetic Operator: Crossover

It is the primary genetic operator, which explores new regions in the search space. Crossover is responsible for the structure recombination (information exchange between mating chromosomes) and the convergence speed of the GA and is usually applied with high probability (0.5 – 0.9). The chromosomes of the two parents selected have combined to form new chromosomes that inherit segments of information stored in parent chromosomes. The strings to be crossed have been selected according to their scores using the roulette wheel [24]. Thus, the strings with larger scores have more chances to be mixed with other strings because all the copies in the roulette have the same probability to select. Many crossover schemes, such as single point, multipoint, or uniform crossover have been proposed in the literature. A single point crossover [1] has been used in our study.

3.2.3 Genetic Operator: Mutation

Mutation is used both to avoid premature convergence of the population (which may cause convergence to a local, rather than global, optimum) and to fine-tune the solutions. The mutation operator has defined by a random bit value change in a chosen string with a low probability of such change. In this study, the mutation operator has been applied with a relatively small probability (0.0001-0.001) to every bit of the chromosome. A sample mutation process has shown as below.

$$\underbrace{0110}_{P_{G1}}\ \underbrace{0101}_{P_{G2}}\ \underbrace{0110}_{P_{G3}}\ \underbrace{0100}_{P_{G4}}\ \underbrace{1100}_{P_{G5}}\ \underbrace{0011}_{P_{G6}}\ \underbrace{1110}_{P_{G7}} \quad \overrightarrow{After\ mutation}$$

$$\underbrace{0110}_{P_{G1}}\ \underbrace{0101}_{P_{G2}}\ \underbrace{0110}_{P_{G3}}\ \underbrace{0100}_{P_{G4}}\ \underbrace{1110}_{P_{G5}}\ \underbrace{0011}_{P_{G6}}\ \underbrace{1110}_{P_{G7}}$$

3.2.4 Genetic Operator: Reproduction

Reproduction is based on the principle of survival of the fittest. It is an operator that obtains a fixed number of copies of solutions according to their fitness value. If the score increases, then the number of copies increases too. A score value is associated with a given solution according to its distance from the optimal solution (closer distances to the optimal solution mean higher scores).

3.2.5 Fitness of Candidate Solutions and Cost Function

The cost function has defined as:

$$f = \sum_{i=1}^{NG} a_i P_{Gi}^2 + b_i P_{Gi} + c_i ; \quad P_{Gi}^{\min} \le P_{Gi} \le P_{Gi}^{\max} \tag{18}$$

To minimize F(x) is equivalent to getting a maximum fitness value in the searching process. A chromosome that has lower cost function should be assigned a larger fitness value. The objective of OPF has to be changed to the maximization of fitness to be used in the simulated roulette wheel. The fitness function is used [3] as follows:

$$FitnessFunction(FF) = \frac{C}{\sum_{i=1}^{NG} F_i(P_{Gi}) + \sum_{i=1}^{Nc} w_j * Penalty_j} \tag{19}$$

$$Penalty_j = h_j(x,t)|.H(h_j(x,t)) \tag{20}$$

Where C is the constant; $F_i(P_{Gi})$ is cost characteristics of the generator i; w_j is weighting factor of equality and inequality constraints j; $Penalty_j$ is the penalty function for equality and inequality constraints j; $h_j(x,t)$ is the violation of the equality and inequality constraints if positive; H (.) is the Heaviside (step) function; N_c is the number of equality and inequality constraints.

The fitness function has been programmed in Matlab in such a way that it should firstly satisfy all inequality constraints by heavily penalizing if they have been violated. Then the equality constraints are satisfied by less heavily penalizing for any violation. Here this penalty weight is not the price of power. Instead, the weight is a coefficient set large enough to prevent the algorithm from converging to an illegal solution. Then the GA tries to generate better offspring to improve the fitness. Using these components, a standard GA procedure for solving the OPF problem is shown in Fig.1.

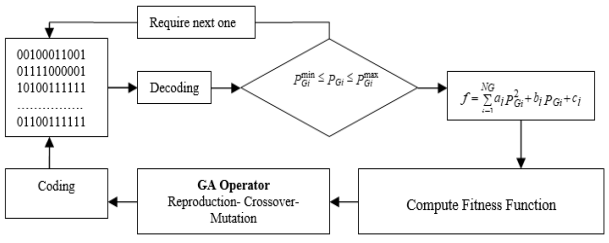

Fig.1: Flowchart of a Simple Genetic Algorithm for OPF

IV. IV. EXAMPLE, SIMULATION AND RESULTS

4.1 IEEE-6 Bus System

The performance of the proposed methodology has been assessed through the results obtained for IEEE-6 Bus system (Fig. 2) with 7 circuits and 2 generators. A dc link has been connected between bus 1 and bus 5. The ratings of the converter at buses 1 and 5 were 1.0 p.u. The voltage values for all buses are bounded between 0.95 and 1.05. The fuel cost function for generators is expressed as ($f_i = a_i P_{Gi}^2 + b_i P_{Gi} + c_i$) in ($/MWh) and demand at various buses are as shown in table A2. All the values have indicated in Per Unit (PU). The results obtained for best and worst GAOPF solution and that for traditional OPF have been shown in Table 1.

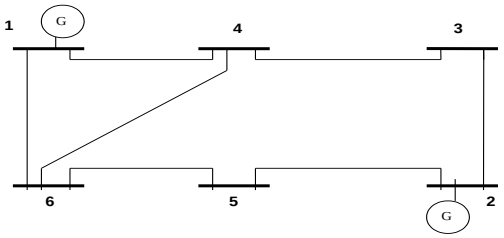

Fig.2: One line diagram of IEEE-6Bus System

Table 1: GAOPF results and Comparison with Traditional OPF Method

Bus No.	GAOPF						Newton Method		
	Best Solution			Worst Solution					
	Voltage (PU)	P (PU)	Cost ($/MWh)	Voltage (PU)	P (PU)	Cost ($/MWh)	Voltage (PU)	P (PU)	Cost ($/MWh)
1	0.99	0.14	26.67	0.97	0.7	138.09	1.00	0.16	25.73
2	1.02	0.03	5.64	0.97	0.3	47.70	0.95	0.04	6.58
3	1.00			1.04			0.96		

4	1.01			0.96			1.05		
5	0.97			1.03			1.02		
6	0.99			1.03			1.04		
Total		**0.17**	**32.31**		**1.0**	**185.79**		**0.20**	**33.83**

The best GAOPF solution gives the improved bus voltage profile and lower total cost of generation as compared to traditional i.e Newton's OPF method.

4.2 IEEE-14 Bus System

The performance of the proposed methodology has been assessed through the results obtained with the well-known IEEE-14 Bus (Fig.3) with 18 circuits and 4 generators. The generator and circuit data have been given in Appendix-B. A dc link is connected between bus 1 and bus 14. The ratings of the converter at buses 1 and 14 were 1.0 p.u. The voltage values for all buses have been bounded between 0.95 and 1.05. All the values have been indicated by p.u. The results obtained with given methodology are shown in Table 2.

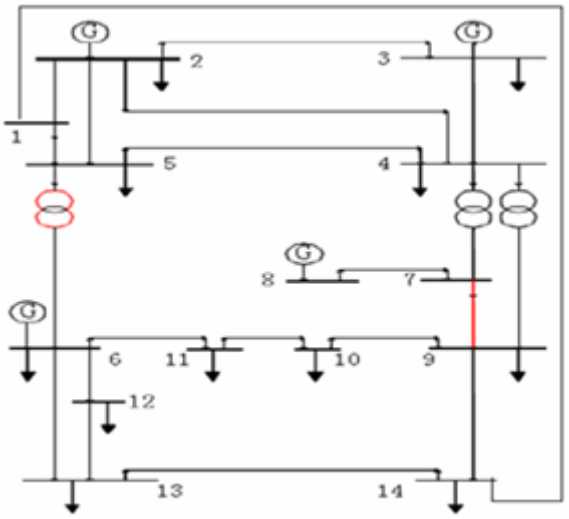

Fig. 3: One Line diagram of IEEE-14 Bus System

Table 2: GAOPF results and Comparison with Traditional OPF Method

Bus No.	**GAOPF**						**Newton Method**		
	Best Solution			**Worst Solution**					
	Voltage (PU)	**P (PU)**	**Cost ($/MWh)**	**Voltage (PU)**	**P (PU)**	**Cost ($/MWh)**	**Voltage (PU)**	**P (PU)**	**Cost ($/MWh)**
1	0.98			1.02			0.99		
2	0.99	0.70	68.47	1.00	0.92	120.01	0.98	0.86	90.94
3	1.01	0.75	60.34	0.97	0.92	180.20	0.97	0.72	90.46
4	0.96			0.96			0.96		
5	0.97			0.99			0.96		
6	0.99	0.55	102.6	0.99	0.87	85.51	1.02	0.66	89.87
7	1.02			0.98			0.97		
8	0.99	0.70	118.6	1.01	0.75	120.91	1.02	0.64	88.40
9	0.98			0.98			0.95		
10	0.97			0.95			0.96		
11	1.01			1.01			0.99		

12	0.98			0.95			1.00		
13	1.03			0.99			0.99		
14	0.97			1.02			0.95		
Total		**2.70**	**350.01**		**3.46**	**506.63**		**2.88**	**359.67**

The voltage at several buses obtained by GAOPF best solution has shown improvement as compared to the Newton method. In addition, total cost of generation obtained by GAOPF best solution is low.

4.3 IEEE-30 Bus System

This system consists of 6 generators and 43 transmission lines as shown in Fig. 4. A dc link connected between bus 1 and bus 28. The ratings of the converter at buses 1 and 28 were 1.0 p.u. The upper and lower bounds (reactive power) for all generators are $-0.4 \le Q_{Gi} \le 0.4$. The voltage values for all buses have bounded between 0.95 and 1.05. The fuel cost function for generators is expressed as $(f_i = a_i P_{Gi}^2 + b_i P_{Gi} + c_i)$ in ($/MWh). For this system there are 2 × 24 equality constraints of S corresponding with their respective real and reactive power balances of the buses without a generator, and about 72 inequality constraints of T corresponding to 30 pairs of voltage, 2 × 6 pairs of generation output and one pair of line flow upper and lower bounds respectively. Table 3 indicates the results for GAOPF best and worst solutions and for Newton method.

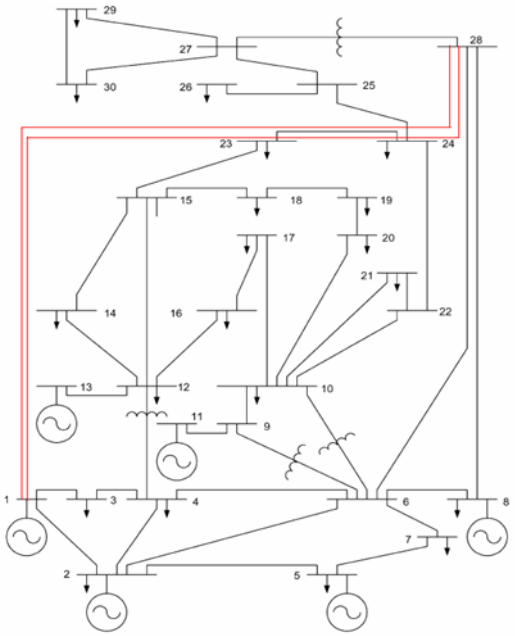

Fig. 4: One line diagram of modified IEEE-30 Bus system.

Table 3: GAOPF results and Comparison with Traditional OPF Method

Bus No.	GAOPF						Newton Method		
	Best Solution			Worst Solution					
	Voltage (PU)	P (PU)	Cost ($/MWh)	Voltage (PU)	P (PU)	Cost ($/MWh)	Voltage (PU)	P (PU)	Cost ($/MWh)
1	1.00	0.35	9.77	0.99	1.67	30.40	1.00	0.37	10.55
2	0.99	0.23	7.97	1.00	1.06	21.33	0.99	0.10	6.53
3	0.96			0.98			0.99		
4	0.98			0.96			0.98		
5	1.01	0.21	8.13	1.02	1.40	26.41	0.99	0.10	6.52
6	0.99			1.00			0.97		
7	0.98			0.95			0.98		
8	0.96	0.21	8.15	0.99	0.57	16.02	1.03	0.10	6.93
9	0.96			1.01			0.99		
10	1.01			1.02			1.02		
11	0.99	0.15	8.40	1.00	0.54	13.07	1.01	0.46	11.87
12	1.01			0.95			1.00		
13	0.99	0.08	6.12	1.01	0.56	15.64	1.01	0.10	6.90
14	0.97			0.96			0.99		
15	1.00			1.00			0.99		
16	0.98			0.97			1.00		
17	0.99			0.96			1.00		
18	0.99			1.01			0.99		

19	1.01			0.98			0.99		
20	0.97			1.01			1.03		
21	0.98			0.97			0.99		
22	0.99			0.99			0.98		
23	0.99			1.01			0.99		
24	1.01			1.01			1.02		
25	0.98			0.97			1.03		
26	0.99			1.01			1.02		
27	0.98			0.97			1.05		
28	0.99			0.95			0.99		
29	1.01			0.98			1.05		
30	0.99			0.98.			1.05		
Total		**1.23**	**48.54**		**5.8**	**122.88**		**1.23**	**49.30**

Results indicates that the voltage profile at few buses have improved for best GAOPF solution as compared to Newton's OPF method. In addition, total cost of generation by best GAOPF is marginally low as compared to Newton's OPF method.

V. V. PERFORMANCE EVALUATION

The performance evaluation of AC-DC based GAOPF and traditional OPF method has been tested with reference to parameters given in Table 4 and in Table 5. Newton's method takes less iterations to perform the OPF for the test system and real network mentioned in Table 4. The program execution time depends on the equality and inequality constraints handled by the methodology. The advantage of Newton's method is that the OPF results are obtained in one run only. The performance parameters for GA based AC-DC OPF for various test system and real networks are shown in Table 5. However, program execution time varies from smaller system to larger system and it depends on the number of iterations assigned initially to obtain the best OPF results.

Table 4: Newton's Parameters/performance for Best Optimal Power Flow

SN	Parameters	IEEE-6 Bus System	IEEE-14 Bus System	IEEE-30 Bus System
1	No. of iterations	9	43	58
2	Execution Time (sec.)	8 sec.	20 sec.	40 sec.
3	No. of Runs	1	1	1

Table 5: GA Parameters/performance for Best Optimal Power Flow

SN	Parameters	IEEE-6 Bus System	IEEE-14 Bus System	IEEE-30 Bus System
1	Initial Population	210	210	520
2	No. of iterations	80	120	150
3	Probability of crossover	0.5	0.5	0.5-0.9
4	Probability of mutation	0.001	0.001	0.0001-0.001
5	Execution Time (Sec.)	90	120	825
6	No. of Runs (for best Soln.)	4	15	19

VI. VI. CONCLUSION

Recently, many developing and transition countries are facing the problems of transmission and distribution infrastructure due to inadequate investments incurred in the past. To reduce the gap between transmission capacity and power demand, trend is to adopt HVDC transmission system in the existing AC networks to gain techno-economical advantages of the investment.

This study proposes an AC-DC based GA optimal power flow solution which may be applied to different size power systems. This method also employs its techno-commercial advantage over the traditional method of optimal power flow. The GAOPF method avoids early load flow as reported in other published literatures. Finally, the result obtained by this scheme is quite comparable with the traditional OPF methodology.

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Analysis of US Stocks & Indian Stocks using Machine Learning

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Abstract – **The stock market is seeing elevated activities and is progressively acquiring significance over the population. In the ongoing setting of globalization and the ensuing coordination of the worldwide markets, this paper catches similarities, patterns in the activities and the impact of US stock markets on the Indian Stock Market. Five years of data from 2015 to 2019 of National Association of Securities Dealers Automated Quotations (NASDAQ), National stock exchange FIFTY (NIFTY) was taken into consideration for analysis. In this work, an attempt is made to predict the development of the stock market. Different algorithms were used to check which one gives the most accurate prediction results. Machine Learning algorithms such as Decision tree and Random Forest are used and the results of both were compared.**

Keywords: Stock Market, Comparative Analysis, Statistical analysis, Efficiency Test.

I. INTRODUCTION

Stock market price data is generated in huge volume, and it changes every second. Stock market is a complex and challenging system where people will either gain money or lose their entire life savings. In this work, an attempt is made for prediction of stock market trends. Supervised machine learning algorithms are used to build the models. Financial decisions to buy or sell an instrument may be made by the traders by choosing the effective predictive model. Successful prediction of Stock Market Index movements may be beneficial for investors. As part of the daily prediction model, historical prices are combined with sentiments. Up to 70% of accuracy is observed using supervised machine learning algorithms on daily prediction models. Monthly prediction model tries to evaluate whether there is any similarity between any two months' trend. Evaluation proves that the trend of one month is least correlated with the trend of another month. Various factors affect stock market prices, here, an effort is made to analyze how US stock markets and their changes can and possibly do affect the Indian Stock Market. Different Machine Learning algorithms are used to get an idea about not only the factors affecting the stock market, but also which algorithm gives better and more accurate results.

daily data from the Dow Jones from 1 October 1928 to

31 January 2009, and daily data from the SENSEX during 1st July 1997 to 31st January 2009 to investigate the relationship between USA and Indian stock markets. To determine the relevant Hurst exponents, the Finite Variance Scaling Method, a type of scaling, is used to

II. II.LITERATURE SURVEY

AVINASH POKHRIYAL et al [1] proposed a method wherein the Multiple Linear Regression and neural networks is carried out to the investor's economic choice making to make investments all type of stocks no matter the high / low index of the scripts, in a continuous time framework. The proposed framework has been examined with stock information received from the Asian Stock Market Database. Finally, the design, implementation and overall performance of the proposed multiple regression and neural network model are described. technique offers two key explanatory variables for bank performance and clearly and simply illustrates the impact of the contributing components. The approach has several drawbacks because its fundamental assumptions are always broken when real data is involved. Biased results are also produced by outliers. Data transformation, robust regression and ridge regression is one of the corrective actions to be implemented. This calls for the necessity of comprehending more statistical methods, which was outside the purview of this work. An artificial neural network uses inputs to produce results that are extremely accurate. The method increases its performance with many examples.

K.J SANDEEP et al [2] made a correlation analysis which focused on for very short term period that is from

10th November to 20th November of 2014, the variables of Asian and European countries were extracted by Indian opening time 9:15 from Asian countries previous day closing prices, European countries were opening

12:30 to 12:40. Estimates indicated that Japan, Singapore, European markets were impacting nifty, partial correlation indicated that all the countries that were selected had slightly to strong correlation. This investigation showed that the Singapore and Nifty are significantly influencing the Nifty opening. European

markets were having an impact on nifty movement

during the afternoon hours period. The volatility of the Indian market is also influenced by openings of selected Asian European markets on nifty.

K. MOFAZZAL HOSSAIN et al [3] presented a study which wherein they examined daily data from the NASDAQ from 5 February 1971 to 31 January 2009 process these three-time series. According to the study, all three series display anti-persistent behavior (short-memory process). It is interesting to note that the related Hurst exponent values do not considerably differ from one another.

RAJIV KUMAR et al [4] suggest that India's financial area isn't profoundly coordinated with the worldwide financial framework, which saved it from the main round not favorable impacts of the worldwide financial crisis

and left Indian banks generally unaffected. In any case, as the financial crisis transformed into an all-out worldwide economic slump, India couldn't get away from the subsequent round impacts. The worldwide crisis has impacted India through three channels: financial markets, exchange streams, and trade rates. The inversion in capital inflows, which made a credit smash in homegrown markets alongside a serious disintegration in trade interest, added to the downfall of GDP by multiple rates in the fiscal year 2008-2009. In accordance with endeavors taken by governments and national banks from one side of the planet to the other, the public authority and the Reserve Bank of India went to forceful countercyclical lengths, strongly loosening up financial strategy and acquainting a fiscal improvement with support homegrown interest.

JANAK RAJ et al [5] provides and acknowledges the national stock markets have arisen as the significant channel for financial integration of developing business sector economies during globalization, liberation, and advances in information technology. Among the elements adding to developing financial integration are a fast expansion in the crossline versatility of private capital inflows because of investors looking for portfolio enhancement and improved yields, a developing dependence of countries on the reserve funds of different countries, and a change in the influence of organizations from debt-to-equity finance. It is by and large apparent that financial integration can be related with a few advantages, including improvement of markets and organizations and powerful cost disclosure, prompting higher reserve funds, speculation, and economic advancement.

CHARLES K. AYO et al [6] stock price prediction is an important topic in finance and economics which has spurred the interest of researchers over the years to develop better predictive models. The autoregressive integrated moving average (ARIMA) models have been explored in literature for time series prediction. This paper presents an extensive process of building stock price predictive models using the ARIMA model.

YAZEED ALSUBAIE et al [7] study shows that stock market forecasting using technical pointers (TIs) is universally applied by investors and researchers. Utilizing an insignificant number of info highlights is essential for fruitful prediction. Be that as it may, there is no agreement about what comprises a reasonable assortment of TIs. The selection of TIs reasonable for a given forecasting model remains part of an area of dynamic research. This study presents a point-by-point examination of the choice of a negligible number of pertinent TIs determined to increment precision, diminishing misclassification cost, and further developing venture return. Fifty universally used TIs were positioned utilizing five different element determination methods. Tests were led utilizing nine classifiers, with a few element choice methods and different options for the quantity of TIs. A proposed cost-touchy calibrated naïve Bayes classifier figured out how to accomplish preferable in general venture execution over different classifiers. Tests were directed on datasets consisting of everyday time series of 99 stocks and the TASI market record.

TROY J. STRADER et al [8] proposed a systematic literature review methodology to identify applicable peer-reviewed journal articles from the past twenty years and bundle studies containing similar methods and contexts. Four categories that emerged were: artificial neural network studies, support vector machine studies, studies using genetic algorithms combined with other techniques, and studies using hybrid or other artificial intelligence approaches. Results showed that Artificial neural networks are best suited for predicting numerical stock market index values. Support vector machines are more suited for predicting whether the forecast is to rise or fall. Financial funding concept desires to be a stronger driving force underlying the ML structures' inputs, algorithms, and performance measures.

POLAMURI SUBBA RAO et al [9] studies different prediction techniques and their advantages when it comes to the stock market. The two general methods for stock prediction: Fundamental Analysis and Technical Analysis are studied, and technical analysis is preferred over fundamental analysis. Different prediction techniques included: Holt-Winters, Artificial Neural Network, Hidden Markov

Model, ARIMA Model, Time Series Linear Model, Recurrent Neural Networks. They concluded that to improve the prediction of the results of stock, combining two or more methods to construct a novel approach method would be efficient

ERNEST KWAME AMPOMAH et al [10] proposes the ability of Gaussian Naïve Bayes ML algorithm to predict stock price movement. It has not been explored properly in the existing literature, Thus, the performance of GNB algorithm when combined with different feature scaling and feature extraction techniques, evaluated using F1-Score, specificity and AUC evaluation metrics showed that using scaling techniques alongside GNB provided much better results than the ones produced on combining either feature scaling technique or GNB algorithm and feature extraction technique except for GNB_LDA.

MEHTABHORN OBTHONG et al [11] illustrates that while many stocks are traded on a stock exchange, different factors influence the decision-making. Moreover, the behavior of stock prices is very difficult and challenging to predict. In addition to historical prices, other factors could also affect stock prices such as politics, economic growth, finance-related news, and social media.

SAMPAT PATIL et al [12] in this study used data from global financial markets with machine learning algorithms to predict stock movements. SVM is used primarily in this study as it does not have the problem of overfitting and works well with large data. Correlation analysis proves strong relations between the Market index and global markets that close before or at the very beginning of the trading cycle. The model also had high profits on some benchmarks.

ARGYRIOS KETSETIS et at [13] states the SLR made obvious that the research community clearly preferred

LSTMs over alternative DL techniques, following the lead of studies in other markets. As just two of the publications used text mining for data extraction, it is also crucial to note that the European stock market- related papers have not widely used text mining techniques from diverse sources to apply sentiment analysis to the forecasts. In these papers, the training and testing times range from 3 months to 26 years. The difference in data frequency employed in those articles can be used to explain the discrepancy in the duration of time.

III. PROPOSED WORK

The Indian stock market holds a crucial value in the world's economy. Integration and influence of global markets on Indian markets need to be studied for investors to get a better understanding and for their benefits.

In Order to analyze the variation in the Indian markets, the goal of this paper is to identify the trends of the global markets and how it affects the Indian economy.

A. Objective

1. To identify impact of US economy on Indian Market
2. To compare different models under Machine Learning.

The historical data of Nasdaq and Nifty Index was downloaded from the website "yahoofianance.com" which is openly accessible, in CSV (Comma Separated Value) format. The available attributes in the historical data were S.No, Open, High, Low, Close and Date. S.No and Date attributes were skipped as these attributes are not important for prediction. As shown in the Open, High, and Low attributes are selected as features and Close attribute is selected as target because it is to be predicted.

To detect outliers in the dataset, box plots for both the datasets were visualized and are shown in 'Fig 1.' and 'Fig 2.' respectively.

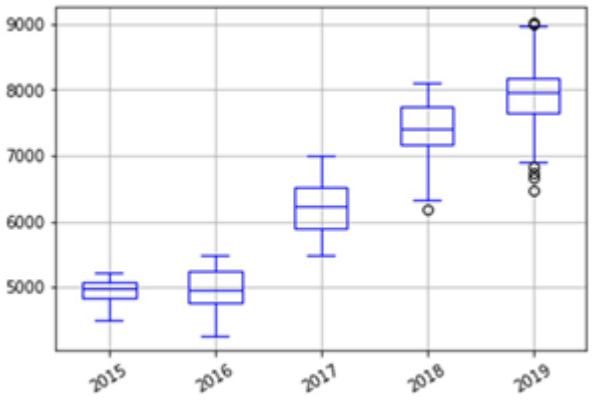

Fig. 1. Box plot for NASDAQ

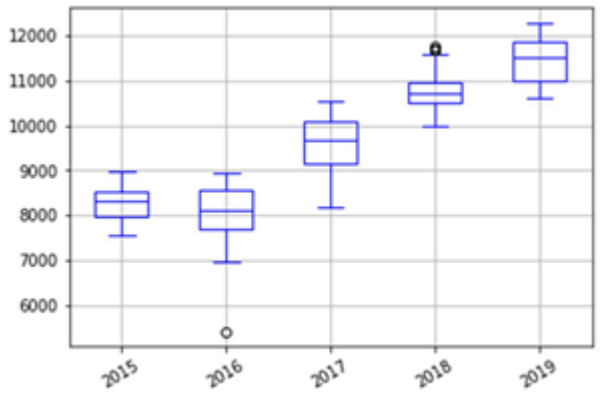

Fig. 2. Box plot for NIFTY

The research data used in this study is the direction of daily closing price movement in the Nifty and NASDAQ Index. The entire data set covers the period from January 1, 2015, to December 30, 2019.

Feature extraction is very important as wrong selection of features can result in wrong predictions.

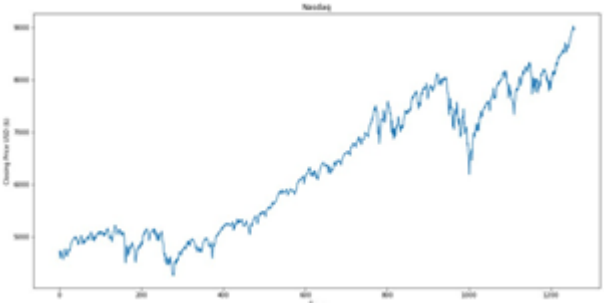

Fig. 3. Graph of Closing Price of Nasdaq

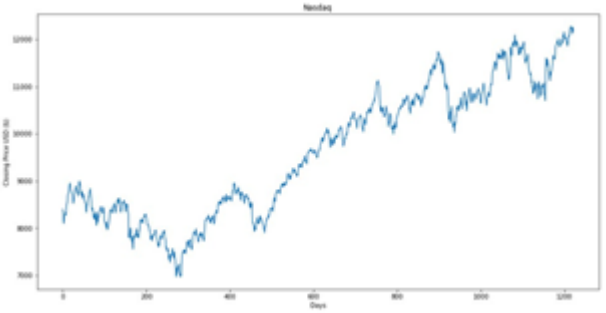

Fig. 4. Graph of Closing Price of Nifty

The above figure shows the graph of the Closing column of Nifty and Nasdaq's data . The closing price is also plotted to get an overview about how the trend is throughout the years.

Table 1. NIFTY and NASDAQ Error validation.

Stock	Error Validation

Nasdaq	Training R-squared: 1.0 Training Explained Variation: 1.0 Training MAPE: 0.72 Training Mean Squared Error: 3979.81 Training RMSE: 63.09 Training MAE: 43.53 Validation R-squared: 0.89 Validation Explained Variation: 0.89 Validation MAPE: 0.77 Validation Mean Squared Error: 3979.81
Nifty	Training R-squared: 1.0 Training Explained Variation: 1.0 Training MAPE: 0.63 Training Mean Squared Error: 5981.98 Training RMSE: 77.34 Training MAE: 58.38 Validation R-squared: 0.92 Validation Explained Variation: 0.92 Validation MAPE: 0.72 Validation Mean Squared Error: 5981.98

B. Methodology

Under machine learning, two models were implemented i.e., Decision tree and Linear Regression.

The Linear Regression model was used for the dataset in the early phase as it is a useful measure for technical and quantitative analysis in global markets. It analyzes two separate variables in order to define a single relationship. Plotting stock prices along a normal distribution—bell curve—can allow traders to see when a stock is overbought or oversold. For this model, 88% of data was selected for training,10% of data for validation and the remaining 2% for testing.

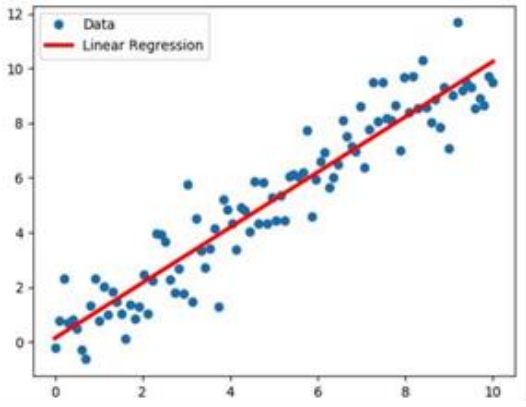

Fig. 5. Diagram of Linear Regression

Decision trees are important tools that work based on flowchart-like structures that are mostly used. Each interior node of the decision tree specifies a condition or "test". Attributes and branches are based on test conditions and results

Finally, a leaf knot has a class label which is obtained after calculating all attributes. distance from root to leaf represents a classification rule. The amazing thing is that it can work with categories and subordinate's variables. They are excellent at identifying the most important variables and show the relationships between variables very well. It is important for creating new variables and functions. It is useful for data exploration and predicts target variables efficiently.

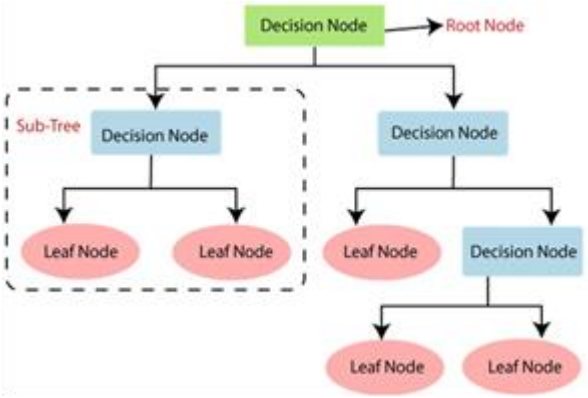

Fig. 6. Diagram of Decision Tree

IV. RESULTS

The below figure represents the difference and variation in stocks between Nifty and Nasdaq for the time period of 2015 to 2019. The trends and fluctuation can be seen from the graph and helps get a better understanding of how Nifty's stock rises and falls in comparison to Nasdaq's. Prediction done below is done using Linear Regression.

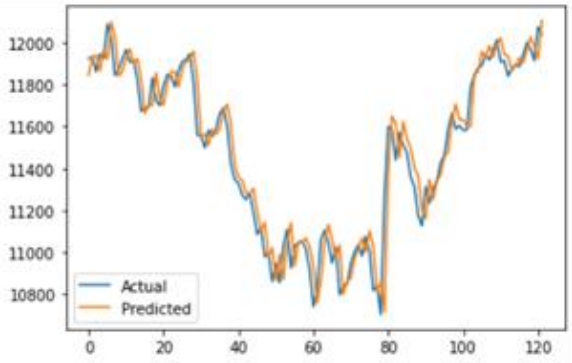

Fig. 7. LR for NIFTY

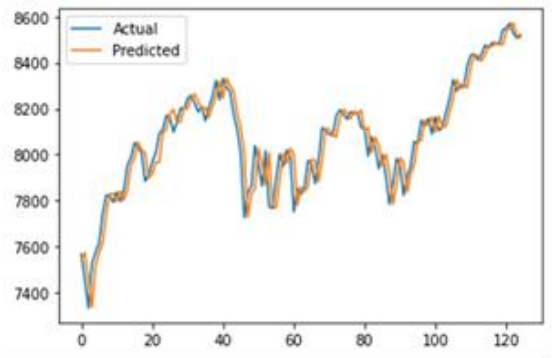

Fig. 8. LR for NASDAQ

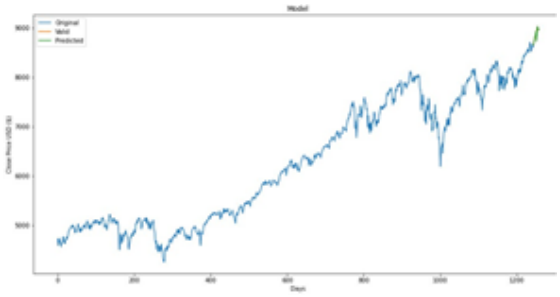

Fig. 9. Prediction Graph for Nasdaq (Decision Tree)

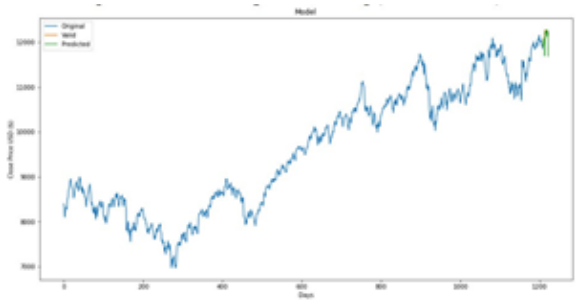

Fig. 10. Prediction Graph for Nifty (Decision Tree)

The above figure represents the predicted value of stocks for a month. The predicted trend is represented in green while the original data set is represented in blue. Prediction is done using Decision tree algorithm.

Table 1. NASDAQ predicted values (May-June 2019).

Index	Actual	Predicted LR	Predicted DT
0	7567.72	7545.31	7520.84
1	7453.14	7572.68	7439.65
2	7333.02	7454.75	7395.71
3	7527.12	7337.67	7512.63
4	7575.47	7515.42	7480.72
5	7615.54	7574.34	7609.19
6	7742.10	7614.47	7666.80
7	7823.16	7739.76	7808.75
8	7822.56	7828.70	7849.27
9	7792.72	7831.60	7707.50
10	7837.12	7796.64	7795.81

Table 2. NIFTY predicted values (May -June 2019).

Index	Actual	Predicted	Predicted DT
0	11924.75	11845.33	11898.67
1	11928.75	11934.65	11921.07
2	11861.09	11939.06	11870.71
3	11945.90	11864.65	11909.07
4	11922.79	11966.46	11939.41
5	12088.54	11920.13	11971.06
6	12021.65	12098.29	12084.84
7	11843.75	12028.47	11913.95
8	11870.65	11839.14	11845.03
9	11922.70	11863.44	11955.89
10	11965.59	11924.97	11970.16

V. CONCLUSION

Prediction of the movements of the stock market index is very important for developing effective market trading strategies. This empirical study attempted to predict the direction of the various stocks and identify the trends and patterns associated with them. The task of predicting the movements of the Stock Market Index is highly complicated and very difficult. This empirical study attempted to predict the direction of the Nasdaq stock. This empirical study used around 5 years of historical data, which is good for machine learning because in such a long period many bull and bear phases of stock market were included.

After all the inclusions of results, applied Machine Learning algorithms. We conclude that Decision Tree and Random Forest Regressor are the best regression algorithms after comparing the results. It is concluded that the Global market affects the Indian markets in a huge way. The algorithms and systems which are traditional systems may not efficiently solve problems associated with this huge amount of data and may lead to the systems running very slowly and cannot yield the best and accurate result of prediction. But with the help of the Python environment, we can handle large data very efficiently without alternating the methods in the existing procedures.

VI. FUTURE WORK

Future work can be proceeded using deep learning algorithms like RNN, LSTM as further implementation of this work to check with comparative analysis of machine learning vs deep learning techniques.

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Traffic Sign Recognition and Maintenance

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Abstract—**In this coming age of Artificial Intelligence and Machine Learning (AI & ML), automation along with safety is the top priority and a major concern to the people. We need accurate signs and symbols for maximum safety on roads which can be achieved with the power of machine learning and computational intelligence. Sometimes these symbols or signals are broken and unrecognizable. These signs need to be maintained for the safety of the mass. We have compared two approaches and tested two models that classify signs and detect broken signs that need maintenance. The model is trained on a dataset which consists of cropped images of the traffic signs for model training and testing. A Convolutional Neural Network (CNN) is used for classification and it is successful in determining whether traffic signs need maintenance or not. Between the compared approaches, the approach of only two classes of damaged and undamaged signs displayed worse results compared to the approach of having one broken sign class among multiple classes of different unbroken signs. Any car with a dashcam and this system can pick up on a broken**

system automates the recognition of broken traffic signs for maintenance. This eliminates the need for an additional manual workforce and minimizes sign breakdown time for safer roads.

Keywords—Traffic, sign, recognition, maintenance, broken, dash-cam.

I. INTRODUCTION

A. Motivation

In today's day and age where vehicles on the road are increasing tremendously in number and are getting faster and more dangerous, road safety has become a genuine issue. Even though traffic rules are made strict and people are taking traffic signals more seriously than ever, traffic signs are a different case. Many times these traffic signs are not followed because of several reasons, one of which is that they are not visible to the vehicle driver itself. These traffic signs are not properly maintained or are vandalized by the local people by sticking advertisements or are made unrecognizable through other means such as paint sprays or spit. Traffic signs themselves also get old or rusted with time or their paint fades away which makes them unreadable. In some rare cases, the traffic sign is completely or partially broken. All these traffic signs require maintenance and we must make the concerned authorities aware of such issues.

To address this issue we have proposed and tested a Machine Learning (ML) model using Convolutional Neural Network (CNN) to recognize and identify broken traffic signs. Our proposed system captures live video from the dashcam of the vehicle and classifies the detected signs if they need maintenance/broken or not. If such a sign is identified, an email with the location and image of the sign will be sent to the concerned authorities so that they can take the appropriate actions at the earliest. The main objective of this research is to automate the maintenance of traffic signs which are many times not taken seriously and ignored, even though they are very essential for the safety of people on the road, drivers and vehicles.

B. Difficulties

- No Dataset is available for damaged signs: One of the biggest difficulties was finding a proper database for the research and model creation. Even after several hours of browsing the internet in search of a database, it was not found. This proved that there was no database or a dataset available of

this research. The absence of an online database meant that we had to create our database for broken signs. This included going out in the world in search of such signs which is a time-consuming and thus an infeasible process. The other option was gathering images from the World Wide Web (WWW). The main problem with gathering images from the internet was that the internet was confusing traffic signs with traffic lights. It also mostly displayed fallen traffic signs where the pole of the sign is broken rather than the actual sign itself.

- Simulate damaged signs: Since no data were available on the internet and finding images on the internet as well as out in the real world was infeasible, we had to create our database by simulating damaged traffic signs. We achieved this with the help of image editing software and some smart editing to simulate broken traffic signs without them looking fake and inconsistent with real-world situations. Even though this was a tedious and time-consuming task, it was the only way to obtain the data which we were looking for to conduct this research. It is possible to improve this study further in future when a proper database is available with multiple classes and various other real-world scenarios and parameters.

- Limited data to work with: As the database was created by editing images by us, the data itself in each class was limited in number. Normally Machine Learning model datasets have thousands of items in each class. This was not possible in this study as editing so many images while maintaining their size within a limit was impossible keeping time constraints in mind. A low volume of data causes a loss of accuracy in Machine Learning models. Having a proper database is a critical part of conducting such studies.

II. EXISTING SYSTEMS

III. PROPOSED SYSTEM

The proposed system takes advantage of CNN to classify damaged signs from undamaged signs on roads for their maintenance. We have tested two approaches to compare which model performs better at distinguishing

faulty traffic signs from operational ones. To compare both approaches, parameters were kept constant to analyze which model performed better. The dataset consists of simulated images of damaged traffic signs.

Approach 1: Two-class approach

This approach is based on Binary classification in Machine Learning. Binary classification is a supervised learning technique which works on tasks that have exactly two class labels. It is mainly used in the determination of things based on a 'YES' or a 'NO' which is very useful in our first approach for determining if the traffic sign is

'broken' or 'not broken'. To achieve this, the dataset was divided into two classes. These were based on whether the traffic signs were damaged or not. A dataset of about 65 images per class was used for training and additional images were used as the testing data.

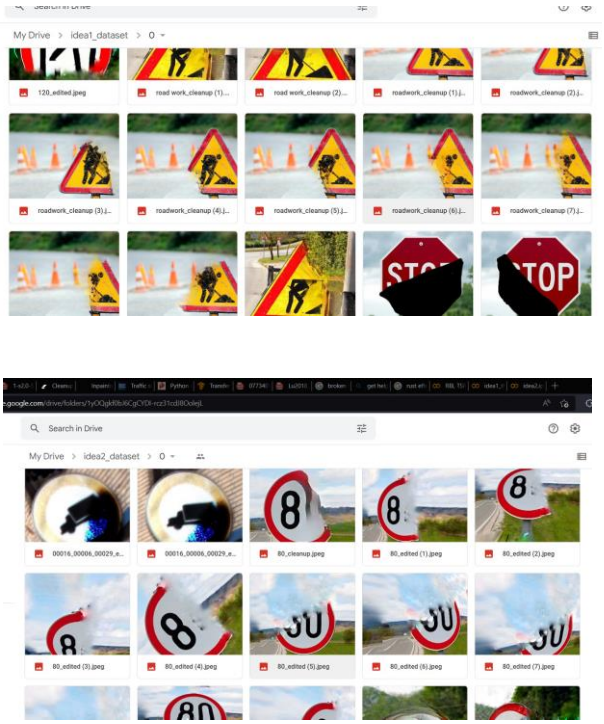
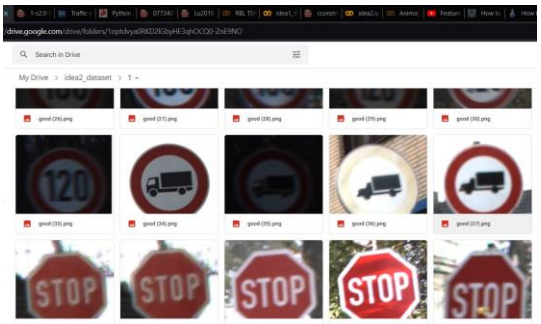


Fig. 1. Damaged Signs dataset



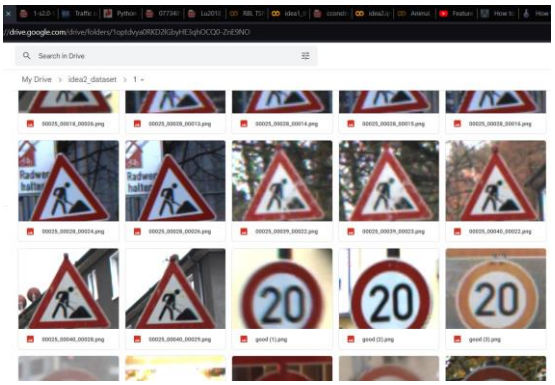


Fig. 2. Undamaged Signs dataset

Only a few sign types were chosen to be represented in both classes for the experimentation. This includes the road work sign, speed limit signs, and stop signs. All of the above-mentioned signs were present in each of the two classes in a damaged as well as an undamaged form to allow the model to learn and discern their difference with maximum accuracy.

Approach 2: Multiclass approach

The second approach is based on the multiclass classification in Machine Learning. Multiclass classification is a supervised learning technique which works on tasks that have more than two class labels. The dataset was divided into different classes based on the sign type including a

'damaged signs' class. For the purpose of this research, three types of signs were chosen: stop signs, A dataset of about 60 images per class was used for training and additional images were used as the testing data.

For the comparison of the approaches the model specifications were kept constant.

TABLE I. MODEL SUMMARY

dense_7 (Dense) (None, 43) 11051

Layer (type)	Output Shape	Param #
conv2d_12 (Conv2D)	(None, 26, 26, 32)	2432
conv2d_13 (Conv2D)	(None, 22, 22, 32)	25632
max_pooling2d_6 (MaxPooling 2D)	(None, 11, 11, 32)	0
conv2d_14 (Conv2D)	(None, 9, 9, 64)	18496
conv2d_15 (Conv2D)	(None, 7, 7, 64)	36928
max_pooling2d_7 (MaxPooling 2D)	(None, 3, 3, 64)	0
flatten_3 (Flatten)	(None, 576)	0
dense_6 (Dense)	(None, 256)	147712

We have created a model with a series of conv2d layers and max_pooling2d layer. After that, we used a flatten layer to convert the matrix into a vector. Finally, we have attached that with dense layers. At the end of the output layer, we have only one neuron responsible for

identifying whether the given image contains a broken sign or not. If not broken then its class label is displayed.

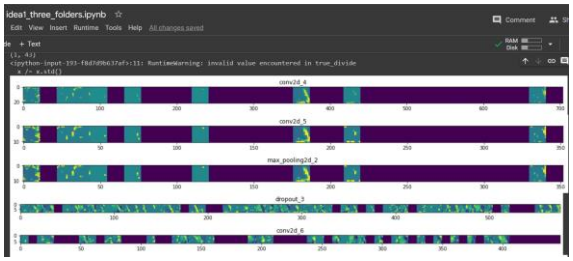


Fig. 3. Feature Maps

IV. PERFORMANCE EVALUATION AND VISUALIZATION

Approach 1: Two-class approach

This model displayed an accuracy of 66.67% on unseen data. Although this method is easy to implement and understand, it produces underwhelming results when working with real-world data. This model also required twice as much time to train when compared to the second model. This difference in train time can be significant when dealing with a huge amount of data.

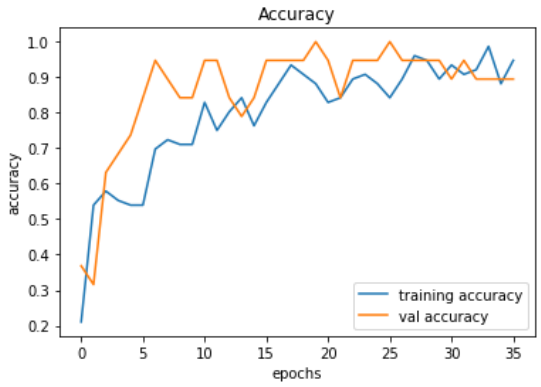


Fig. 4. Training accuracy for Approach 1 (Two class)

Approach 2: Multiclass approach

This method yielded an accuracy of 83.33% on unseen data. Although this approach performs better than the first approach, it was difficult to create an appropriate database to maximally squeeze out the model's accuracy.

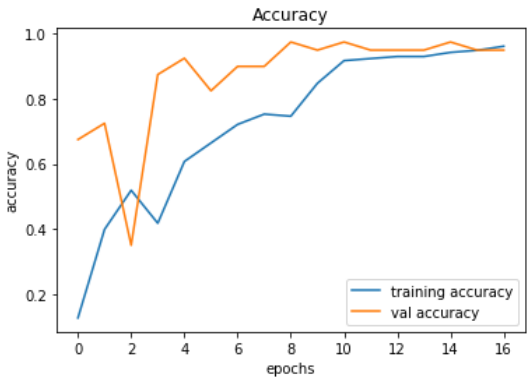


Fig. 5. Training accuracy for Approach 2 (Multiclass)

V. RESULT

The Two-class approach was considered due to the sheer simplicity of its execution with respect to dataset creation. All of the 'good' signs were dumped in the undamaged signs folder whereas all of the 'bad' or faulty signs were put in the damaged signs folder. But model testing proved that the Multi-class approach outperformed the Two-class approach. It also recognizes signs while simultaneously classifying them into damaged and undamaged signs. Hence, this approach eliminates the need of requiring a separate step of recognition as opposed to the two-class approach in which the undamaged signs would require further classification.

VI. CONCLUSION

Through rigorous testing it was concluded that the accuracy difference between the two-class and multiclass approaches was significant enough to consider using one approach over another. Even though both of the approaches have their respective pros and cons, the Multiclass approach turned out to be superior to the Two-class approach. The success of the Multiclass approach and its accuracy proves that the maintenance of traffic signs is plausible and feasible using CNN and can be implemented by the government to automate the task of maintenance of road signs cutting off the costs of manual labour to do so further improving general safety on the road.

VII. FUTURE SCOPE ACKNOWLEDGMENT

The authors would like to extend their sincere gratitude to Mr. Rahul Khokale for their invaluable support and guidance throughout the research process. This work would not have been possible without their contributions. The authors would also like to acknowledge Dr. B.K. Mishra and Thakur College of Engineering and Technology for their support.

References

Notes: In proposed sys display original images beside the edited damaged images.

In each approach, display folder structure of dataset so the reader easily differentiates between the approaches.

Scaling Entity Resolution to Large heterogeneous Data with Enhanced Meta-Blocking using Machine Learning

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Abstract—**This research paper presents a novel approach for scaling entity resolution (ER) frameworks using enhanced blocking techniques and machine learning. It proposes an unsupervised model for the entity resolution problem, whi ch is a common task in natural language processing and information retrieval. Entity resolution is the process of identifying entities that describe the same real -world object across many databases and merging duplicate records in large datasets. However, traditional ER methods are often slow and inefficient when dealing with big data. Our proposed approach addresses this issue by incorporating advanced blocking techniques, such as indexing and hashing, to reduce the search space for duplicate records. Instead of considering all possible pairings of items, it restricts the computing cost to those that are equivalent. This is accomplished successfully by classifying entities with similar or identical signatures and giving each entity one or more signatures. Extensive experimental assessments have demonstrated that the schema-agnostic signatures outperform the schema-based ones without the need for domain or schema expertise. The result is that any entity's characteristics or subsets of its values can be used as signatures. Additionally, we utilize machine learning algorithms to improve the accuracy of the ER process. Through extensive experimentation, we demonstrate that our approach significantly improves the scalability and performance of ER frameworks. The proposed method can be applied to a variety of domains and has the potential to greatly enhance the efficiency of data cleaning and integration tasks.**

Keywords— Entity Resolution, Redundancy-positive Blocking, Metablocking.

I. INTRODUCTION

Entity resolution, often referred to as de-duplication, is a current research issue of interest. The process of determining whether two references to the same real-world things are equal is known as entity resolution (ER). This process can seem straightforward, but it gets quite difficult when dealing with Big Data issues. Deep Learning, which makes use of neural networks with numerous layers, is the foundation of many current research projects aimed at developing models for emergency room issues. These techniques need substantial time and computing resources to train and eventually be ready to operate. Take DeepER, one of the deep learning frameworks created for ER, as an example.

In this work, we aim to build an unsupervised

Machine Learning (ML) model that is very effective, remarkably simple, and depends on basic principles of Pattern Recognition. The majority of research is conducted on supervised learning since it is a safer method to get reliable results. However, the majority of demonstrate that it competes with and surpasses other state-of-the-art models.

II. EXISTING SYSTEM

1. Conventional data matching:

Conventional record linking devices have been around for quite a long time and are an essential way to deal with entity resolution. In any case, the accuracy accomplished by these items is essentially lower than genuine entity resolution tools, and they battle to deal with the bad quality data.

2. Custom tool development:

A few organizations attempt to take care of the issue in-house, entrusting their development department to construct data matching tools from scratch. Much of the time, these drives convey some early accomplishment with 'straightforward' matches, however they miss a ton. They regularly battle to operationalize their underlying evidence of ideas into a creation grade framework that can adapt to complex difficulties, bringing about long lead times prior to seeing worth and building high improvement costs. Organizations have billions of data records spread across numerous frameworks yet don't have the right solution to utilize it and create meaningful value out of it. No association can fabricate a 360-degree perspective on clients, possibilities, accomplices and associations without a solid data record establishment and it's basically impossible to transform this information into bits of knowledge.

For most associations, more data means more issues.

From duplicate client records to endless information, there are unlimited difficulties. Also attempting to conquer these difficulties is troublesome: associating dissimilar data records into an extensive single chunk of information is time-consuming and relentless, with a labyrinth of security issues.

III. LITERATURE REVIEW

Collaborative filtering is one of the prominent techniques used in recommender systems. Collaborative filtering as the name itself suggests that it is a method of filtering the interests of a particular user based on collaboration among the various users, various thoughts, etc. Collaborative filtering involves a large amount of user data and his/her preferences. Collaborative filtering is of two types namely model-based and memory-based.

Memory-based approach requires us to find the similarity measure i.e. we need to find the correlation between two users or a group of users while in Model-based approach a model has to be created using various data mining and machine learning algorithms.

IV. OBJECT IVES

We plan to build a tool for Entity resolution to MDM, which will consist of Features such as:

• Ability to handle any entity like customer, organization, supplier, product etc.

• Ability to scale to large volumes of data

• Ability to handle inputs in multiple formats like csv, json ,etc.

V. PROPOSED SYST EM

The model's first component is this part, The input string data must now be transformed into an object space. There are several methods available for prototype selection, but many of them are sensitive to data variability, making it impossible for them to perform equally well across different data sets.

A Dissimilarity Space Of Objects will be constructed in order to get around this circumstance.

We investigate and contrast well-known string metrics, such as the Edit and Jaccard distance, and from this work, we provide a unique distance in articles.

These investigations show that a metric may have both euclidean and dissimilarity properties simultaneously. Nevertheless, a Euclidean distance that produces a dissimilarity score offers a lot of promise from a more theoretical and in-depth standpoint. Since the string distance selection is at the core of our model's prototype selection phase, it is important to stress at this point that we will perform an extensive analysis of it. We shall explain how this hybrid string distance, which we refer to as Euclidean-Jaccard, operates both theoretically and empirically.

Additionally, we provide a short explanation of the "tokenization" strategy that is necessary for this measure to function correctly as a member of the Jaccard family. Since sets are necessary for the Euclidean-Jaccard distance, the strings must first be transformed into sets of letters or words. There are other ways to carry out this transformation, but we'll focus on the n-grams approach. Next, we provide the framework's prototype selection section. For this, we use the method outlined in the original study, which was created using the Vantage Objects schema from the paper. In addition to discussing the theoretical foundations for this schema, we will also go into the clustering and prototype selection procedures we use. We will also discuss how we modified and enhanced this algorithm to make it more compatible with our framework. Last but not least, we use the Maximum Mean Discrepancy (MMD), a statistic measure between two data distributions, to assess the effectiveness of the prototype selection strategy. One way to carry out the assessment is to calculate the MMD between the two distributions that were constructed, one using the prototypes and the other using the original data set. Algorithm 1 String Clustering and Prototype Selection Algorithm

The second component of our model is this. Currently, we have a schema in place that produces a number of prototypes from a given data collection. The original strings must now be converted into numerical arrays. This process is known as vectorization in pattern recognition, and the vectors themselves are known as embeddings. A number of vectors, one for each string, that each uniquely describe it are called embeddings. For each string in our scenario, we want to create a vector (think of it as a list of integers). We will use an embedding method based on Vantage Objects in this model. The work Efficient picture retrieval with vantage objects by J. Vleugels and R. C. Veltkamp contains the fundamental concept behind the Vantage Objects. To construct an effective object indexing, they first described and used a technique known as Vantage Objects. The Vantage Objects in our research will be the prototypes created in the previous model process.

The third and arguably most crucial component of the paradigm is hashing. Entity resolution issues are difficult in terms of time and memory complexity. This is because it takes a lot of comparisons to figure out which items are similar and which ones are not. Consider an issue with a 1,000 string data collection, which is regarded as being quite little in modern times. In a brute force approach, we would compare each string to all the others in order to identify the strings that are identical to real-world things. This indicates that to do this work, we would need to make 1,000,000 comparisons. The processing time and computer power needed for this strategy would be considerable.

Therefore, a hashing approach is used in this study, which may often reduce the number of comparisons to 10%. In line with the preceding illustration, this model can provide predictions with 100,000 comparisons and respectable results.

This tactic, also known as blocking, divides sets of data into smaller subsets using a criterion function (i.e., a hashing method), with records only being examined for matches inside the same block. Standard blocking places all records with the same blocking key into the same block, where they are compared pairwise.

Blocking is a typical tactic in Entity Resolution issues. It may be used to connect records from many sets or to resolve ER problems in a single set. Furthermore, as shown by the studies, blocking is a technique utilized in cutting-edge frameworks with a performance gain.

This research embeds a blocking architecture using Jay Yagnik's Locality Sensitive Hashing (LSH) Approach, often known as Winner-Take-All (WTA) Hashing. Yagnik first introduced a very effective hashing technique in his article The Power of Comparative

Reasoning, which may quickly group items from the original data set that have similar characteristics. WTA schema is one of the quickest hashing methods accessible, while having a pretty simple purpose. This method creates a hash for each input vecto r that is rank-ordered. This hash is used as an indication in our model to create collections or buckets of embedding that seem to be comparable.

Because it dramatically reduces the amount of time needed to operate correctly, this step is crucial in our methodology.

The last component of our model is this. Many buckets have been created through WTA hashing. It is now time to thoroughly compare all of the string embedding inside of each bucket.

The process of comparing two items to each other is known as similarity checking. To do this, a similarity measure may be used. In general, this metric produces a forecast using two vectors (in our case, embedding) as input. This forecast is a number that falls between a range of values, most often between zero and one.

The similarity between two predictions increases as one approaches. We first define a similarity threshold and then execute. If the similarity measure returns a value larger than this cutoff, we shall rely on the assumption that these

VI. SYSTEM ARCHIT ECTURE

We will provide the model scores to the CORA data set in detail in this part and demonstrate how it outperforms other applications in the same data set. The four scores Recall, Precision, F1 and Accuracy as well as the time required to create these predictions comprise our criterion. To begin, assess this model using the CORA data set. Along with presenting the findings from this data set, we will also quickly assess each model element independently. We'll look at the choice of prototypes, show the embeddings, watch WTA acceleration, and then comment on the outcomes and evaluate how the similarity metrics we recommended performed. Remember that our model has to be adjusted for it to function. With the aid of the cutting-edge framework Optuna, the fine-tuning will be carried out. We will briefly discuss how we utilised it and why it was so important to our work. Finally, we will evaluate the effectiveness of several ER models and contrast them with our own. Another cutting -edge framework, JedAI, will be used to build these models.

VII. ALGORIT HM, TOOLS& TECHNOLOGY

A. Algorithm

I. S : Array of strings (dataset) II. d : Max distance threshold

III. k : Max number of clusters

IV. procedure PrototypeSelection(S, k, d) V. i ← 0 ▷ Variable initialization

VI. y ← 0

VII. C ← array(0 : size(S)) ▷ C: Cluster array

VIII. r ← array([2, k]) ▷ r: 2-dimension

Representatives array

IX. for i < size(S), i ← i + 1 do ▷ String clustering phase

X. while j < k do ▷ iteration through clusters

XI. if r0(j) = ∅ then ▷ case empty first representative for cluster j

XII. r0(j) ← S[i]

XIII. C[i] ← j ▷ store in C that i-string belongs to cluster j

XIV. break

XV. else if r1(j) = ∅ and distance(S[i], r0(j)) ≤ d then

XVI. r1(j) ← S[i] XVII. C[i] ← j

XVIII. Break

XIX. else if r0(j) = ∅ and r1(j) = ∅ ▷ triangle inequality check

XX. and (distance(S[i], r0(j)) + distance(S[i], r0(j))) ≤

d then XXI. C[i] ← j

XXII. break XXIII. else

XXIV. j ← j + 1

XXV. end if XXVI. end while

XXVII. end for two items are similar. But these things should be treatedphase

XXIX. Prototypes ← emptyList()

XXX. SortedProjections ← emptyList()

XXXI. finalNumOfClusters ← k

XXXII. j ← 0

XXXIII. for j < k, j ← j + j do

XXXIV. aprxDistances ← AprxProjectionDistancesOfCluster(r1[j], r0[j], Cluster(j))

XXXV. if aprxDistances = ∅ then ▷ no prototype from this cluster

XXXVI. finalNumOfClusters ← finalNumOfClusters−1

XXXVII. continue

XXXVIII. end if

XXXIX. Projections(j) ← aprxDistances

XL. SortedProjections(j) ← Sort(Projections(j)) XLI. Prototypes(j) ← median(SortedProjections(j)) XLII. end for

XLIII. OptimizeClusterSelection(Prototypes,

finalNumOfClusters)

XLIV. return Prototypes, finalNumOfClusters

XLV. end procedure

B. Tools

- CORA dataset
- Python Idle
- Web Tools
- Google Colab

C. Technologies

- MachineLearning
- Python
- Data Science
- Web Technologies

VIII. RESULT S

the CORA dataset's findings

Optuna refining

Optuna is a well-known hyper-parameter tweaking system in the Deep Learning and Data Science fields. For the tweaking of our hyper-parameters, we used this tool. Starting with the plot below, which shows all of Optuna's attempts as well as her best F1 scores.

Fig. 1

In order to prevent poor recall and high accuracy or the contrary, we have made graphs that display the categorization statistics. The figure below makes it clear that we achieved excellent results among the same and distinct entities in the trials with the greatest F1-score.

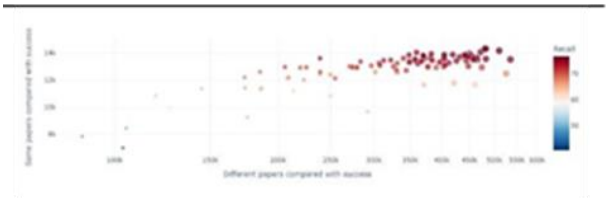

Fig. 2

Lastly, we present our best scores :

Trial id	Recall	F1	Precision	Accuracy
97	87.02	79.05	72.43	99.06
87	86.91	79.16	72.68	99.06
95	86.91	79.11	72.60	99.06
88	86.30	79.12	73.05	99.07
96	86.28	78.88	72.64	99.05
37	84.71	79.05	74.11	99.08
65	84.56	78.92	73.98	99.07
84	84.41	78.77	73.83	99.07
83	83.95	78.78	74.21	99.07
41	82.65	78.77	75.24	99.09

Fig. 3

IX. CONCLUSION

We provide a unique approach in this paper for solving ER issues with string data sets. To start, we offered a Prototype Selection strategy that, as the findings demonstrate, may lead to a collection of prototypes that have undergone careful selection in addition to a rich Euclidean and Dissimilarity, Embedding Space. After then, a rank-ordered approach was presented in order to escape the effects of dimensionality and take use of rank-ordered embedding' benefits.

The Winner-Take-All hashing strategy, which extends the

life of our model over time while retaining excellent Recall scores, was then presented as the most crucial part of the study.

We were able to cut the number of comparisons by around 80% and restrict the similarity checking phase to just the most similar pairings by using our blocking method. In the last segment, we went into great depth about the performance of our models and used and presented two cutting-edge frameworks, Optuna and JedAI. We demonstrated how our model generates a high recall score and an F-Measure that competes with other effective ER frameworks using these two frameworks. To sum up, we created an end-to-end model that can be applied to string ER issues and provide high-performance and reliable ratings in a short amount of time.

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XI. ACKNOWLEDGMENT

This paper on 'Scaling Entity resolution to large heterogeneous data with enhanced meta-blocking techniques using Machine learning' has been possible only because of kind co-operation lent by my teacher and project guide Mrs. Neha Patwari, without which this would not have been possible. We would also like to thank our parents, who have provided us with all possible resources to gain the best possible knowledge. At last, we would like to thank Dr. B.K. Mishra (Principal), Dr Sangeeta Vhatkar (Information Technology department, HOD) for their guidance and support

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Route Optimisation using Particle Swarm Optimization and Genetic algorithm- A detailed comparison

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Abstract— **This paper puts light on various routing problems faced in the transportation system. The Vehicle Routing Problem (VRP) and movement of goods that need to be transported from one destination to another should be planned in a way they are cost and energy efficient, It highlights various optimization techniques which can yield a powerful client and driven-centric outcome. Strengths and weaknesses of these methods are described. Soft computing techniques are proposed and these methodologies are compared to the real-world example. We compare different techniques used for VRP.**

Keywords – Soft computing, Optimisation, Particle Swarm, Vehicle Routing Problem, Road Transportation, Vehicle Utilization.

I.INTRODUCTION

Route is a particular road used for travel or transporting goods. There are various routes between a source and a destination. The user has the liberty of selecting a specific route but the problems faced are cost and point in time at the destination. The standard event is to travel between two points using the shortest path known, within a given specific time and value. But usually, what happens when the shortest path or route becomes the longest because of an occasion leading to deadlock on the route[5]. Then ,the user is probably going to spend more time and cost on the route which is meant to be shorter than other routes available, thus making it not an optimal or the feasible route at that point of time.

Most optimization problems are often solved by using any evolutionary algorithm. One of the most important classes of Evolutionary algorithms is Genetic algorithm (GA). GA uses various biological techniques such as inheritance, selection, crossover or recombination, mutation and reproduction[1]. Since GA is ready to handle both discrete and continuous variables, it can be used to solve complex optimization problems.GA has been very efficient in various problems like optimization, design and scheduling ,data handling, etc.

Particle Swarm Optimization (PSO) was developed by

Kennedy and Eberhart in the 1990s. The fundamentalidea in PSO is that each particle represents an optimal solution which it updates according to two important kinds of information available within the decision process. The primary one (cognitive behaviour) is gained by its own experience, and also the second one (social behaviour) is the experience gained from the neighbours, that is, they tried the choices themselves and have the knowledge which choices their neighbours have outstand to this point the way positive the most effective pattern of choices was [1],[2].

II. OBJECTIVE

The objective is to deliver goods to all kinds of customers, at the same time minimizing the cost required to deliver those goods. It allows the user to specify a number of business-specific constraints like time capacity windows, multiple capacity dimensions etc., and it can even be used to solve large scale problems.

III. VEHICLE ROUTING PROBLEM

The Vehicle Routing Problem (VRP) occurs when there is movement of goods from a certain point to serve the customers in various places. It is widely applied to various areas such as transport delivery routing, mail delivery, public bus routing planning, trucks that deliver products across the country [4]. This VRP is a mixture of the well-known routing problem called Capacitated Vehicle Routing Problem (CVRP). This problem helps to identify routes which start and end at an available centre. It has been designed such that a vehicle visits a customer once. The goal is to minimize the distribution cost for the assigned routes.

VRP can handle large volume problems quite efficiently. It offers a solution that is more scalable, cheaper to execute in real-life problems. Customisable algorithms and iteration logic can give us the mathematical result.

IV.PARTICLE SWARM OPTIMIZATION

The PSO model is designed to obtain optimal distance, and the transport objective is designed to minimize the transport cost in main logistics considering the Capacitated Vehicle Routing Problem[2]. To find the maximised output, there are several ways one can look into.

One optimization problem which can be suitable for a certain problem may not necessarily be optimal for another problem.

This algorithm is based on the swarm intelligence concept which solves complex mathematical problems in engineering. PSO is frequently implemented in VRP field. An advanced PSO is also designed to solve demands of customers that are uncertain and the demand distribution is undetermined. The goal of this optimization is to determine a variable represented by a vector X that minimises or maximises depending on the proposed optimisation of the function f(X) [1].

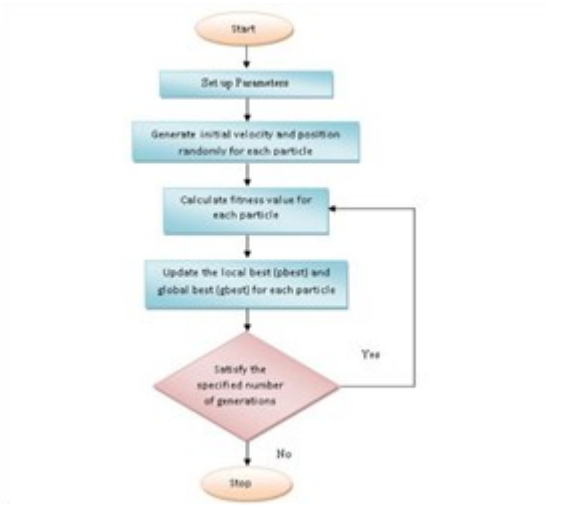

Fig 1. PSO Flowchart

The various steps used in the PSO algorithm are mentioned below:

1. Initialize the particles with some arbitrary velocities and positions within the search space.

2. Start calculating the corresponding value of fitness function of the swarm particles.

3. Equate the fitness value evaluation with the present value of the particle's pbest. If current value is best than pbest, set it as new pbest value and set the pbest location to this location in n- dimensional space;

4. Next equate the fitness value with the previous overall best. If current value is healthier than gbest, then reset gbest to the current particle's array index and value;

5. Finally assign these values to the corresponding position and velocity of the swarm particle.

PSO Variants:

Various versions of the PSO algorithm may be obtained by combining it with other evolutionary algorithms. There is a trend in research to create hybrid PSO algorithms to boost the general optimization of the algorithm. Some commonly used variants of PSO algorithm are:

- Discrete PSO
- Constriction Coefficient
- Bare-bones PSO
- Fully informed PSO.

Applications:

PSO found its first application within the field of neural network training. Since then, it's been used in various kinds of fields including telecommunications, design, power systems, control and lots of others. PSO algorithms have been majorly used in dynamic tracking, MinMax problems and various optimization problems [2].

V. GENETIC ALGORITHM

Genetic algorithms are a category of numerical and combinational optimizers which are especially useful for solving complex nonlinear and nonconvex problems. Genetic algorithms are randomized search algorithms that are developed in a shot to imitate the mechanics of natural selection and natural genetics. Genetic algorithms operate on string structures, like biological structures, which are evolving in time in keeping with the rule of survival of the fittest by employing a randomized yet structured information exchange. In a genetic algorithm, a population of candidates to an optimization problem is evolved toward better solutions. Each candidate solution encompasses a set of properties which may be mutated and altered; traditionally, solutions are represented in binary as strings of 0s and 1s, but other encodings are also possible [2].

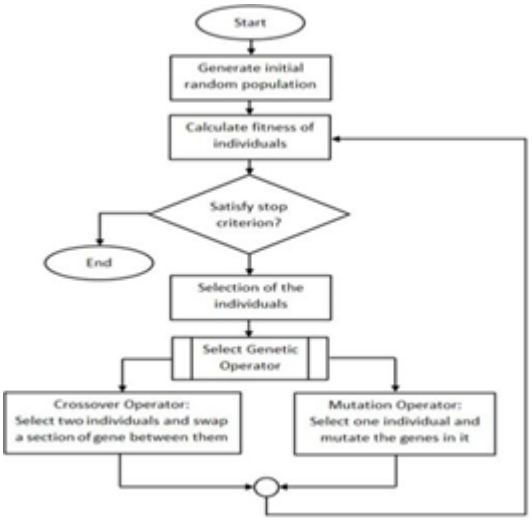

Fig 2. GA Flowchart

Hybrid discrete particle swarm optimization algorithm for clustered vehicle routing problem (2019) - Anisul Islam,Yuvraj Gajpal,Tarek Y

Key Findings: A new hybrid approximation algorithm is developed in this work to solve the problem. In the hybrid algorithm, discrete particle swarm optimization (DPSO) combines global search and local search to search for the optimal results using a certain probability to avoid being trapped in a local optimum.

Research Gap: Future research should focus on improving the DPSO-SA algorithm for solving larger vehicle routing problems. The proposed approach is also

suitable for other problems. It is especially suitable for discrete optimization problems.

Genetic algorithms can be used in a wide variety of fields. It is mainly used to solve optimization problems. Some of the fields where GA is used are: bioinformatics, computational science, electrical engineering, manufacturing, and phylo-genetics, etc

VI. LITERATURE SURVEY Performance Comparison between Particle Swarm

Optimization and Differential Evolution Algorithms for Postman Delivery Routing Problem (2021) - Warisa Wisittipanich, Khamphe Phoungthong, Chanin

Srisuwannapa , Adirek Baisukhan and Nuttachat

Wisittipanit.

Key Findings: In this study, two methods—particle swarm optimisation (PSO) and differential evolution (DE)— were applied with particular solution representation to find delivery routings with minimum travel distances. The performances of PSO and DE were compared along with those from current practices. Research Gap: It is important to note that the results

obtained from this study were based on the delivery constraints of the Chiang Rai post office. However, for the operations of other post offices, other constraints such as vehicle capacity, a customer's time window and the delivery time horizon could be taken into consideration. In such cases, the problem must be remodelled, and new solutions will be obtained.

Route Optimization in logistics distribution based on Particle Swarm Optimization (2019) - Appiah Martinson Yeboah Xiong Qiang.

Key Findings: Optimisation algorithm. A

computational experiment is carried by the proposed model to obtain optimal distance and imputed into the cost function to obtain the optimal cost. We found that an increase in population size and the number of iterations gives better minimisation results.

Research Gap: Only mathematical formulae and a flowchart were provided to demonstrate the particle swarm optimization. Also, cumulative results were obtained on the basis of problem assumptions. Real time constraint should also be checked.

Hybrid discrete particle swarm optimization algorithm for clustered vehicle routing problem (2019) - Anisul Islam,Yuvraj Gajpal,Tarek Y

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A Stochastic Approach Towards Travel Route Optimization and Recommendation Based on Users Constraints Using Markov Chain

(2019) - Shabir Ahmad, Israr Ullah, Faisal Mehmood , Muhammad Fayaz, and Dohyeun Kim

Key Findings: The results indicate the difference between the short- and long-term popularities to prove the

effectiveness of the Markov chains in forecasting long-term behaviour. The accuracy of the system is computed based on the historical data and the recommendation system, and it is ascertained to fall between 95% and

100% all the time.

Research Gap: The long-term steady states predictions alongside user preferences and constraints helped in finding optimal routes within user constraints. A

recommendation system is developed to take user constraints such as current location, number of locations to visit, maximum time and maximum distance from users and return optimal routes on Google Maps having maximum index within input constraints.

Research on Logistics Scheduling Based on PSO (2017)

- Huifang Bao, Linli Zhou and Lei Liu

Key Findings: The study of the logistics distribution vehicle routing optimization problem is not only of great

theoretical significance, but also of considerable value.

Particle swarm optimization algorithm is a kind of evolutionary algorithm.

Research Gap: Solutions were derived by experimenting under standard conditions and avoiding real life conditions and variables.

Route Optimization Techniques: an overview (2016) - Bale, D. L. T. Ugwu, C Nwachukwu, E. O

Key Findings: This paper discusses the various routing problems in the road transportation system and focuses

on route optimisation and its techniques. The techniques

were categorised as hard and soft computing; presenting their general strengths and weaknesses

Research Gap: With different techniques mentioned, the swarm based technique is not discussed. Fuzzy logic, artificial neural networks are a part of soft computing but other than that no other algorithms have been provided.

Performance Evaluation between GA versus PSO (2016)

- Ajay kaushik, Hiesh Kumar

Key Findings: When sensor nodes are in operation, performing their task most of their energy is depleted in

improper routing, uneven distribution of traffic load. So in this paper we are proposing two metaheuristic based

load balancing techniques GA and PSO and have a comparative result analysis in between them.

Research Gap: In the Upcoming future scope we can work on an agent-based burden balancing positioning algorithm for wireless sensor networks.

Hybrid discrete particle swarm optimization algorithm for capacitated vehicle routing problem (2015) - CHEN Ai-ling† , YANG Gen-ke, WU Chi-ming

Key Findings: A new hybrid approximation algorithm is developed in this work to solve the problem. In the hybrid

algorithm, discrete particle swarm optimization (DPSO)

combines global search and local search to search for the optimal results using a certain probability to avoid being trapped in a local optimum.

Research Gap: Future research should focus on improving the DPSO-SA algorithm for solving larger vehicle routing problems. The proposed approach is also suitable for

other problems. It is especially suitable for discrete optimization problems.

VII. GENETIC ALGORITHM VS PARTICLE SWARM OPTIMIZATION

PSO has been used increasingly because of its several advantages like robustness, efficiency and ease to use, compared with other stochastic algorithms it has been found that PSO requires less computational effort. Although PSO has shown its potential on various aspects for solving different kinds of optimization problems, it still takes considerable execution time to find out the optimal solutions for large-scale engineering problems.

GA is discrete in nature, i.e., it changes the variables into binary 0's and 1's, and so it can easily handle discrete problems, and PSO is continuous and hence must be modified in order to handle discrete problems.

Unlike GA, the variables in PSO can take any values supporting their current position within the particle space and therefore the velocity vector [5]. Genetic algorithms do not handle complexity in an efficient way, because in such cases the number of elements undergoing mutation is extremely large which causes a considerable increase in the search space. So, during this case PSO is the best alternative because it requires a smaller number of parameters and correspondingly lower number of iterations [7].

The performance of Particle Swarm Optimization is found to be better than the Genetic Algorithm, because the PSO carries out global search and the native searches simultaneously, whereas the Genetic Algorithm concentrates mainly on the world search. Hence, the findings show that the proposed PSO optimization algorithm is easy to develop and apply , producing competitive designs compared to the GA algorithm.

VIII. SWARM INTELLIGENCE ALGORITHMS

Types of Swarm Intelligence Algorithms include

- Genetic Algorithms (GA)
- Ant Colony Optimization (ACO)
- Particle Swarm Optimization (PSO)
- Differential Evolution (DE)
- Artificial Bee Colony (ABC)
- Glow worm Swarm Optimization (GSO)
- Cuckoo Search Algorithm (CSA).

1. ANT COLONY OPTIMIZATION

Ant Colony Optimization (ACO) is a systematic approach inspired by the Ant System, proposed in the year 1992 . It is inspired by the foraging behaviour of the real ants. This algorithm consists of 4 main components

; Ant, Pheromone, Daemon action, and Decentralized control, which contributes to the general system. Ants are agents that are employed in order to mimic the exploration and exploitation of the search space [3]. In reality, pheromone is a chemical material spread by ants over the path they travel and its intensity changes over time thanks to evaporation.

In ACO, the ants drop pheromones when traveling within the search space and also the quantities of those pheromones indicate the intensity of the trail. The ants choose the direction based on the path marked by the high intensity of the trail. The intensity of the trail can be considered as a worldwide memory of the system. Daemon actions are used to gather global information which cannot be done by a single ant and uses the information to determine whether it is necessary to add extra pheromone in order to help the convergence [2],[3].

Step 1:Edge selection

Step 2:Pheromone update

ADVANTAGES :

1.Provides Feedback accounts for rapid discovery of optimal solutions

2. Efficient for Representative Traveling Salesman

Problem and similar problems

3.Can be utilized in various dynamic applications

:Adapts to changes such as new distances. [4]

2. Artificial Bee Colony

Artificial Bee Colony (ABC) is one of the most recent swarm intelligence algorithms. It was proposed by Drevis Karaboga in 2005 . During one of the years, the performance of ABC was analyzed and it was concluded that ABC performs efficiently well compared to the various other approaches. This algorithm is inspired by the intelligent behavior of real honey bees in finding food sources, known as nectar, and then indulging in sharing information about that food source among other bees within the nest. During this approach, the artificial agents are defined and categorized into three types: the employed bee, the onlooker bee, and therefore the scout bee [3],[6].

Each of those bees have different tasks assigned to them so as to complete the algorithm's process. The employed bees target a food source and retain the locality of that food source in their memories. The number of employed bees is equal to the number of food sources since each employed bee is related to one and only 1 food source [9]. The onlooker bee receives the knowledge of the food source from the employed bee within the hive. After that, one of the food sources is chosen to assemble the nectar.

Step 1. Initialization Phase Step 2. Employed Bees Phase Step 3. Onlooker Bees Phase Step 4. Scout Bees Phase

Step 5. Termination Checking Phase

ADVANTAGES:

- Easy to implement, robust, and highly flexible.
- Only requires 2 parameters of maximum cycle number and colony size.
- It is often employed in many optimization problems with none modification.
- ABC has been implemented in various fields including engineering design problems, networking

, electronics , scheduling and image processing [3].

3. Differential Evolution

Differential evolution (DE) is a population-based search algorithm that optimizes an issue by iteratively improving a candidate solution supporting an evolutionary process. Such algorithms make few assumptions about the underlying optimization problem and can quickly explore very large design spaces. DE is arguably one among the foremost versatile and stable population-based search algorithms that exhibits robustness to multi-modal problems. Within the field of structural engineering, most practical optimization problems are associated with several behavioral constraints [8].

In the present study, we investigate the performance of 4 DE variants in dealing with structural optimization problems.

• The standard differential evolution (DE)

• The composite differential evolution (CODE)

• The self-adaptive differential evolution (SADE)

IX. CONCLUSION

Particle Swarm Optimization (PSO) is a relative algorithm where its behavior is based on swarming characteristics of the living organisms. PSO is kind of like Genetic Algorithm as both of those are evolutionarily search methods, which implies that they change from a set of points to another set of points within an iteration.GA is well-established and a popular algorithm with many applications and different versions.

Even though they have been a fundamental part of this research paper, there are certain disadvantages which limit their usage to only certain problems. They are still not an optimal solution for real-world problems. In order to overcome these disadvantages, a mixture of both GA and PSO will be accustomed to improve the performance. So, a hybrid algorithm of GA and PSO could be a good topic for future research too.

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Crop Yield Prediction using a Wavelet based Fusion of Landsat and Sentinel Data with Meteorological Parameters

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Abstract- **Crop yield prediction before harvest will help the formers to maximize their crop production. Thisproposed research, works on satellite data. The goal of this proposed paper is to enhance the precision ofthe yield forecasting model by considering various growing stages of wheat and using the fusion of Landsat and Sentinel images with meteorological parameters for improving the prediction accuracy compared to using the single satellite image. The collected images were fed into the atmospheric correction process to remove the atmospheric effect from the satellite images and to get the surface properties. This process is significantly necessary when calculating the vegetation indices. Then fusion technique was applied to combine the Landsat and Sentinel images. NDVI was calculated from the fused images then this value was combined with meteorological data and find the final yield of the crop using ensemble learning. This work also compares the production accuracy of wheat and jowar and predicts which crop will give maximum production in rabi season**

Keywords —Satellite imagery, Machine learning, Normalized Difference Vegetation Index, Fusion,Ensemble learning.

I. INTRODUCTION

Wheat is the most used cereal in the world. In the production ranking of wheat, India is the second place across the world. It occupies approximately 29 million acres of cultivation land. The growing season varies according to the type of wheat. In India, it is mainly sowed in the winter season. it's also called rabi season. The important factors which mostly affect the growth of wheat are radiation, rainfall, temperature,humidity, wind speed, and fertilizers. The wheat has almost seven developmental stages: it starts from March to June. The Green-up (beginning of March) is the first stage, followed by the Jointing Stage (end of march), Elongation Stage (beginning of april), Booting (middle of april), Heading Stage (end of april), Anthesis Stage (beginning to middle may), and finally maturity stage (beginning of June).

The previous study of this paper used sentinel data with meteorological parameters like sunshine hours,minimum and maximum temperature and NDVI. This proposed work used the combination of Landsat andSentinel data with meteorological parameters. This paper aims to predict the yield of wheat crops. The satellite images of Maharashtra state were collected for this proposed work. The various growing stages areconsidered for the yield prediction model. The same dates of Landsat and Sentinel images for various growing months are collected. Then these images were preprocessed and combined to find the Vegetationindex of the crop (NDVI). This vegetation portion was mainly used to find the yield of the crop. Then NDVI value is combined with meteorological parameters such as rainfall, temperature, humidity and find the yieldusing the ensemble learning technique. This is the combination of Random forest and Ada-boost algorithm. This technique is mainly used to enhance the accuracy of the yield prediction model. Ensemble learning is mostly used in complex real time problems to reduce the variance and minimize bias.

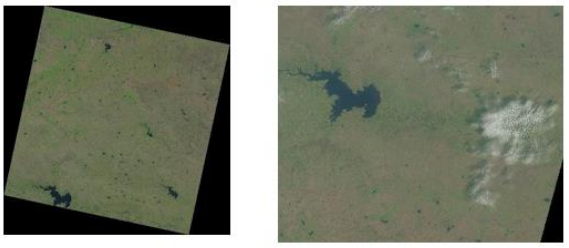

Fig. 1. Example Landsat and Sentinel image

II. RELATED WORK

Asha et al [1] used Landsat data with meteorological parameters to develop the yield prediction model.
U.S Nagar data was collected for the experiment. This paper developed four models using four meteorological parameters such as Bright sunshine hours, Maximum temperature, minimum temperature, and NDVI. The model with all four parameters has higher accuracy than the other three models.

Chang Xu et al [2] developed a soybean yield prediction model by using the remote sensing satellite images incorporating NDVI. This proposed work analyzes the relation between vegetation portion and production by utilizing the Flexible Fourier Transform model (FFT). This paper proves that the Flexible Fourier Transform model performs better than the ordinary least square regression model.

Shakarika Sharma et al [3] proposed a yield forecasting model using Deep LSTM. This paper used MODIS satellite images. It considers 7 states in India for their experimental zone. It has not used any preprocessing steps; they directly work on collected satellite images. This proposed work proves that the addition of information like farmlands, water bodies, and urban areas helps in enhancing prediction accuracy.

Pengfei Chen et al [4] considered the Landsat8 images for winter wheat yield prediction. It consideredYucheng city in china as their research zone. It covers 990km2. This paper compared the two multivariatemethods such as Partial Least Square Regression Model and Artificial

Neural Network. The result of this study showed that ANN outperforms the PLSR model.

Gang Pan et al [5] used digital camera images to estimate the crop cover area. The vegetation and soil background were classified using an Object-based image analysis technique. Images were classified into shadow and non-shadow classes by using a membership function. The non-shadow class is further grouped into soil or vegetation area. Then to determine the vegetation area, the no. of green pixels was divided by the image's absolute count.

III. DATASET DETAILS

The data set was obtained from USGS (United State Geographic System) website. This study focused on the state of Maharashtra. Landsat 8 OLI/TIRS c2 L1 and sentinel images were collected for Maharashtra state. The Path and row of this dataset are (146, 046). The latitude and longitude of this study area are 19 45'05" North latitude, 075 42'50" East longitude respectively. The Cloud cover range is below 5%. The dataset years were collected from 2013 to 2021

IV. METHODOLOGY

The basic process followed in this paper is explained below. It has 5 steps. Each step is explained in detail below

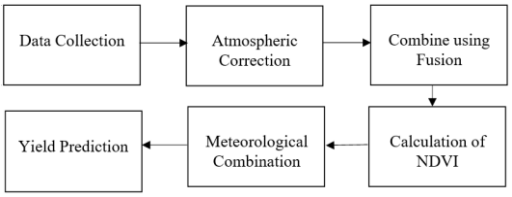

Fig 2. The Workflow of Yield Prediction Model

A. Data Collection

The Dataset used in this research work is taken from the USGS website. It consists of various satellite images. This proposed work uses Landsat 8 and Sentinel images dataset.

B. Atmospheric Correction

The main objective of doing atmospheric correction is to extract the surface properties from the satellite images. This method improves the accuracy of classification. The atmospheric corrected images significantly will give better accuracy when using multiple date images. It is a significantly necessary process when calculating the vegetation indices.

This process can be calculated using two phases

1.DN to Radiance conversion L= G* DN+ B

where DN: Digital number G and B are gain and bias values for a particular band

2.Radiance to TOA conversion P=Π * L* D 2 / ESUN * Cosɵ

All the values used in the formula are available in the metadata file of the image file.

B. Fusion

Image fusion is a technique for combining images. It combines two images and the resulted images is the fused one. The fused image contains more information than a single image. This fusion technique is not only needed for reducing the amount of data but it also helps to restore an image from more than one degraded image and for mixing images. There are various fusion techniques are available for combining images. Some of the examples are; feature-based, pixel-based and decision-based fusion. The fusion technique is of two types: spatial and frequency domain. The spatial domain consists of High Pass Filter, Intensity Hue Saturation, Brovey algorithm and Principal component substitution method. The frequency domain consists of pyramid-based algorithms, discrete cosine transforms, curvelet based and discrete wavelet transforms. This proposed work uses a wavelet based fusion technique. It is a mathematical tool for decomposing the images and it provides efficient localization in both spatial and frequency domain. It the extension idea of high pass filtering and it produce enhanced accuracy than other fusion methods. These wavelets are generated using High and low pass filters. The signal S is passed through these filters and down sampled by two. It produces low and high-frequency signals called an approximation and detailed coefficient respectively. The atmospherically corrected images were fed into the image registration step. This method converts the two different sets of images into one format. It is used in the remote sensing field to align different satellite images. Then resampling was done. It is same as resizing but it changes the physical number of pixels. This proposed work uses the down sampling method rather than up sampling because it preserves most pixels information and enhances the quality of the image. The 30m resolution band was reduced to 10 m as same as in the sentinel band.

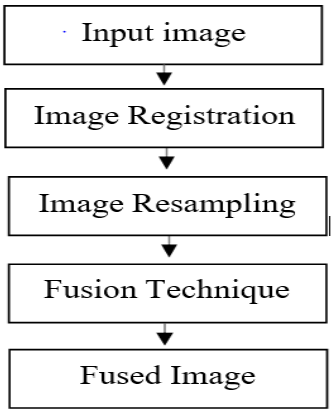

Fig 3. Fusion Steps

The Wavelet transformation based fusion technique was used in this proposed work. It has two forms discrete and continuous wavelet transforms. This research work uses the discrete wavelet transform technique.

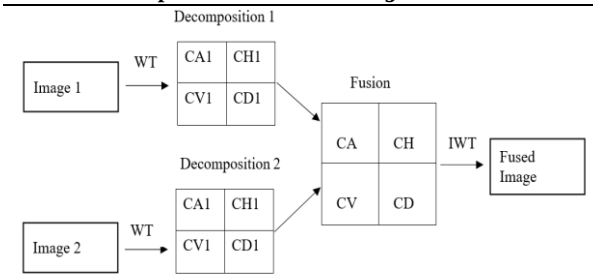

Fig 4. Working of wavelets in fusion process

Steps followed in wavelet transform technique

1. Gets the input images

2. Apply wavelet transformation on two images to get the decomposition of two images. This function decomposes the two images into 4 coefficients.

NDVI = NIR- R / NIR+ R

3. Find the detail and approximation coefficient of two input images. CA is the approximation coefficient of image, CH, CV, and CD are the detailed coefficient of input images.

Here CA1 is the approximation coefficient of image1. CH1is the detailed horizontal coefficient of image1

CV1is the detailed vertical coefficient of image1. CD1 is the detailed dimensional coefficient of image1

4. Merge the coefficient of two images by using the rule CA=fusion1(CA1,CA2)

CH=fusion2(CH1,CH2) CV=fusion2(CV1,CV2) CD=fusion2(CD1,CD2)

Fusion 1 and 2 are two mathematical operations. Fusion 1 is for approximation coefficient and fusion 2 is for detailed coefficient. These operations can be mean, max or min. so nine combinations of operations are possible.

5. Apply inverse transform on the merged coefficient

6. Get the final fused image as output.

Table 1: Final fused output

Fusion 1	**Fusion 2**
Mean	**Mean**
Mean	**Max**
Mean	**Min**
Max	**Mean**
Max	**Max**
Max	**Min**
Min	**Mean**
Min	**Max**
Min	**Min**

D. Calculation of NDVI

Normalized Difference vegetation Index (NDVI) estimates the green portion by calculating the ratio between the discrepancy between the near-infrared (NIR) and red bands (R) and the summation between the near-infrared and red band.

This NDVI value fluctuates between minus one to plus one at all times. water bodies are represented by a negative attribute. The value near to zero indicates, there is no vegetation portion, and the value near to positive one indicates dense leaves portion.

In Landsat8 image, NIR is the 5th band and RED is the 4th band as shown in Table no.2. In sentinel 2 image, 8 and 8a bands are NIR and RED is the 4th band as shown in Table no .3

E. Meteorological combination

Meteorological parameters such as temperature, precipitation, dew point, humidity, pressure and production factors are combined with NDVI value and find the final yield of the crop using ensemble learning. This ensemble learning is a combination of Random Forest and Ada-Boost algorithm.

Working of Random Forest:

Step1: N number of the decision tree was built for the various subset of the given dataset

Step 2: Then take the average of all decision trees to improve the accuracy of the prediction model. Advantages of using Random Forest Model:

1. It's Fast, Accurate and doesn't overfit

2. It can be used to solve both classification and regression problems

3. Work better with the high dimensional data point

4. It handles well missing values

5. Versatile in nature

Working of Ada-boost:

Step 1: First decision tree model is made from the dataset.

Step 2: The misclassified items from the first model only given as input to the second modelStep 3: These steps will continue up to the specified number of base learners

Advantages of using Ada-boost model:

1. It can be used with any model to improve its efficiency

2. Can be used to solve a decision tree problem

3. It learns from the model's prior error.

Table 2: Landsat8 resolution band

Bands	**Name of the band**	**Resolution in m**
I	Ultra-blue	30m
II	Blue	30m

III	Green	30m
IV	Red	30m
V	Near infrared	30m
VI	Cirrus	30m
VII	Short waveinfrared	30m
VIII	Short waveinfrared	30m
IX	panchromatic	15m
X	Thermal infrared	100m
XI	Thermal infrared	100m

Table 3**:** Sentinel resolution band

Bands	**Name of the band**	**Resolution**
I	Coastal	60m
II	Blue	10m
III	Green	10m
IV	Red	10m
V	Vegetation rededge	20m
VI	Vegetation rededge	20m
VII	Vegetation red edge	20m
VIII	Near infrared	10m
VIII a	Near infrared	20m
IX	Water vapor	60m
X	cirrus	60m
XI	Shortwaveinfrared	20m
XII	Shortwaveinfrared	20m

F. Performance Evaluation

The performance of the yield prediction model was estimated using Mean Absolute Error, Mean squared Error, and Root Mean Squared Error metrics.

$$Mean\ Square\ Error = \sum_{i=1}^{N} \frac{(predicted\ value - actual\ value)^2}{N}$$

Table 4 shows that ensemble algorithm shows better MAE results. Hence the ensemble algorithm of random forest and Ada boost with ensemble of SVM and Linear Regression was compared and former showed better results as shown in Table 5.

Table 6 shows wheat has less values in all three metrics which indicates the higher accuracy of production. Compared to jowar, wheat will give maximum production and jowar will give less production in rabi season as it needs different weather conditions for growing.

Table 4: Comparison of ML algorithms for predicting wheat yield

Metrics / Methods	MAE	MSE	RMSE
Random Forest	0.1772	0.0865	0.2941
Ada-Boost	0.1493	0.0648	0.2547
Ensemble Learning	0.0737	0.0276	0.1661

Table 5: Comparison of ML ensemble algorithms for predicting wheat yield

Metrics / Methods	MAE	MSE	RMSE
Random forest and Ada-boost	0.0737	0.0276	0.1661
SVM and Linear Regression	0.1794	0.0562	0.2372

Table 6: Comparison of wheat and jowar yield prediction using ensemble of Random Forest and Ada Boost

MetricsCrops	MAE	MSE	RMSE
Wheat	0.0737	0.0276	0.1661
Jowar	0.2222	0.1029	0.3209

V. Experimental Results

The satellite data in the day of 29/12/15 was collected and then atmospheric correction was done to get the surface properties of the land As shown in Fig 5.

The performance was estimated using the R2 score, Mean Squared score, and Root Mean Squared Value. The accuracy was increased when fusing two images. This proposed work increases the precision of the yield forecasting model compared to utilizing the single satellite image.

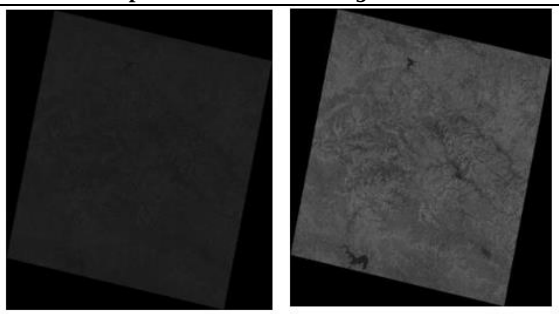

Fig.5. 29/12/15 atmospheric correction of Landsat data

NDVI calculation

The NDVI value was calculated from the atmospheric corrected image to get the value of vegetation and other parameters as shown in Fig 6.

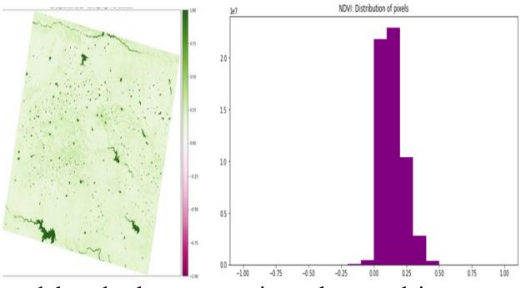

Fig 6. Distribution of NDVI value

It was observed that compared to the single satellite image the fusion of images increased the accuracy of the estimation model and when comparing wheat and jowar crop in rabi season, the wheatcrop will give maximum yield than jowar crop as shown in Fig 7.

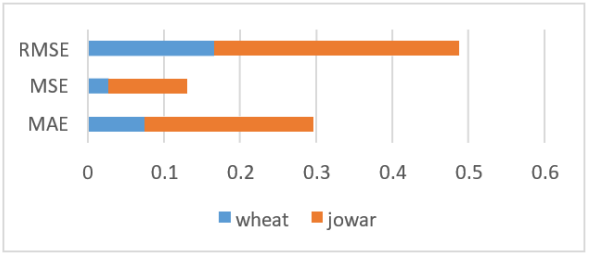

Fig. 7. Accuracy comparison of Landsat, Sentinel and Fused image

VI. CONCLUSION AND FUTURE WORK

Various works are done in the agriculture sector to predict the yield of the crops. The proposed work uses the combination of Landsat and Sentinel data with meteorological parameters to enhance the precision of the yield estimation model. The performance was estimated using the R2 score, Mean Squared score, and Root Mean Squared Value. It was inferred that the accuracy of predicting the wheat yield is more compared to jowar yield predicting. This proposed work increases the precision of the yield forecasting model compared to utilizing the single satellite image.

This proposed work will extend in the future by considering more input parameters. And also, will extend for other combination of satellite images like MODIS, sentinel 2B, etc.

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Sarcasm Detection for Code-Mix Language using Machine Learning Khushbu Ravaria,

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Abstract – **Sarcasm is a way of communication that creates gap between the intended meaning and the actual meaning comprehended from the conversation. Communication and human relations over social media sites like Facebook, Twitter circles around a lot of sarcasm and debates. Sarcasm detection is an important processing problem which is needed to understand the human and machine communication better. This paper aims to understand the gap between the emotion and the contextual meaning by using different machine learning approaches for Sarcasm Detection of code-mixed Hi-En dataset. The algorithms that we have used are Bernoulli Naïve Bayes, Logistic Regression and Support Vector Machine. SVM outperforms all the used algorithms giving an accuracy of 87.36%.**

Keywords --- machine learning, natural language processing, human interpersonal communication, support vector machines

I. INTRODUCTION

A code-mix dataset consists of phrases and words from two are more languages in a single sentence. It is generally used by people who understand and use more than one language to communicate in their daily life. Today, the world over, people communicate using not just one language, but rather with a mixture of more than one language.[1] Code-Mix language is widely seen on social media and with so many social media applications available the amount of code-mix data available is tremendous. So code-mixed text data analysis in multilingual societies like India has become a vital linguistic research area more specifically for social media content.[2] However, this data has various combinations of languages especially in India where 22 different languages exist.

Sarcasm detection is a relatively specialised area of NLP

research, a particular application of sentiment analysis where the emphasis is on sarcasm rather than detecting a sentiment throughout the entire spectrum. Consequently, the goal of this sector is to determine whether a particular text is satirical or not. Sarcasm detection is an important processing problem in natural language processing (NLP), which is needed for better understanding to serve as an interface for mutual communication between machines and humans. To understand this is to underline the basic problem behind it - being able to detect the contradiction. [3]

The sarcasm over social media can be of various types. Social media is an open platform to let people express their thoughts and feelings over something or someone. An individual may like-dislike, agree or disagree with another person's tweets, posts, or opinions. It is however easier for humans to understand the gap between the underlying sarcastic nature of the comment, but the machine brain cannot easily differentiate. This is an addition to the numerous machine learning as well as natural language processing approaches that have been used to address the problem. The paper focuses on code-mix data for the Hindi-English dataset abbreviated as the Hi-En dataset

TABLE I: EXAMPLE OF HI-EN CODE-MIX DATASET

Tweet: "Ha ha ha, really great job, yaar. Tune dikha diya that even a clock that doesn't work is right twice a day."	Sarcasm
Tweet:	Non- Sarcasm
Tweet:	Sarcastic
"Very well done, shayad apne aapko Einstein	
Translation:	
"Very well done, perhaps you have thought	
Tweet:	Sarcastic
" Bahut hi unique kaam kiya hai, koi bhi nahi kar	
Translation:	
"Very unique work done, no one else can do it."	
Tweet:	Non-Sarcastic
"In dino economy achi chal rahi h."	
Translation:	
"These days the economy is doing well."	

The messages in Twitter or tweets are generally labelled with hash tags like #angry, #driving, #joy etc. These hash tags have been used to construct a marked set of naturally transpiring negative, sarcastic and positive tweets.[4]

II. LITERARY SURVEY

The paper "Sentiment Analysis of Mixed Code for the Transliterated Hindi and Marathi Texts" [1] throws light on using plain machine learning algorithms for sentiment analysis of texts English-Hindi and English-Marathi. The dataset used in this paper contains 1200 Hindi and 300 Marathi samples collected from social media including YouTube comments, tweets and chats. The proposed methodology includes 6 steps which are Language Identification, Word Transliteration, Sentiment Scores Tagging, Feature Extraction, Supervised Learning Methods and lastly the Output as sentiments. Among all the algorithms applied direct linear SVM has the maximum F1 score.

"A Corpus of English-Hindi Code-Mixed Tweets for Sarcasm Detection" [5] sarcasm detection have been provides a resource of English-Hindi code-mixed tweets

which contain both sarcastic and non-sarcastic tweets. It provides tweet level annotation for presence of sarcasm and token level language annotation. For training the algorithms, developing them and evaluating the performance of language identification and sarcasm detection on code-mixed data, this corpus can be used.

The paper "Detection on sarcasm using machine learning classifiers and rule-based approach" [6] shows comparative study on various algorithms to identify which of these algorithms give the best results. Machine Learning algorithms used to detect the sarcasm here are Support Vector Machine, Naïve Bayes and Decision Tree for the SemEval 2018-T3-train- taskA.txt dataset and found Support vector machine algorithm to be the best suited for the particular dataset. Algorithms like Random Forest and SVM are used for the dataset Sarcasm Detection.txt and found Random Forest algorithm to give best results with the accuracy of 76%.

The paper "Sentimental analysis from imbalanced code-mixed data using machine learning approaches" [7] throws light on class imbalance distribution in code-mixed Tamil-English data for sentiment analysis. Oversampling techniques namely Synthetic Minority Over-Sampling (SMOTE) and Adaptive Synthetic (ADASYN) is used to solve the class imbalance problem. An enhanced spell-checking algorithm is used for sentence classification. Levenshtein distance metric is used to normalize the words with spelling variations. TF-IDF is used for feature extraction. Different machine learning algorithms that were experimented includes Random Forest Classifier, Logistic Regression, XGBoost classifier, SVM and Naive Bayes. For evaluation of the algorithms macro average F1 score is used. According to this paper the performance of Logistic Regression is superior to other algorithms.

"A Dataset of Hindi-English Code-Mixed Social Media Text for Hate Speech Detection" [8] paper addresses hate speech detection in code-mixed text. Using Twitter Python API tweets were mined by selecting certain hashtags and key words from politics, public protests, riots, etc. A total of 1,12,718 tweets were retrieved in JSON format. After pre-processing, a dataset of 4574 code-mixed Hindi-English tweets was created. Different feature vectors were used to train supervised machine learning model. These vectors included Character N-Grams, Word N-Grams, Punctuations, Negation Words and Lexicon. Support Vector Machine algorithms performs the best with an accuracy of 71.7%.

Sarcasm Detection in Hindi-English Code-Mixed Data using Bilingual Word Embeddings" [9] has five different deep learning models. The corpus was scraped from twitter. The dataset included 100k Hindi-English code-mixed tweets with 49% of it being sarcastic and rest 51% non-sarcastic tweets. Data pre- processing was performed in order to remove any sort of extra URLs, hashtags, mentions and other punctuations. Two types of word embeddings were used that is Word2Vec and FastText. The paper also presented a comparison of traditional Machine Learning algorithms for sarcasm detection. From which RBF Kernel SVM had the maximum accuracy of 71.23%. The paper concludes with attention based Bi-directional LSTM being the best performer with an accuracy of 78.49%.

In the paper "SA-SVG@Dravidian-CodeMix-FIRE2020: Deep Learning Based Sentiment Analysis in Code-mixed Tamil- English Text" [10] Bi-LSTM algorithm is used for classification of text which processes the data both in forward and backward direction. Along with this transformers-based models can be used to achieve more accurate results then LSTM and traditional machine learning algorithms such as SVM, random forest, etc.

The paper "Multi-modal sarcasm detection and humor classification in code-mixed conversations" [11] uses Attention based multi-modal classification model. This paper presents a unique dataset named MaSac that is extracted from the hindi series Sarabhai vs Sarabhai. MaSac is a qualitative multi-modal dataset for sarcasm detection and humor classification in code mixed conversations. To extract speech signals Google Speech API-based automatic speech recognition tool is used.

In the paper "Multilingual and code-switching ASR challenges

for low resource Indian languages" [12] approximately 600 hrs of speech dataset was created for the research from different sources and different domains. The variabilities in each language was preserved. Robust Multilingual ASR was built by considering graphemes and phonemes in six different languages. Code-switching ASR designed for 2 major pairs Hindi-English and Bengali-English. The dataset generated is huge as compared to existing publicly available dataset in this category and can be further used for future research.

The paper "Sentiment Analysis of Code-Mixed Text: A survey" [13] talks about how sentiment analysis has wide range of applications in e-commerce, recommendation systems, review analysis, etc. Sarcasm detection, multipolarity, word ambiguity are the major issues in sentiment analysis. The two major ways of sentiment analysis discussed in this paper includes machine-learning based and lexicon-based techniques.

III. OUR RESEARCH

Topics like sentiment analysis and sarcasm detection with machine learning and neural networks have gained attention in the past few years. Research has been done for monolingual dataset and certain code-mix dataset like Tamil-English, Bengali English and mainly the English dataset.

However, very few research has been done for sarcasm detection for Hi-En dataset. Our approach is to research on various algorithms, compare accuracy metrics and thus

provide insight on the most suitable algorithm that can be implemented. We are aiming to do sarcasm detection on code-mix dataset of Hindi-English by using machine learning algorithms as well as convolutional neural networks and we then compare the results.

The machine learning algorithms that will be implemented are Bernoulli Naïve Bayes, Logistic Regression and Support Vector Machines. The accuracy metrics that will be measured for analysis are F1 Score, Precision and Recall. Deep learning techniques like Long-Short Term Memory and Recurrent Neural Networks will also be will be implemented in the future.

IV. DESIGN & IMPLEMENTATION

A. Dataset

The dataset consists of tweets and comments from Twitter with over 115000 samples. The dataset is in JSON format. It has 3 parameters which are article_link, headline and is_sarcastic. In the is_sarcastic parameter, 0 means that the statement is non-sarcastic and 1 means sarcastic.


```
{
  "article_link": 5,
  "is_sarcastic": 1,
  "headline": "koi toh hamko bhi follow karlo bhai"
},
{
  "article_link": 6,
  "is_sarcastic": 1,
  "headline": "idhar toh alag level ka offer chal raha hai toh aap
  bhi aao aur ek pizza pe dusra pizza free leke jao"
},

{
  "article_link": 7,
  "is_sarcastic": 0,
  "headline": "for a sec i thought this was a rally in rawalpi
},
{
  "article_link": 8,
  "is_sarcastic": 1,
  "headline": "bhaai ko sab pata hain"
},
{
  "article_link": 9,
  "is_sarcastic": 0,
  "headline": "kiya dhoni k liye as a captan e tne safal rahe
  uska ek bahot bada karan rahe hain"
},
{
  "article_link": 10,
  "is_sarcastic": 0,
  "headline": "ab yeh kaam bhi karne laga hain hamara kuldee
},
{
  "article_link": 11,
  "is_sarcastic": 0,
  "headline": "jeeta hu bhai aise comment karke"
},
```


Fig 1: Dataset

Table II gives the overview of total number of tweets and count of sarcastic and non-sarcastic tweets in our training dataset.

Further the model assigns 'Sarcastic' class to 1 and 'Not sarcastic to 0. When an input is provided from the testing dataset features of the input text are compared with the training dataset and accordingly output is produced.

TABLE II: TRAINING DATASET

Category	Tweet Count
Total Tweets	115000
Sarcastic	57633
Non-Sarcastic	57367

B. System Architecture

The overview of our project has been shown in Fig 2 which includes the key algorithms we have used for implementation. The accuracy yielded by each will enable us to make decision on the effectiveness of the algorithm for sarcasm detection.

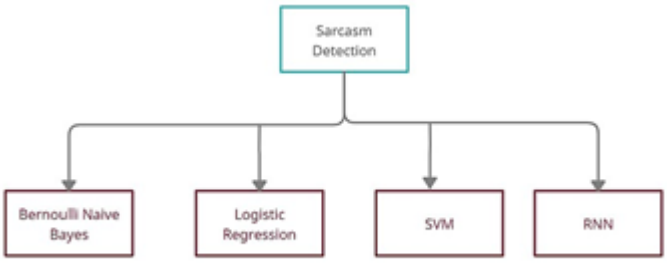

Fig 2: Block Diagram

The diagram in Fig 2 defines the hierarchy of the algorithms with respect to implementation and defines the various components and sub-components. We have used 80% of the data for training and the remaining for testing in each of the algorithm applied

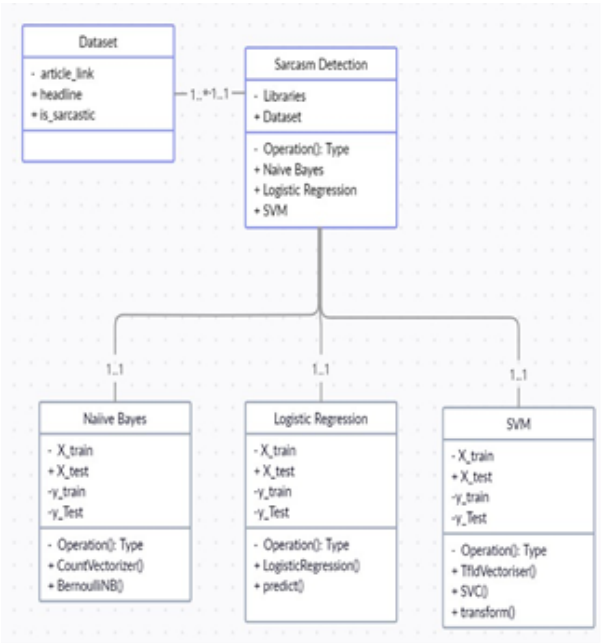

Fig 3: UML Diagram

The step-by-step process in the development of the machine learning model has been outlined in Fig 3.

The key component of any machine learning algorithm is the dataset. Hence the process starts with collecting suitable dataset and data analysis. Further the algorithms have been implemented in sequence to follow.

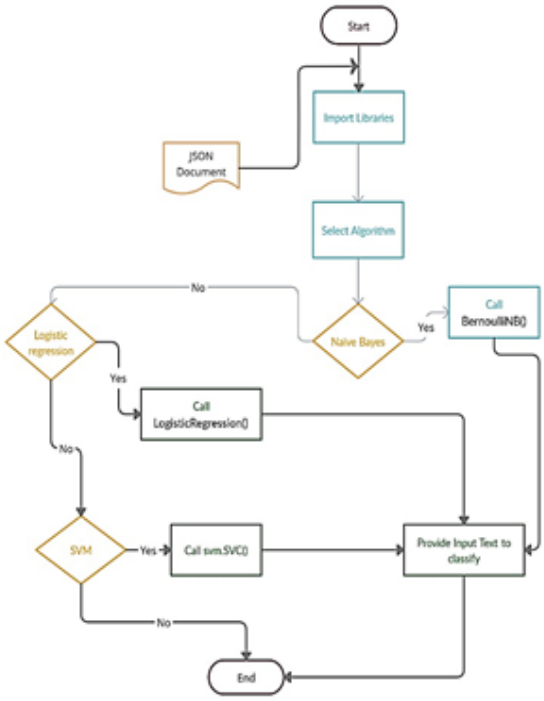

Fig 4: Flowchart for Mode

C. Algorithms

Machine Learning allows computers to seek new tasks without being explicitly programmed to perform them.[2] In Sentiment analysis, machine learning can be used to analyse text for polarity. The three models that we have used in our project are discussed below.

1) Bernoulli Naïve Bayes

Bernoulli Naive Bayes is a part of the Naïve Bayes family. Naïve Bayes classifier is a probabilistic classifier and has been derived from the concept of Bayes Theorem which assumes that all features are independent or unrelated.

The concept of Bernoulli Naïve Bayes follows the concept of probability called the Bernoulli Distribution as shown below.

$$p(x) = P[X = x] = \begin{cases} q = 1 - p & x = 0 \\ p & x = 1 \end{cases} \quad (1)$$

One of the reasons for using Bernoulli Naïve Bayes is that it based on Bernoulli Distribution and accepts only binary values such as true or false, yes or no, 0 or 1 and so on. In our model we have used sklearn and calculated the accuracy and f1 score of the model.

2) Logistic Regression

Logistic Regression is a type of statistical model which is used for classification and predictive analysis which comes under the Supervised Learning technique. It is mainly used when the dependent(target) variable is categorical.

As a result, the result must be a discrete or categorical value. Rather than providing the exact values of 0 and 1, it provides the probabilistic values that fall between 0 and 1. The Logistic regression equation can be obtained from the Linear Regression equation

1−*y* 0 1 1 2 2 3 3 n n (2

In logistic regression, we fit a "S" shaped logistic function, which predicts two maximum values, rather than a regression line (0 or 1). The logistic function's curve represents the likelihood of something.

Since it can classify new data using both continuous and discrete datasets, logistic regression is a key machine learning approach. The Fig 5 shows the logistic function:

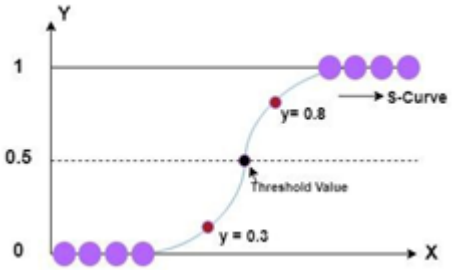

Fig 5: Logistic Regression

3) Support Vector Machine

SVM was introduced by Vladimir N. Vapnik and Alexey Ya. Chervonenkis in 1964. The SVM algorithm's objective is to establish the optimum decision boundary which is chosen in a way that maximizes the margin, which is the distance between the boundary and the closest data point from each class.

The new data points are then classified based on which side of the boundary they fall on.

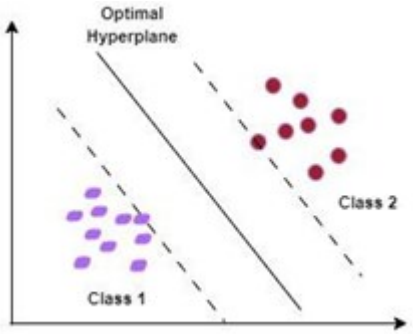

Fig 6: Support Vector Machine

In the case of sarcasm detection, SVM can be used to classify a given text as sarcastic or not by training the model on a labelled dataset of text examples. In our project we have used sklearn linear SVM library for implementing our SVM based models.

V. RESULT AND ANALYSIS

A. Result

We have used 3 different approaches to split the data into training and testing sets. The first approach includes 80-20 split with 80% of data used for training and 20% used for testing. The reason for splitting the dataset into 80:20 ratio is that it provides a good balance between having enough data for the model to learn from, while still reserving enough data for evaluating the model's performance.

The other two splitting approaches have been summarized in Table 3 below. The accuracy of a model is defined as the ratio of the number of correct predictions to the total number of predictions.

We can infer from the Table III that all the three algorithms have very close performance results. The performance decreases when the train-test split is made 50-50. Support Vector Machine gives the best result at a 80-20 split.

We have used F1 Score to evaluate the performance of different algorithms from which we have seen that SVM performs the best out of the three models.

Train-Test Split	**Accuracy Obtained**		
	Bernoulli Naïve Bayes	**Logistic Regressi**	**Support Vector Machi**
Training Set: 80% Testing Set: 20%	0.7918717122	0.7918717122	0.873652173
Training Set: 60% Testing Set: 40%	0.7911845730	0.7918717122	0.870413043
Training Set: 50% Testing Set: 50%	0.7785357468	0.7785357468	0.868643478

B. Error Analysis

We found that the model showed bias in the result depending on the length of the test input. A comparatively shorter sentence would have higher probability to be classified as being "Sarcastic" whereas a longer sentence would be classified as "Not Sarcastic".

To rectify these errors, we have planned to use POS tagging on the dataset and further implement deep learning techniques.

VI. CONCLUSION

With the increase in number of people using social media to express their views, tasks like opinion mining and sentiment analysis have gained a lot of importance. And using sarcasm in these social media texts make these tasks much more challenging. In our project, we have presented an English-Hindi code-mixed dataset for sarcasm detection. We also presented a baseline supervised classification that is developed using the same dataset which uses three different machine learning techniques.

VII. FUTURE SCOPE

In the future, we intend to implement a deep learning algorithm

for detecting sarcastic texts. We will compare the two approaches that we have implemented to understand which algorithm or approach gives the best results

ACKNOWLEDGMENTS

We acknowledge Thakur College of Engineering and Technology for giving this wonderful opportunity to think innovative and express our ideas. We would also like to express our gratitude to our mentor Mrs. Shruti Mathur for her guidance throughout. It is our privilege to be able to do such work

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Disease Prediction System

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Abstract-Predire is a web-based application that will help to predict diseases and provide an educational environment for students and patients. This project will provide an effective platform for the medical students and patients. There's been an increase in soul disease prediction models but there has never been models which predicts more than one variety of disease in a wider spectrum. This project focuses and tackles this research problem by using classification algorithm of data science on meticulously curated medical dataset. Random Forest Classifier is used for the classification of the dataset, where the users predict their disease based on 5 input symptoms. The met conclusion of this project is to predict user's diseases accurate, however the research is labelled to be in progress as with more medical data, more accurate, descriptive and intricate prediction models can be made.

Keywords— Healthcare Prediction, Recommendation, Machine Learning.

I. INTRODUCTION

Predire is a website that uses Machine Learning algorithms to predict diseases with the help of symptoms provided by our users/patients. It also provides Healthcare related news and research papers for doctors and medical students.

This website caters not only to the public but also to hospitals and private corporations.

With the integration of powerful machine learning techniques and accurate medical data, we have developed a website that can predict 41 diseases. It predicts diseases that range from common diseases such as common cold, fever, etc. to severe diseases such as hepatitis, tuberculosis, diabetes, etc.

The already existing applications for disease prediction do not predict a wide variety of diseases, instead, they are focused on predicting a single disease. Additionally, they do not provide an environment where the user can learn or gain knowledge about topics related to their application.

Predire tackles all the above constraints and provides an intricate and accurate prediction using a different approach than the pre-existing systems on the internet. Predire's prediction model is weight-based. It predicts the highest weighted disease based on 5 symptoms provided by the user. Here, weights are values ranging from 1-5 assigned to each disease based on their severity, where the higher value indicates a higher severity.

II. THEORY

The main objective of making this project (Predire) is to create an environment where the user can browse through various Health-related news, site curated research papers and get an accurate synopsis of the disease they might have while using our Prediction page. As this is a Web Application, it is easily accessible from anywhere in this world as long as there is a stable internet and hardware, and software requirements are met. The User Interface of the website is meticulously designed for a user-friendly experience wherein the user can easily navigate through the website using our well-designed Home page and Navigation bar. The main highlight of the website is our Prediction model. It is an easy-to-

understand model which consists of 5 symptom inputs and a predict button. We have also provided detailed instructions on how to use the model for the user's convenience. There is also a Blog/News section where we provide news feeds from around the world related to the field of medicine. This project is also trying to create an environment that caters to medical students

by providing latest research papers in the field of medicine.

III. LITERATURE SURVEY

We read a variety of research articles as our project was being developed, and they helped us comprehend our alternatives and potential solutions. They also assisted us in comprehending the technical and mathematical knowledge that will be useful.

One of the papers that we studied was the "Disease Prediction in Data Mining Technique" by the Authors S. Vijyaranhi and S. Sudha and it talked about how data mining techniques are used to predict various types of diseases. This paper reviewed research papers that focused on predicting heart disease, diabetes, and breast cancer. The prediction of heart disease was discussed using machine learning algorithms such as naive bayes, K-NN, and Decision List. When compared to other algorithms, the nave bayes algorithm has the highest classification accuracy. The author concluded that naive bayes correctly classifies

74% of the input instances. Following that, we will talk about breast cancer prediction. It is carried out using a variety of data mining techniques, including C4.5, ANN, and fuzzy decision trees. Using C4.5, the author discussed and resolved the problem's issues and algorithms. Using ANN, the author concluded that the network is trained to have consistent accuracy over time and good performance. Finally, we discuss diabetes prediction, where the author discovers overfitting and over generalization behavior of classification using a homogeneity-based algorithm. The author predicts class accuracy using a genetic algorithm.

The second article was titled "The Use and Role of

Predictive Systems in Disease Management" published by the authors David H. Gent,, Walter F. Mahaffee, Neil McRoberts, and William F. Pfenderdid a study about the Disease predictive systems are intended to be management aids. With a few exceptions, these systems typically do not have direct sustained use by growers. Rather, their impact is mostly pedagogic and indirect, improving recommendations from farm advisers and shaping management concepts. The degree to which a system is consulted depends on the amount of perceived new, actionable information that is consistent with the objectives of the user. Often this involves avoiding risks associated with costly disease outbreaks. Adoption is sensitive to the correspondence between the information a system delivers, and the information needed to manage a particular pathosystem at an acceptable financial risk; details of the approach used to predict disease risk are less important. The continuing challenge for researchers is to construct tools relevant to farmers and their advisers that improve upon their current management skill.

And the third paper published by the authors Mangesh Limbitote and Kedar Damkondwar named "Prediction Techniques of Heart Disease using Machine Learning" talks about Heart is one of the most important parts of the body. It helps to purify and circulate blood to all parts of the body. Most number of deaths in the world are due to heart diseases. Some symptoms like chest pain, faster heartbeat, discomfort in breathing are recorded. This data is analyzed on regular basis. In this review, an overview of the heart disease and its current procedures is firstly introduced. Furthermore, an in- depth analysis of the most relevant machine learning techniques available on the literature for heart disease prediction is briefly elaborated. The discussed machine learning algorithms are Decision Tree, SVM, ANN, Naive Bayes, Random Forest, KNN. The algorithms are compared on the basis of features. We are working on the algorithm with best accuracy. This will help the doctors to assist the heart problem easily.

Furthermore, in the fourth paper named "Data-driven Automatic Treatment Regimen Development and Recommendation" by authors Leilei Sun, Chuanren Liu, Chonghui Guo, Hui Xiong, Yanming Xie discussed about the analysis of EMR records to detect typical treatment regiments and measuring (quantitatively) the effectiveness of those regimens for specific patient cohorts. The authors compare the similarity of treatment records in the EMR, use Map Reduce Enhanced Density Peaks based Clustering to group similar ones to treatment regimens, extract semantically meaningful information for the doctor, and estimate the treatment outcome for a patient cohort for a typical treatment regimen. The results of an empirical study using this approach show that the patient's effective rate and cure rate both increases.

In summary, recommendation systems are used to suggest various measures to patients or users based on their history or symptoms. Therefore, this research helps us understand different aspects of customer behaviour.

IV. METHODOLOGY AND PROPOSED MODEL

When creating a project or piece of software, it is essential to comprehend the process or kind of software development lifecycle model that will be used. We need to select the SDLC model that will work best for our project from a variety of models, which is why we use the agile methodology.

Additionally, the actions taken up until this point have been previously discussed. After deciding on a project title, we first began studying about and establishing the project's requirements. During this, we also decided on the approaches to be applied. After that, we made the decision to research already-in-use systems to gain a deeper knowledge before implementing them. We devised a schedule for when this implementation should take place, along with considerations for any revisions that could be necessary and the errors that should be investigated. Therefore, we selected Agile methodology

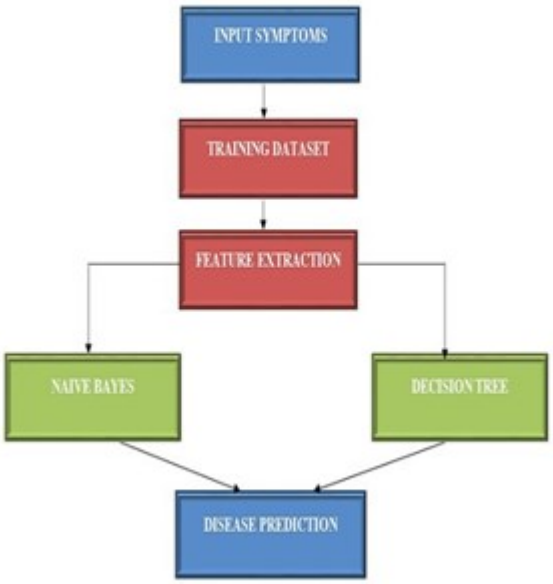

Fig. 4.1 Data flow diagram

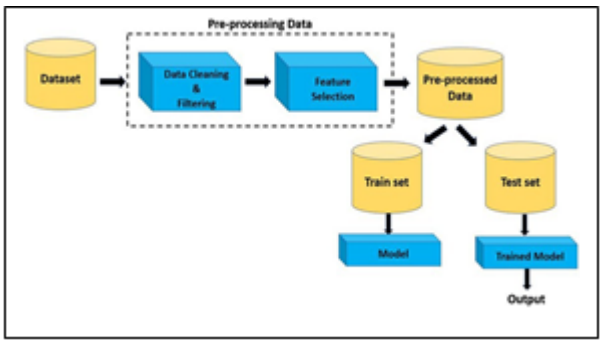

Fig. 4.2 Block diagram

Above attached diagrams are a couple of the ones that we made during our project planning phase using tools available online to achieve our goal.

V. IMPLEMENTATION

This system's primary goal is to diagnose illnesses using user-provided symptoms as input. Additionally, if

it is feasible, we might test a few additional machine learning models so that we can compare how they perform to the ones we are currently using

Fig 5.1 Random Forest Classifier

We decided on Logistic Regression algorithm along with feature selection to yield high accuracy using training and testing dataset which was freely available for us to use. The model was trained and tested using the dataset which contains the columns of different symptoms and based on these symptoms the prediction of diseases.

Fig. 5.2 Libraries Used

Fig. 5.3 Reading and training the dataset

Figures 5.1 and 5.2 are a few code examples that we used and put into practise when categorising the dataset during training and testing and when using feature engineering, respectively

Fig 5.4 Data Exploration and Optimisation

VI. RESULTS AND DISCUSSION

The model predicts the diseases and makes a confusion matrix and based on the predictions results are provided. Based on the results of confusion matrix using different algorithms results are displayed. Below is the output that we managed to achieve.

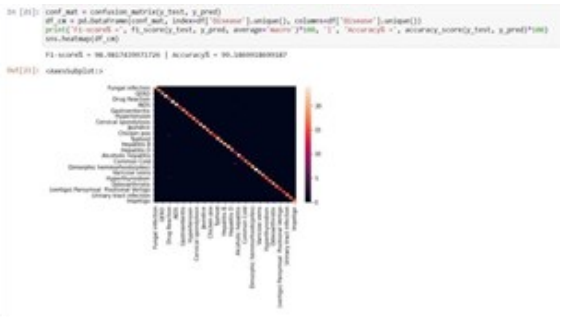

Fig 6.1 Heat Map

Fig. 6.2 Confusion Matrix

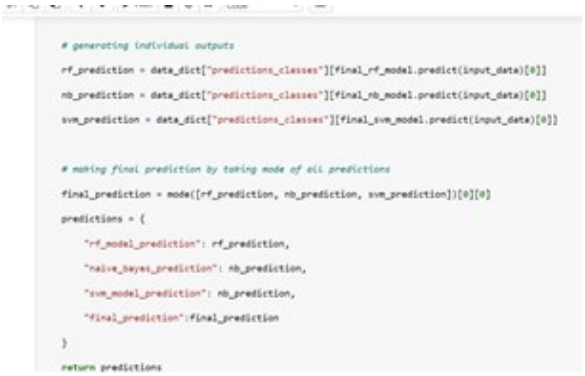

Fig. 6.3 Results

All the above-mentioned actions were taken after consulting the manual and receiving advice from professionals in the field. What is anticipated of the system is predicted by its output. One anomaly, which is that the values that are to be submitted for prediction right now are being given and taken in normalized form, is something we would like to fix in the following phase. So, that's one significant feature that we anticipate changing later in the ensuing period.

The Website will be based on prediction model where users can embed their symptoms and get the possible prediction based on the symptoms. The best possible accuracy level of prediction model. Nearby hospital will be suggested based on the predicted disease. Users will have all the medical data stored in one place with all the prescribed data uploading facilities. The simple Gui will help user in easy navigation. Many other side features such as recommendation of nutritional foods, tracking of one's data hence acting as a data storage as well, appointment booking system, chatting system and

many more minor features which are aimed to healthify one's life

The scope of the project is clear to give a simple and attractive application to simplify the work as well as to reduce the efforts while doing it offline or we can say by doing it with old methods. In this application we are able to save database of all patients present on the site.

Prediction Module: As part of healthcare, a prediction

model is necessary as it would help users to know if they are suffering from disease or not thereby also reducing the cost of visiting a doctor which costs a lot.

Throughout this research paper, logistic regression, naive Bayes, support vector machines, decision trees, random forests, XGBoost classifiers, CatBoost classifiers, AdaBoost classifiers, and extra-tree classifiers. Experimental results show that there are his two ensemble learning methods, Adaboost classifier and XGBoost classifier. It is very difficult to predict the actual customer society. With the upcoming concepts and frameworks of reinforcement learning and deep learning, machine learning is proving to be one of the most efficient ways to tackle problems such as churn prediction with more accuracy and precision in the future. increase.

VII. CONCLUSION

The mechanism proposed aims at the continuous data and establishes the prediction model based on the regression analysis method, which is not only applicable to the analysis and prediction of the guidance data in the smart medical industry. In the future, new features can be added to improve the accuracy of the prediction model. For example, new disease data have an impact on the number of systems seeking medical treatment and the hospital. In addition, in the face of a larger amount of data, we can use the cloud architecture in this paper to carry out distributed computing. It has all necessary features for one's need. So, this project will help consumers for improving their health and know more about digital healthcare. In the near future, smart medical healthcare can be improved in some aspect, for example, this way can help patients and doctors identify the right information and deal with this information effectively. The first step of literature survey and research was completed till now for more knowledge of the domain.

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Traffic Light Detection

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Abstract— **For intelligent vehicles, the detection of traffic lights is an essential duty. Due of the variety of backgrounds and lighting situations, it is not trivial. Consequently, a traffic light detection system that may be used in various settings is required. Human drivers can typically recognise the relevant traffic lights with ease, but autonomous vehicles must incorporate their recognition. For the detection and recognition of the traffic light, however, an extra solution is needed. Deep learning algorithms have demonstrated excellent performance and a strong capacity for generalisation, which includes issues with traffic.**

Keywords— Blob analysis, color thresholding, waterwashed.

I. INTRODUCTION

In the modern world, real-time traffic light recognition via a camera stream has a variety of uses. The majority of trains in Indian Railways now rely on manually detecting train signals, which raises the risk of accidents. In this case, a system that instantly recognises the traffic light from the video feed and warns the driver can increase the safety of the roads and railways. When there is low vision due to fog or other environmental circumstances, this device might help the driver recognise traffic lights. Different colours, sizes, and shapes can be found in traffic lights. We concentrate on the detection of circular red and green lights in this work. Later, the same strategy can be expanded with a few minor adjustments for traffic signals with different colours and forms.

II. THEORY

The structure for image recognition problems generally looks like the following –

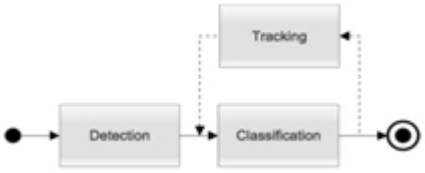

Fig. 2.1 Data flow diagram

The process breaks down in a similar three part fashion- Identifying Regions of Interest, Training a Classifier, Tracking and Optimization. Images from urban scenes have

a lot going on. There are cars, pedestrians, traffic signs, and a whole slew of information that needs to be processed at a quick rate. Detection limits the amount of information that needs to be analysed to much smaller regions of interest (ROI). In our case, the ROI represent a list of potential traffic light candidates. If handled properly, detection should improve the system's speed and performance.

III. LITERATURE SURVEY

We read a variety of articles as our project was being developed, and they helped us comprehend our alternatives and potential solutions. They also assisted us in comprehending the technical and mathematical knowledge that will be useful.

One of the papers that we studied was the "Literature Review on Traffic Control Systems Used Worldwide" by the Authors Vaishali Mahavar and Dr-Jayesh Juremalani and it talked about over the past few years, the condition of the road infrastructure has steadily improved. Road transportation has become a focus of rapid development as connectivity has grown. Better access to services, simpler transportation, and greater freedom of movement are all made possible by roads. However, when traffic congestion in major cities worsens, it creates a recurring problem in the crowded downtown regions. The system of urban transportation is significantly enhanced by traffic signals. By selecting the proper signal timing settings, they manage the flow of traffic on metropolitan roadways. Intelligent transportation systems' primary component, adaptive traffic signal controllers, play a key role in efficiently reducing traffic congestion by making real-time adjustments in response to shifting traffic network dynamics.

The second article was titled "Traffic Lights Detection Based on Deep Learning Feature" published by the authors Changhao Wang, GuanWen Zhang, Wei Zhou, Yukun Rao

& Yu Lv. In this study, they investigated the recognition of traffic lights using deep learning, which can automatically extract features with representation and resilience from input images and prevent the need of artificial features. The

method for detecting traffic lights that is suggested in this paper consists of two stages: (1) A proposed region; and (2) An organization of traffic signals. They suggest a method for determining regions based on the geometrical, colour, and intensity information of traffic lights. Second, convolutional neural network (CNN) was used to classify traffic lights,

with an average accuracy of 99.6%. On 6804 photos of various scenarios, they tested their system for detection, and the recall and accuracy of detection were 99.2% and 98.5%, respectively.

And the third paper published by the authors Karsten Behrendt; Libor Novak; Rami Botros named "A deep learning approach to traffic lights: Detection, tracking, and classification" talks about how the classification and recognition of traffic lights is essential for automated driving in urban settings. There are currently no systems that can accurately detect traffic lights in real-time, without using a map, and at adequate distances for comfortable city driving. They suggested a comprehensive system that combines a real-time traffic light detector, tracker, and classifier based on deep learning, stereo vision, and vehicle odometry.

Furthermore, in the fourth paper named "Traffic Light Detection with Convolutional Neural Networks and 2D Camera Data" by Dennis Hein discussed about the popular datasets BSTLD and DTLD that were used to train a variety of traffic light detection models utilizing the TensorFlow Research repository. The analysis showed that there is typically little performance loss when transferring predictive power from one dataset to another that is similar. This conclusion does not appear to be impacted by either architectural decisions or geographic differences between datasets (such as traffic signals at the beginning or end of an intersection). Additionally, it demonstrates how crucial it is for self-driving autos to obtain predictions promptly in addition to accurately. On realistic hardware, the architectures and resulting models should be tested for computational performance. Both topologies deliver (near) real-time performance on strong, contemporary hardware (RTX 2070), with SSD Mobile net reaching about 50FPS and Faster RCNN Inception reaching about 22 FPS. An RTX 2070 will be too expensive for car manufacturers though.

IV. METHODOLOGY AND PROPOSED MODEL

When creating a project or piece of software, it is essential to comprehend the process or kind of software development lifecycle model that will be used. We need to select the SDLC model that will work best for our project from a variety of models, which is why we use the agile methodology.

Additionally, the actions taken up until this point have been previously discussed. After deciding on a project title, we first began studying about and establishing the project's requirements. During this, we also decided on the approaches to be applied. After that, we made the decision to research already-in-use systems to gain a deeper knowledge before implementing them. We devised a schedule for when this implementation should take place, along with considerations for any revisions that could be necessary and the errors that should be investigated. Therefore, we selected Agile methodology.

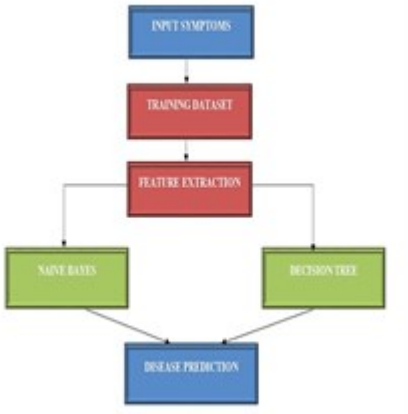

Fig. 4.1 Data flow diagram

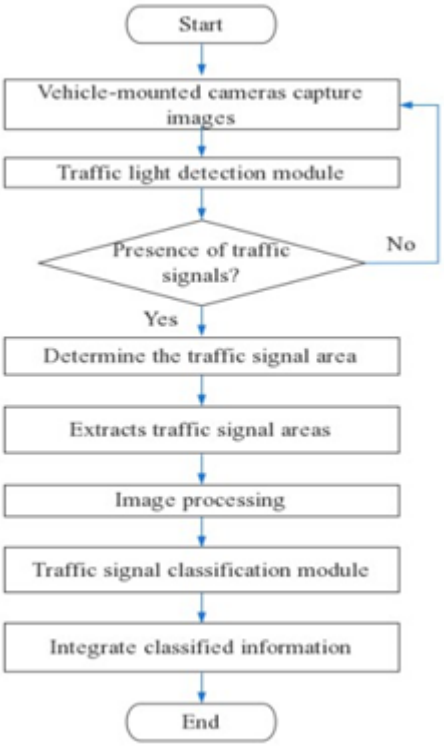

Fig. 4.2 Block diagram

Above attached diagrams are a couple of the ones that we made during our project planning phase using tools available online to achieve our goal.

V. IMPLEMENTATION

To precisely identify the regions of interest in photographs, numerous, varied strategies have been presented. Color thresholding, BLOB analysis, and spotlight identification are three of the most used methods for finding traffic signal candidates. Although obviously not all possible combinations, it is fairly frequent to see at least one of these three used. Given that we know the traffic lights will always appear in the top-half of the image, we can begin by removing the bottom portion of the image.

Fig. 5.2 Getting rid of the lower part of the image for removing unwanted part.

The application of colour thresholding is the subsequent step. Red, yellow, or green are the three hues that are emitted by traffic lights. Limiting the image to areas where certain colours are present is the core notion behind colour thresholding. The image's non-red, non-yellow, and non- green areas are all set to zero (black). The colour space, the threshold cutoff, and fluctuations in light are three crucial factors to take into account in order to successfully isolate the colours we're interested in. Images are often represented in the RGB colour space. However, RGB combines information about colour and intensity across all of its channels. The RGB format is hence sensitive to variations in illumination. We cannot allow differences in lighting (such as sunny, rainy, cloudy, etc.) to prevent our threshold from identifying the proper colors if our objective is to detect traffic signals. Many choose to switch to color spaces that separate the chroma, or color information, from the luma, or image intensity, in order to combat this.

After this, we have to get the image information refined. The information in the scene is often refined using morphological filters by colour and BLOB-based approaches. The term "BLOB" (Binary Large Object) refers to collections of linked pixels in an image. Blobs are the black, linked areas in the illustration below.

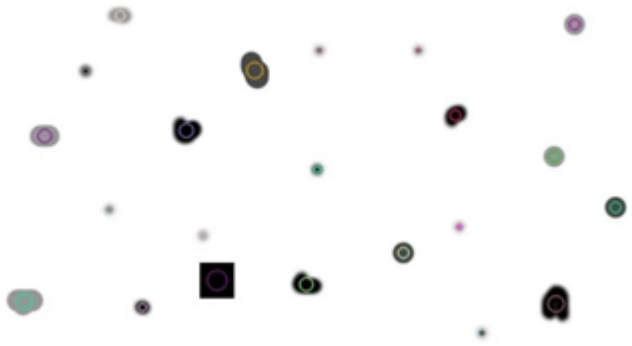

Fig. 5.3 Example of blob analysis from OpenCV

The red threshold image from above is another illustration. It is possible to think of each red object in the image as a BLOB with significant characteristics like size and form.

A wide range of image processing techniques known as morphology process images based on forms. The two main morphological processes are erosion and dilation. Dilation enlarges the foreground object, whereas erosion removes the foreground object's boundaries.

Fig. 5.4 Left the original image. Center the dilated object. Right the eroded object. Graphic by OpenCV

Dilation is excellent for fusing together damaged pieces of an object, while erosion is useful for removing noise later on. This will enable us to fill in any gaps left by the color threshold and provide a more comprehensive image. Spotlight detection is the third technique. A bright area in an image surrounded by a darker area is what is meant by this technique. With this detecting technique, it is anticipated that the intersection's traffic lights will appear to be brighter than the area around them. A grayscale conversion and a white top-hat filter are applied to the image. The top-hat filter emphasizes regions that stand out from their surroundings in brightness.

VI. RESULTS AND DISCUSSION

In order to find a group of bright spots in the image, we first use the spot light detection method described above

Fig. 6.1 Applying a top-hat filter to a grayscale image

Fig. 6.2 Applying colour thresholding to the processed image

Take note of the fact that many of the spot lights come from the sky or nearby structures. We could drastically cut down on false positives if we could disregard the spot lights that emanate from such locations. We must carry out some type of image segmentation to distinguish items from the foreground and from one another. Watershed is what we employ to do this.

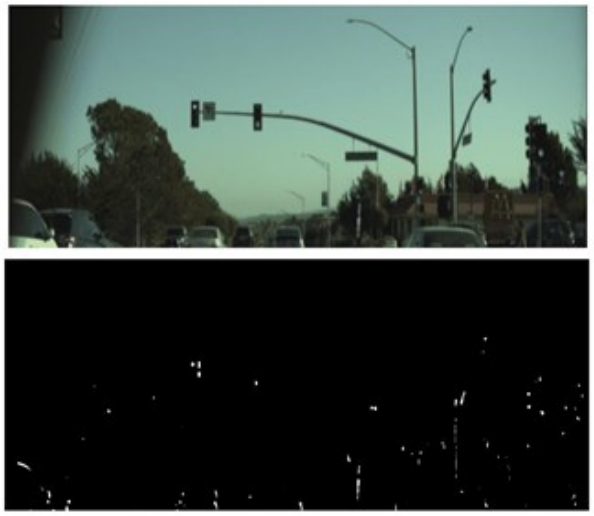

Fig. 6.3 Example of the top-hat morphology and threshold

The watershed algorithm is a well-known segmentation algorithm that is particularly helpful when removing touching or overlapping items from photos. The spot lights we discovered serve as the starting indicators in our situation. The background elements in the image will expand into larger sections as the markers begin to flood, while the lights emanating from the traffic lights will maintain roughly the same size.

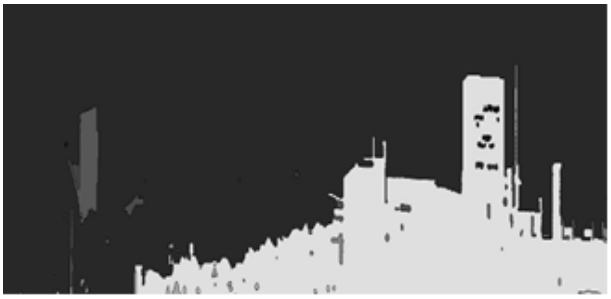

Fig. 6.4 Watershed Segmentation

Fig. 6.5 Extracting windows around spot lights that do not grow too large

We may contrast the size of our original bright spots with those of their newly segmented equivalents when the watershed change is finished. It is safe to presume that a bright spot is not a traffic signal if it became significantly larger. The penultimate stage is to remove windows from the vicinity of the light areas that have maintained relatively the same size. The end result is a set of windows that are small enough to send to the classifier.

VII. CONCLUSION

The approach we suggest in this paper can identify circular red and green traffic signals. To recognize the traffic signals, blob detection and color extraction are performed. The percentage of successfully collected traffic lights is the focus when it comes to detecting. Even though it compromises accuracy, it is critical that we do not overlook traffic lights during the detection phase. The point is that while we can always afterwards filter out false positives, we can never make up for a light that was initially overlooked. If done correctly, detection is an excellent approach to expedite the process and minimize false positives.

The management of the transportation system is a significant problem for the next generation due to the global population's ongoing growth. Future developments will be very positive. We should consider the intelligent and autonomous manner of managing the traditional transportation system. The number of automobiles likewise rises along with the population. The use of clever solutions is required to manage the enormous number of automobiles. The usage of an image sensor or imager is possible in the future. It does its task by creating an image of the roads. It does this by turning the light's fluctuating attenuation into a

signal that communicates the image. Imagers employed both analogue and digital technology.

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Online Exam Proctoring System

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Abstract—**In the present world, the need for Online education is growing very rapidly and is playing a vital role in changing the world's pace of learning. The result of COVID-19 pandemic has directed many students to switch to virtual way of learning. Education through online mode is very feasible, convinient and cheap and therefore many students around the globe find it user friendly. It not only helps us to enhance our understanding of a particular concept but also it inspires us for meticulously researching of any technology which can proove a career option for us in the future. But like every other object in this world has some flaws, online education too generates and contain some disadvantages and weaknesses respectively. In this abstract we deeply articulate the problem of online learning and the technological solution for it. As conduction of examination through online mode is becoming a very tough challenge than learning. The present system used by various schools and colleges is very vulnerable and can fail to provide discipline during examination.Students appearing can try to dismantle the rules of examinations by cheating, copying or by implementing any kind of malpractices undetected by the system. This questions the integrity and confedentiality of the system. Supervision through virtual mode is not as compatible as it is in physical mode, since supervisors have to monitor each and every student present at one time which can lead to breaking of the discipline. The need of Machine learning was very essential to resolve and to extract a permanent solution for this problem. By introducing and implementing technologies of Artificial Intelligence, it will boost the organisations efforts for conducting the examinations and also will help to smoothly conduct any examination. Designing appropriate algorithms, can strategically help the machine to achieve the targets of unsupervised and reinforced learning. Artificial Intelligence can address many problems and itself contains various technologies which can provide better results in limited time. The use of Convolutional Neural Networks in the proctoring system of online learning can simplify many tasks which the developer wants to achieve. CNN (Convolutional Neural Networks) is a network of interconnected data neurons which transfers information each other, analyse with the help of input data and will train the machine itself to generate the expected output accurately. Online proctoring system can engender CNN becuase of its various vulnerabilities. It will calculate the data of the students face typically connected through webcam and can process the data by applying the appropriate algorithm like geez detection, face detection, eyeball movement, person detection etc and will provide the programmed output for each one respectively hence improving the accuracy and decreasing the malpractices of students. The CNN algorithm will divide the data into various pixels and will store them across various nodes publicly accessible by anyone which will help to initiate the learning of the machine by mapping them appropriately for expected outcomes through algorithmic calculations and deep learning mechanism. The system can also be upgraded by introducing more security improvements like secure browser detection, audio processing and analysing, deploying secured database for storage etc thus limiting the misconduction threat of a particular student and also help proctors to smoothly conduct examinations by monitoring student through the system artificially. By developing this system we will also try to discover many alternate technologies like cloud computing, data science and uncover the concept of neural networks in a deeper way.**

Keywords— Convolutional Neural Networks, Machine LEARNING, ARTIFICIAL INTELLIGENCE.

Exams are a very important component in education. In any exam, there is a risk of cheating from the students and therefore, its detection and prevention are important. Educational Trusts are offering various programs on courses that can be done online from anywhere to upgrade the skills. Besides due to COVID – 19 institutions have to switch rapidly from offline to online mode thereby changing their entire educational model. Instead of taking the lectures in classroom, students can now attend the lecture from anywhere in the world. During examinations, authentication and detection of misconduction becomes very crucial. Some institutions only authenticate the identity, some may take effort to monitor but most of the work is done by the proctors to identify malpractices and to detect them. But it is not feasible for a large scale of attendees. While some research is being done to make the systems totally human based solutions (non-scalable) or fully automatic ones (non-reliable). Authentication becomes a very important step for the next activites or functionalities in the system. However, there is no comprehensive solution which will combine multi-biometric continuous authentication with continuous visual

and audio monitoring to provide 100% accurate results. During the examinations, the web camera is used to capture the photos of the candidate after certain intervals of time (approximately 30 to 60 seconds). These photos are compared with the one which is already scanned and stored in the system during validation. This helps to keep a check on the candidate who attempt for cheating with disguise. If the system finds any deviation, then it is flagged as an error and notified to the administrator. These photos are analysed by the proctor to ensure the security of the online exam. This mechanism is especially useful in the areas where internet stability is relatively low. These were the key features of the system. Besides conduction of examinations, result displayer, paper uploading section, scanner etc will be present in the current system. This paper describes about the specifications and features explained thoroughly in this section and will also additionally upgrade as per the custom needs. It is based on applications which offer a rigid authentication service of students through a biometric recognition system, as well as an artificial continuous proctoring through automatic image which will constantly check the behavior of the student through his posture, gaze estimation, eyeball movement and detecting the presence of another person as well as switching of one browser to another during the examinations, allowing the institute to mainatin the

discipline and not harm the integrity of the examination courses to gain value of which will benefit both institutions and students. Neural Networks algorithm use will constantly help to change, monitor and specify the movement of the student at every point of time through passing the data to different neurons.

LITERATURE SURVEY—

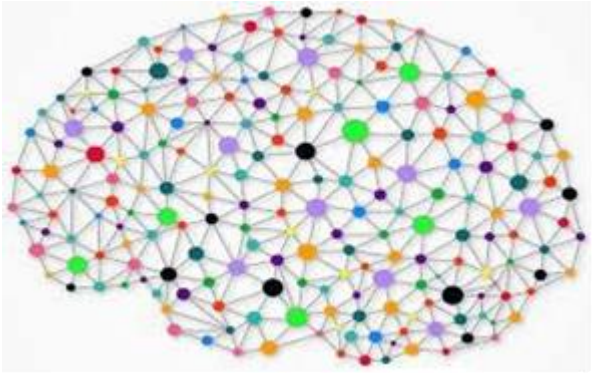
Prior to this proposed system, some researchers and technologists have carved some intelligent techniques which can prove very beneficial to monitor and analyse human behavior and to predict the outcomes based on the input data and many digital ways like semi automated machine processing and by using IOT devices. Previously there was an attempt to do semi-automated machine proctoring, through building desktop robot. This desktop robot contains a 360◦ camera and motion sensors. The robot will then capture the data through web camera and then will transmit the data to a monitoring center and will predict if there is any suspicious motion inside the captured video. The most important flaw in this system was that a single camera cannot rotate and see what the subject sees, and as a result it may inspire the user to provide a breakthrough from the algorithm and he/she can try to cheat via vaiorus non integral ways which were not significantly programmed in the system like rotation of the camera and the time taken for the system to send the data from the motion sensors which are not fully capable of acquiring every single piece of reactions of the user.

In 2016, Jin, Jian, Feng, Huihui, Gu, Liubao developed an intelligent exam management system based on the Browser/Server structure for Hebei University. This system was integrated with three levels: user interface, business logical, and data access. These levels were able to manage the data, behavior analysing of the student and performance of students through intelligent data processing. Three function modules based on ADO.NET, C#, and ASP.NET

technology were developed. Many sub-function modules, including the exam arrangement module and the score registration module, were also insalled. The results showed that the established intelligent exam management system can efficiently achieve education informatization and plays a significant role in eadministration and managing the system.

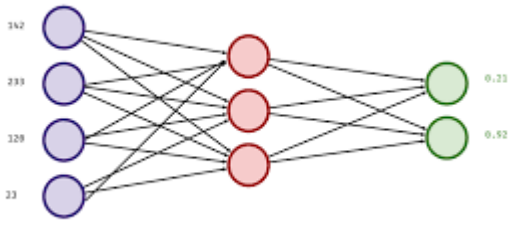
Proposed Methodology—

The paper demonstrates some features of this system which are used by the technique convolutional neural networks. CNN is the main important sub type and the most powerful type of neural networks than RNN(Recurrent nerual network), ANN(Artificial Neural Network). This system will be using a combination of both CNN and RNN. Neural networks are basically are collection of neurons interconnected with each other which are used for passing the data from one node to another. Likewise in biological term, our brain carries a millions of neurons which are interconnected with each other which helps us to recieve and store the input data from our sensory organs and then process the data by using past experiences and making it applicable to our real life.



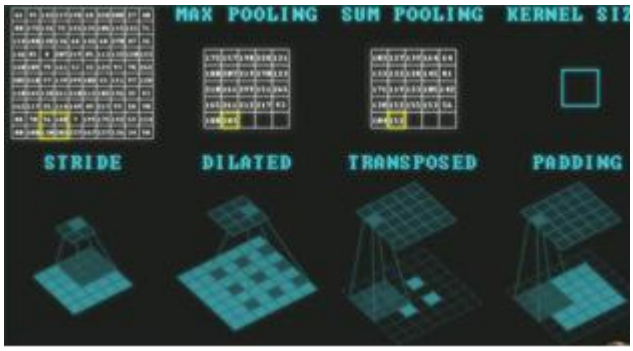
Similarly the machine stores data which it recieves from the input devices or motion sensors into the neurons. These neurons are inteconnected with each other and are capable of storing and passing the information from one neuron to another thereby helping the machine to process the data and analyse it in an effective way thereby helping the machine to generate the user expected outcome from the given input. Various types of algorithms are applied like the backpanel algorithm used in RNN which is used for finding the data stored in the nodes previously thereby making it efficient for reusing the same node which carries, saves and extracts data of the node all time. The machine carrying NN technology is capable of learning itself from the data and this proves very beneficial for the machine to process any type of input, learning it and then producing the expected outcome. Various machines running on deep learning concept carries Neural networks technology for executing machine learning. ANN(Artificial Neural Networks) works mainly on the input data which is text or string format and it is a linear network going in only one direction therefore not efficient and reliable for the machine to learn from the data. CNN(Convolutional Neural Network) works mainly

onimage processing and RNN(Recurrent Neural Network) consists of sequential data which includes backtracking of the node data.



In this paper we have briefly discussed about CNN(Convolutional Neural Networks) as it is used for processing the image input. In CNN firstly, the input data in image format is divided into multiple pixels or array of numbers and then the data is stored in a matrix format. In the beginnning the input data stored in neurons is very large in size (in kilobytes) as it is very necessary to shorten the data. The data is then represented as a matrix

and then the feature detector matrix is applied to each and every portion of the input data. Feature detectors or filters help identify different features present in an image like edges, vertical lines, horizontal lines, bends, etc. After applying the feature detector matrix then the final convolutional matrix is generated which is very shorter in size as compared to CNN. This matrix which contains every part of the regular image is used to compare with any type of input images which the machine recieves in the future to predict and analyse the data. For example: The human brain can recognize any of his known person regardless of any look he/she may come in front of you. Bur the machine programmed with a certain images will not be able to identify the person. Feature extractor is a very important model in CNN technology as it determines the structure of the image divided into pixels connected through neurons altogether and then applying the feature extractor, max pooling, sum pooling for dilating and shortening the input image which will contain the exact version of the input image which can identify further images of similar kind.



Our system will mainly focus on delievering the expected outcome to the user by using convolutional neural networks as using the base technology for identifying the user and his positions through video which is a combination of images. The system will mainly include 5 base modules which will

help the user and the institute for a smooth conduction of examination.

Authentication Module – This proposed module will authenticate the user with the input image which will be already stored in the system to check the authenticity of the user and to identify the disguise appearing for the test.

Pose and Geez estimation – The proposed module will observe the head movement and the physical movement of the user and will check their changing behavioural pattern. A new method, called as M3L (Multi- level, Multi-modal, Multi-task Learning), is used to improve efficiency in face points and other facial attributes detection (gestures of the face and eyes).

Active Window detection – The proposed model will check whether the system from which the user is giving the examination is having any alternate browser or window opened, by detecting it and getting a screenshot.

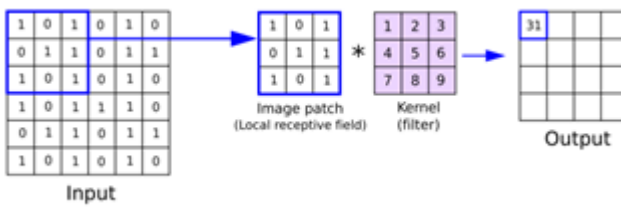
Facial Recognisation – This proposed model will check the facial expression changes recieved by the user through the webcamera and will identify and ensure the change in patterns of the structure of the image, eye movement, lips movement, analyse the changes and and will provide the estimated output to the user as programmed.

Person detection – This proposed model will ensure that there is no one in the surroundings of the user and also will ensure that the user does not leave the original place. It will detect the presence of another person and will formulate the data and will send the expected output to the user accordingly. Besides this, the system will also contain a Non relational database eg:- Mongo DB to store the exam information and subject score unknown to the user seperatley in each users database. While monitoring the test, the captured images are processed with different techniques in order to detect and identify inappropriate behaviour of students during examination. For instance if , the system is able to detect if the student is receiving or is checking forbidden documentation (books, other electronic devices) by facial and pose detection. All these actions can be strictly forbidden in some face-to-face learning activities according. This system will include a facial detection and recognition module through a biometric model which will capture images and compare the student appearing for the exams with the input user image stored at server side. Besides This system includes a facial detection and recognition module through a biometric model created using registration time face pictures. The output results are clustered in five groups a) Detect another person b) How many people are present in front besides user c) who should be the legitimate person allowed to enter the screen d) If the person is helping the user inappropriately by using false means. This totally will provide integrity and will maintain the decorum, values, and trust between institution and the student and will help the student and institution to progress efficiently.

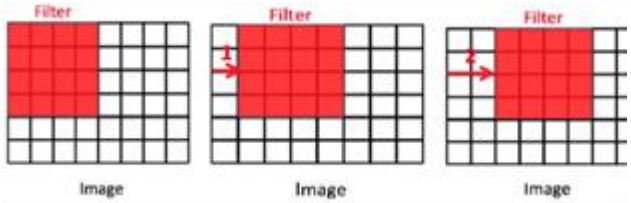
Mathematical Modelling— Mathematical modelling is the process of depiction and conversion of real life problems and solving then using mathematical solutions and

which is a type of mathematical modelling which represents the processing of the objects in a continuous manner. Video data taken through the input devices like webcamera will pass this information to the CNN neurons, where in the processing of the data will take place. However this data will not be in a discrete state, it will constantly change its patterns and create a new structure every single time. Also this system will be using quantitative model where matrix representation of the input data are executed by applying various equations like max pooling, sum pooling equations of the feature extractor. This section decsribes about the stages of the input data when passed to the CNN network feature extractor and the steps carried by it to generate a convolutional network matrix by applying mathematical modelling. It goes through convolutional modelling first before passing the new dataset of the input image to the neural networks. The input video is the result of multiple images, these images will be divided into pixels and then passed to the first stage of the feature extraction which is filtering. In this stage the pixel matrix which is of fixed height and width will be multiplied with the kernel matrix of fixed rows and columns. Every block of the matrix will

be multiplied with the kernel matrix and lastly forming the feature map or convolutional matrix. The equation used in this process is O=[ƨ-K]+1 where ƨ is the input matrix style and K is the kernel size.

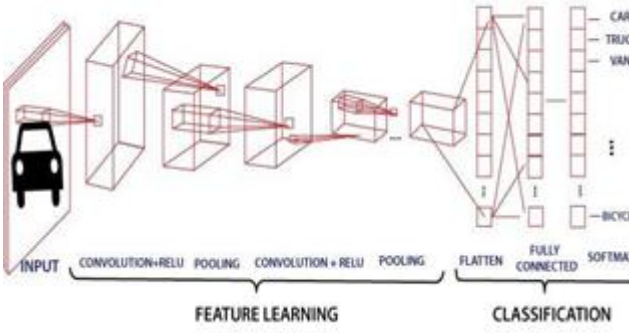


After filtering of the data the the next step is striding. Stride is the process where the filter is moved from left to right, top to bottom with one pixel column changeon the horizontal movements, then one pixel row change on vertical movements. The equation for striding can be derived as O=[(ƨ-K)/S]+1 where ƨ is the input matrix style and K is the kernel size and S is the number of strides. The matrix size decreases in this step. Then the input matrix goes for padding



Padding is the best approach needed for convolutional kernelto process the edge pixels are added onto the outside copying the pixels from the edge of the image. Here the edges of the input matrix are surounded by 0 values and then multiplied by the kernel matrix to find the output. Here the size of the output remains same as the original matrix. The equation for striding can be derived as O=[(ƨ- K)+2ϕ/S]+1.

After padding Pooling comes into picture where is required to down the sample detection of the features in feature maps. Pooling layers provide an approach to down smapling feature maps by summarizing the presence of features in patches of the feature maps. Finally Flattening of the data takes place where the feature matrix is then fed to neural network or neurons for processing.



Expected Results— This section mainly describes about the outcomes the system will have after the project is implemented. With the use of convolutional neural networks the result generation becomes very accurate and expected to the customer. The basic flow of algorithm of this project will be as follow:

Start □ login □ examination authentication □ enter exam session □ if caught then warning issued (maximum3) □ else continue session until meeting ends □ logout □ end.

Still some more findings are yet to be performed on the technology used for constructing the system and also the platform on which the system should be deployed. The expected system will detect any type of malpractices happening and will issue an alert to the user. If the user recieves the alert 3 times then the users exam session will automatically be terminated and marks will be counted. Physical movement, hand and facial gesture recognizer will recognize the changing gestures of the user and will issue gesture warnings to the user if detected. It will also identify the unknown person coming in the users screen while the examination. Besides authentication by comparing the data with the live facial data of the user is very much important for security reasons. Also the system will help the proctors to constantly take a follow up of all the students and will recieve the count of warnings each student gets with their respective screenshots. The data of every student will be managed by the Non relational database which will store the information of every user independently. Lastly, the system will also detect the active window and will ensure that no other window is opened during the examination.

Future Scope—

Delievering the product basic functionality and with the expected outcome will be the primary aim of this system. Planning and upgrading the project to a large scale as per the customer needs, making the prototype version of the modules before the final project is very crucial for testing and analysing purposes. Therefore we can determine what

exactly the customerr expect from the system and also will make a greater change for the system to excel in the education+technology sector. Audio voice analysing will be the key factor for the system which we will be focusing on mainly after the successful execution of the system with the required modules. Analysing the voice of the student through VoIP Since the data used in VoIP which will normalize the voice data collected from students microphone and will analyse the input by encoding it into digital format. Signal pre-processing will be applied to discard that acoustic segments that do not contain speech in silence, music or noise. Also system monitoring will be another aim to be achieved which will constantly track and check the systems actions and behavior, through keystroke management technique by implementing the combined CNN and RNN model. Shortcuts like copy pasting from different browsers, active window detection, splitting window on screen and mouse movement will be tracked during the exam session therby providing a complete secured access to user for its system.

Conclusion—

The effect of proctoring the video is large enough that can have an actual impact on the results of the students, with the likelihood that when non proctored, students may resort to academic dishonesty or malpractices by using techniques that were disallowed during the exam and may score more marks. The potential effect of conducting examinations in a fixed time constraint which will redundantly reduce the extra time students take to complete the examinations. Besides, Lockdown software without video monitoring, did not have a similar impact as proctoring software. Online test conduction is the new way of adopting and delievering transparency during tests with the use of latest technological algorithms. This system will not assure full proof online security and conducting exams 100% accurately but it will significantly decrease the amount of false practices conducted during exams. Furthermore with the use of neural networks passing the data and determining the possibility of breakthrough of misconducts through actions, voices, facial expressions by training it with the data passed by the input devices will gradually benefit in the quality of the output delievery and will help for increasing the accuracy of the outcome. With the advent of Online Proctoring system, security issues associated with it will play a vital role and is increasing significantly and detecting it will be the priority concern of this system. Biometric data collected through the by the input deives from camera and passing and analysing the data through it by algorithms supported by various features will constantly help to identify and keep a check on students activites internally and externally.Hence, personal data collected during OPS operations need to be carefully identified, classified, and labeled accordingly. Non relational databases will help us a lot for storing and accessing the data of each and every student and will provide real time data to the proctors without any tampering happening in between. Furthermore, we have to accept the fact that it is vital to maintain academic integrity to protect both students and institutions future life.

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Adaptive Authentication Based Security Enhancement of Banking Application Using Facial Recognition

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Abstract-**The increasing prevalence of online banking has made security a major concern for financial institutions and their customers. To address this issue, many banks are turning to biometric authentication methods viz. facial recognition technology to improve the security of their applications. This research aims to evaluate the effectiveness of facial recognition technology in enhancing the security of a banking application. The research methodology includes surveys, user testing, and performance metrics to assess improvements in security, user experience, and overall effectiveness of the technology. The results of the research indicate that facial recognition technology can provide significant benefits in terms of improved accuracy and reduced risk of fraud. However, the technology also has some limitations such as privacy concerns and potential for errors. These results have important implications for the use of facial recognition technology in banking applications, and provide guidance for future work in this area.**

Keywords python library, facial recognition, scalability, availability.

I. INTRODUCTION

The project is all about digital banking system and how we can enhanced the features of the existing websites for the banks and improve the security of the website with facial recognition(deep learning), adding advanced features such as stock analysis, chat system, Making the entire bank work for the customers online. Easy and handy to use. In today's world security has become a big concern which is being possible by providing various security systems with the use of passwords

and user ID/pin available to the user for it access. These systems were facing the drawback like misplace of passwords, pin code hacking, forgetting passwords etc. Due to these reasons a new technology emerged which is known as biometric technology which uses the feature parameter of the user as the password like finger print [1], palm, voice, heartbeat etc. This technique is safe since we don't have to fear about ID card misplacement, stolen or password hacking.[1]

If we consider one of the situations where recognition of face and detecting it is done. In a simple way, facial recognition means identifying and confirming whether a person in a digital image or in a video frame is the same in the Database or not. Face detections are the first and foremost step for face recognition. Previously, people used nonliving things such as plastic cards, tokens, smart cards, Pins and authentication keys to get access grants in a confined area such as DRDO, ISRO, SpaceX, NASA, and in Industries. Eyes, Nose, Forehead, and mouth which leads to facial extraction. In a system with recognition of face and detection is cheaper, simpler, more precise, and non-interrupting process contrast with biometrics. Commonly most members used OpenSource Computer Vision Library, in short, it is called OpenCV which is used for execution or operation related to pictures. In other words, we have to install a library called OpenCV to do Image processing. Regularly used facial detection algorithms by OpenCV are Haar Cascade Classifier, LBP Cascade Classifier but here in this work I used Harr Cascade Classifier and face recognition algorithms are Haar-like features, Fisher face, and Eigen's face. Several face recognition techniques provide analyzing the geometric features of facial images, such as location and distance amongst, nose, eyes, and mouth. After this Ojala etal in produced one of the extraction feature methods called a local binary pattern (LBP) [2]

Online transaction has end up a common place fashion now- a-days and security related to the identical is turning into an difficulty. Authentication using passwords is liable to assaults like hacking; therefore by making use of biometric traits we are able to authenticate the person‘s identification. Face is a included internal organ whose random texture is complex, particular, and very stable at some stage in lifestyles, it can serve as a kind of living passport or password that one want no longer to be remembered however can usually be gift. So face popularity is on efficient manner of securing online transactions. Iris popularity machine affords correct, strong, speedy, secure and user-pleasant authentication solution. It protects personal identity of users by using the acquisition, processing, evaluation and contrast off ace patterns from their iris image. The intention of this undertaking is to enhance the safety of Internet Banking using face biometrics, as comfy authentication can't be judged most effective on the basis of username and password as they may be guessed easily. Face is an inner organ of an eye fixed this is rather blanketed. It has random texture with excessive complexity. They are recognised for their forte and balance throughout lifestyles. This undertaking aims to put in force an application so as to ask for the username, password as well as an iris photograph of the consumer, which the person must provide through his respective tool digicam. The software will pre-technique the iris photo and experiment through the database for authentication. If the username, password and iris image suits with database that in database then the consumer is authenticated [3]

II. BACKGROUND

In recent years, there has been a growing concern for

security in banking applications, as more sensitive information is being stored and accessed online. This has led to a need for stronger authentication methods to ensure the safety of user data. One such method is the use of biometric authentication, which uses unique physiological or behavioral characteristics to identify a user. Facial recognition technology, in particular, has become increasingly popular as a secure and convenient form of biometric authentication. This technology works by analyzing and comparing the unique features of a user's face, such as the shape, size, and position of their eyes, nose, and mouth, to confirm their identity.[4]

The use of facial recognition technology in banking applications has the potential to greatly improve security and user experience. By providing a secure and efficient means of authentication, it can reduce the risk of fraud and protect sensitive financial information. However, there are also concerns about privacy and the potential for errors in the technology, making it important to carefully evaluate its effectiveness in real-world applications.

Banks in India as a whole were very reluctant to adopt the changes brought about by technological advancement. A number of factors brought about the mechanization and digitization in banking industry in India. The putting in place standard cheque encoders was the first step forward in digital transformation in banking. Magnetic Ink Character Recognition (MICR) helps in the sorting and processing of cheques with each bank branch having an MICR code. The next step was more of a necessity than an innovation. Banking is a repetitive job, and therefore a labor intensive one where the worker is prone to making mistakes. In order to minimize errors and speed up the process, banks began using computer technology with standalone personal computers and then set up their own local area networks (LAN).

A. Importance of the Project

The importance of Adaptive Authentication Based Security Enhancement of Banking Application Using Facial Recognition is driven by the growing need for more secure and efficient authentication methods in the digital age. With sensitive information increasingly being stored and accessed online, the risk of fraud and data breaches is also increasing. Facial recognition technology offers a convenient and secure method of authentication, by using biometric features unique to each individual. By incorporating this technology into banking applications, security can be greatly improved and user experience enhanced. As such, the study of Adaptive Authentication Based Security Enhancement of Banking Application Using Facial Recognition is a significant contribution to the field of digital security and technology.

The current work carried out in the project is useful in terms of digital marketing and also the customers don't have to visit the banks for the small papers work or authentication everything will be there in the website and is very useful in terms of security and features provided to the customers.[5]

B. Perspective of stakeholders and customers

The perspective of stakeholders and customers regarding security enhancement of banking applications using facial recognition technology may vary. Stakeholders, such as banks and financial institutions, may view it as a valuable investment to improve security and reduce the risk of fraud. Customers may appreciate the convenience and efficiency of the technology, but may also have privacy concerns. To ensure widespread adoption and acceptance of the technology, it is important to address these privacy concerns and educate customers on the benefits and secure implementation of facial recognition technology.

C. Objectives and Scope of the project

Face recognition systems are becoming more prevalent than ever. From face recognition on your iPhone/smartphone, to face recognition for mass surveillance. However, face recognition systems are easily fooled by "spoofing" and "non-real" faces. Face recognition systems can be circumvented simply by holding up a photo of a person (whether printed, on a smartphone, etc.) to the face recognition camera. In order to make face recognition systems more secure, we need to be able to detect such fake/non-real faces — face detection is the term used to refer to such algorithm More in the project development can happen in terms of biometrics and online atm system and more security with high accuracy and cryptography part with complex algorithms can be added. Also in the designing part more of user interactivity and automation can happen for the users. More deep learning algorithms could be added for the enhancement of security [6]

III. II. LITERATURE SURVEY & PROPOSED WORK

Facial recognition technology has been the subject of numerous studies and research in recent years, with a focus on its use in security enhancement, particularly in the financial sector. Previous research has shown that facial recognition technology can provide improved accuracy in authentication compared to traditional methods, such as passwords or security tokens. This technology can also reduce the risk of fraud, as it is much more difficult to forge or steal someone's facial features compared to a password or security token. However, the use of facial recognition technology in security enhancement has not been without its challenges and limitations. Privacy concerns have been raised, as the technology requires access to personal information and the storage of facial images. There have also been instances of errors in facial recognition systems, particularly with regards to accuracy and bias.

Despite these challenges, facial recognition technology has proven to be an effective solution for enhancing security in banking applications. Further research is needed to address the limitations of the technology and to ensure that it is used in a manner that protects privacy and ensures accuracy.

The use of facial recognition technology in security enhancement has several benefits, including improved accuracy and reduced risk of fraud.[2],[7]

Benefits:

- Improved accuracy: Facial recognition technology can provide improved accuracy compared to

traditional methods, such as passwords or security tokens. By using unique facial features, the system can accurately identify users, reducing the risk of false rejections or fraud.

• Reduced risk of fraud: Facial recognition technology can reduce the risk of fraud, as it is much more difficult to forge or steal someone's facial features compared to a password or security token.

However, the use of facial recognition technology in security enhancement also has some limitations, including privacy concerns and potential for errors.[6]

Limitations:

• Privacy concerns: The use of facial recognition technology requires access to personal information and the storage of facial images, which can raise privacy concerns.

• Potential for errors: There have been instances of errors in facial recognition systems, particularly with regards to accuracy and bias. These errors can result in false rejections or incorrect identifications, reducing the reliability of the system.

Despite these limitations, facial recognition technology has proven to be an effective solution for enhancing security in banking applications, with its benefits outweighing its

limitations in many cases. Further research is needed to address the limitations of the technology and to ensure that it is used in a manner that protects privacy and ensures accuracy

2.1 Introduction

In the literature survey part there were various surveys conducted for the software of the bank website that is digital banking , enhancing the features of the website and also the security part of the website using facial recognition(Deep learning). So the various years papers were studied under this and gaps were identified accordingly using research methodology(Applied research & Fundamental research) of just enhancing the feature of the website and adding some new feature to it.[1]

2.2 Problem definition (Phase wise)

1.In the first part as mentioned in the table the first gap identified is Yet lot of paper works is done in banks not 100% the banks are digitalized. The form that has to be filled is not online available totally. And for submission of the documents with it.[8]

2. In the second gap as mentioned in the table it is related to Improvement of the Face recognition using specific characters in the face (distance between eyes) and also analyze the face in 3-D .

The software for the system was coded in MATLAB and was based on face detection and

recognition. Although its accuracy is above 90%, this system may be improved by utilization of additional features(increasing the accuracy of the system and using appropriate software and algorithm for the security).[9]

3. The backend which is used is MYSQL instead we can use No-SQL for the faster accessibility, scalability, and many more features like analyzing the data (for the stock market analysis)

2.4 Feasibility Study

There were two types of study involved in it Applied and fundamental where in the features are updated to the existing system and many more unique and advanced features like facial recognition. The project is study based.[10]

2.5 Methodology used

2.5.1 Agile methodology is used for the making of the project with code, testing and review and adjust. Role: Scrum master which comes under agile and 2W1hmodel.

They enable the close co-operation between all the roles and functions.

They remove all the blocks which occur.

They safeguard the team from any disturbances

They work with the organization to track the progress and processes of the company.

They ensure that Agile Inspect & Adapt processes are leveraged correctly which includes

A. Planned meetings

B. Daily stand-ups

C. Demo

D. Review

E. Retrospective meetings.

2.5.2 Customer interaction details

A kind of questioners conducted in family and grp for the requirement means what features should be enhanced and what are the drawbacks you fill for the digital bank website and also what should to be improved in the website and should be there in the new website.

IV. III.ANALYSIS AND PLANNING

• Understand – Understand the entire project and also break them down into steps to allow the team to visualize and complete the task in an orderly manner. Discuss with the customer about your understanding before communicating the same to the team.

• Prioritize – Prioritise each item and list them in the order. Sit with the team and SM while prioritizing that will be making it more effective. Include the advantages of the story point, efforts involved in creating, the complexity and the customer need in mind while prioritizing the items.

• Estimate – Estimate the stories based on the definition that is mutually agreed upon. Keep the stories at a high level and never elaborate on the details at the time of estimation. The team will do this task of breaking it down and the PO can leave it at a high level. Do not interfere too much with the team and give them free hands to take

a call on their time estimation.

• Keep it dynamic – Keep the backlog dynamic giving rooms for revisiting based on the suggestions given by the customer and the possibility agreed by the team. Keep the list open for the addition or deletion of backlogs at any time during the project.

Asana(calendar) is a popular tool for managing projects of various sizes, and while the free version comes with limited features, it seems to be perfectly suitable for smaller projects.[4]

V. DESIGN AND IMPLEMENTATION

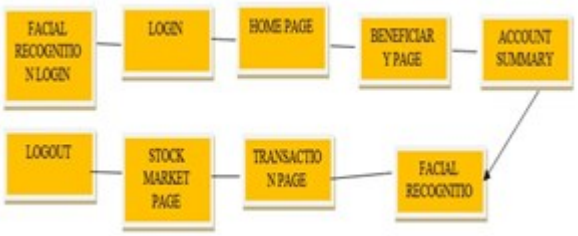

Fig.1 Flow Chart of Facial Recognition

VI. V. RESULTS AND DISCUSSION

5.1 Outcomes

A. In this paper has been developed with authentication with facial recognition and enhanced security features.Firstly the user will be verified with face detection and then the user have to enter the credentials then the user can login into the system.

Fig.2 Image Uploading as shown in UI

B. The website is being developed with front end technologies like Html, CSS, Bootstrap and backend technology NOSQL. The beneficiary page is also added where the user can add, delete and update the account

Fig.3 Model Detecting the face

C. Improved User Convenience: Facial recognition can provide a quick and convenient authentication method, reducing the need for users to remember passwords or use security tokens.

Fig.4 Request send by the user saved in postman

D. Enhanced User Trust: Implementing a secure and user-friendly authentication process can increase user trust in the banking application and improve customer satisfaction.

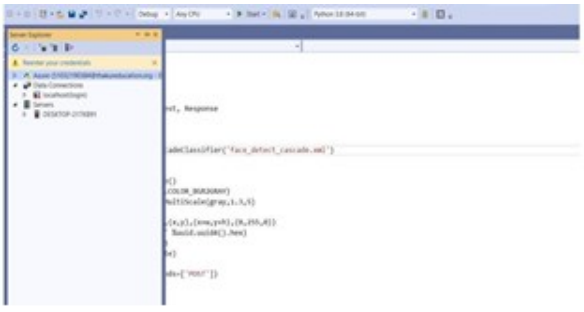

Fig.5 Apllication Code

The outcomes of implementing an adaptive authentication- based security enhancement of a banking application using facial recognition technology could be:

a) Increased Security: Facial recognition can provide an additional layer of security and reduce the risk of fraud and unauthorized access to sensitive information

b) Improved User Convenience: Facial recognition can provide a quick and convenient authentication method, reducing the need for users to remember passwords or use

security tokens.

c) Enhanced User Trust: Implementing a secure and user- friendly authentication process can increase user trust in the banking application and improve customer satisfaction.

d) Reduced Cost and Increased Efficiency: By reducing the need for manual authentication processes, the solution can lower costs and increase operational efficiency for the bank.

e) Data Privacy and Compliance: The solution should adhere to data privacy laws and regulations and provide robust security for sensitive user information.

f) Improved User Onboarding: Facial recognition can provide a smooth and fast onboarding process for new users, improving their overall experience with the banking application.

Overall, the implementation of facial recognition technology for adaptive authentication in a banking application can provide a range of benefits in terms of security, convenience, and efficiency.

5.2 Future Scope

The future scope of research on the adaptive authentication- based security enhancement of banking applications using facial recognition technology could include:

a) Improved Accuracy: Continuously improve the accuracy of facial recognition algorithms to reduce false positives and negatives.

b) Integration with other biometric methods: Research ways to integrate facial recognition with other biometric methods, such as fingerprint or iris recognition, to provide multiple layers of security.

c) User Experience: Study the user experience of the solution to identify areas for improvement and ensure the technology is easy to use and convenient.

d) Security and Privacy: Investigate ways to further enhance the security and privacy of the solution, such as implementing encryption and data anonymization techniques.

e) Cross-platform compatibility: Explore the feasibility of making the solution compatible with various platforms, such as desktop, mobile, and web, to increase accessibility for users.

f) Large-scale implementation: Study the scalability and feasibility of implementing the solution in large-scale banking systems, potentially in multiple countries.

g) Advancements in Facial recognition: Stay updated with the latest advancements in facial recognition technology and explore new techniques, such as deep learning and 3D facial recognition, to further improve the solution.

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Machine Learning-Based Career Guidance System for Engineering Students (CS/IT)

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Abstract - In today's world, choosing the right career is the most difficult decision. Many students today are confused about their future. They have some abilities, but they are unable to identify their abilities and appropriate areas. Different people offer different career options, but ultimately students have to choose their own career. This project focused on this issue for students using machine learning. We use machine learning to help students determine the best career options and disciplines for them using a variety of machine learning techniques. Career is determined based on the personal and academic information provided by the student. This project helps students focus on specific areas according to their abilities.

Key Words: Machine Learning, Naive Bayes, Random Forest, Web Development.

I. INTRODUCTION

The Career Guidance System using Machine Learning is very helpful for Engineering Graduates who've finished their very last year (Computer Science), who're stressed concerning which field/route to select for his or her career. As there are already many alternatives to be had to select Careers, nevertheless taking the ideal choice is a challenge. So we've taken into consideration all of the factors that are crucial to select a Career. The factors taken into consideration in our mission are marks scored in individual subjects which covers the academic side of student, personality based questions which covers the non- academic/psychological side of student[2]. These two factors are crucial for making any choice on Career.

We have created a user friendly internet site for our users. The user has to give a test on our internet site[3]. The solutions given by user on Front-End will be saved

withinside the backend. The Backend is used to keep a classifier version for prediction. Already advanced code for classifier prediction is appended with the input given through the user.

Classifier (Gaussian Naïve bayes) offers us 3 career choices primarily based on probability. The output is saved in Backend and once more exhibited to the user in Front-End. The user can test the encouraged Career and may select the high-quality amongst 3 choices. The Career with the best possibility is displayed first then 2nd and at remaining third. Accuracy metrics are used to calculate the accuracy of our Prediction System.

A feedback mechanism is also a part of our system, which helps us improve accuracy and obtain user input on how well it works. They can write to us and rate us on our portal. They can get in touch with us via our system's email address.

II. SYSTEM ANALYSIS

A. Existing System

In the current scenario, the career prediction system works to get job recommendations. Some platforms, such as AMCAT and CoCubes, provide work recommendations. There is no system that takes input and recommends the appropriate job profile[1].

B. Proposed System

Learn about career guidance systems for students in the CS

/ IT industry who are confused by their career path. The contribution of this system is to help such students reach their hidden and important abilities, guided by the standard system. We want to keep students from getting confused in many areas. Based on the student's opinion, we want to make it easy for the student to use by recommending the three areas that are best for the student. The system we propose takes input from the GUI and processes it to provide three task fields. We also need feedback on student satisfaction with the output to know where we can improve the system. You can also send an email report on your career selection and after graduation to see if you are happy with your career path. This feedback system helps to make the system more and more robust.

III. DIAGRAMS

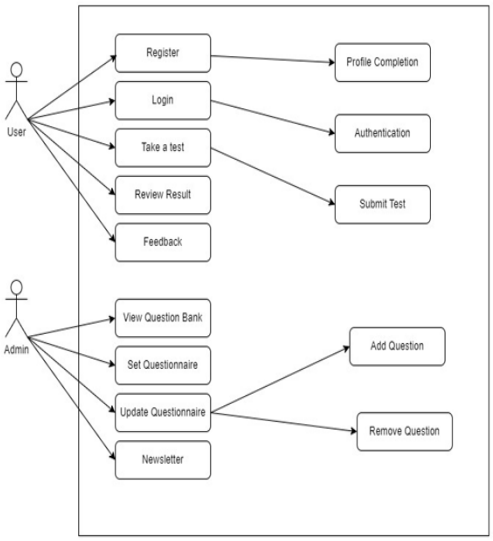

Fig-1: Use case Diagram

IV. COMPARISON TABLE

	Existing system	Proposed System
Main Function	Job Recommendation	Career Path Recommendation
Test	Based on Aptitude and Logical Reasoning	Based on Performance in academics and personal traits
Feedback System	Consist of job Recommendation interest feedback	Consist of Career path recommendation feedback

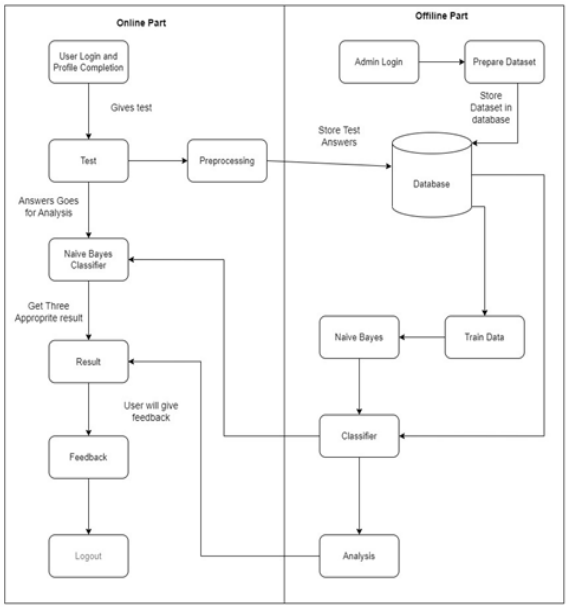

Fig -2: System architecture

V. SYSTEM IMPLEMENTATION

A. Collection of Data:

C. Label-encoding:

Data collection is an important part, but another

[5]

Data collection is one of the largest and most important tasks of a machine learning project to provide the correct data for an algorithm. Therefore, the efficiency and accuracy of the algorithm depends on the accuracy and quality of the collected data. Predicting a student's career requires many parameters, including various subjects, personality traits such as interests, academic performance of students in hackathons, hobbies, workshops, etc. All of these factors are taken into account as they all play an important role in determining student progress in the field of career. Data is collected in a variety of ways. A total of 20,000 records will be collected, including 21 columns of data.

B. Feature Scaling:

Initially, the dataset had 38 features, but to reduce the features, we used the Select best and chi2 (chi-square) methods to scale the features. The number of functions has been reduced from 38 to 20. This has improved accuracy. algorithm with raw data. This data must be preprocessed

before it can be sent to the algorithm. Label encoding is part of the preprocessing. Since the dataset consists of both categorical and numeric data, we need to convert the categorical data to numeric format. You also need to track the conversion because you need to reverse the conversion of the categorical data. You can use scalar's Label Encoder library to convert categorical data to numeric format and vice versa.

D. Training and Testing:

In training and testing, the model is divided into kfolds (2 folds) and most of the data is used to train the model. Later, we will use the test parts to calculate the accuracy of the model. The higher the accuracy, the more efficient the model.

E. Algorithm Implementation:

We have used several algorithms to implement the

project. Based on f1 score we have finalized with using Gaussian naïve bayes algorithm because in the final step it calculates the class probabilities for each class and displays the class with the highest probability. I modified this algorithm so that I could finally get three outputs for each input.

F. Machine learning Algorithm

The algorithm we have finalized is Gaussian naive Bayes algorithm[6]. This is a classification algorithm used to predict the probability of each class specification. It is based on Bayes' theorem, which presupposes naive (strong) independence between functions. This is a very scalable model that requires parameters in vector form. Naive Bayes is an easy way to create a classifier and model that assigns a class label. It is represented as a vector of feature values. These classes are extracted from a finite set of class labels. There is no single algorithm for training such a classifier, but there is a group of algorithms based on a common principle.

G. Accuracy

It shows the performance of the algorithm, the quality of the data, and the required output. We calculated the accuracy of the model based on the expected number of outputs and the actual expected outputs.

H. Result

The data provided by the user is evaluated on the backend using a naive Bayes algorithm with 75% accuracy. So we built a website that takes input from the user, calculates the output using the Naive Bayes algorithm, and returns the result to the user. In the future, more e-learning blogs will be added about the latest technologies on the market, linked to websites that teach these technologies, which could be the best platform for e-commerce and career prediction.

VI. CONCLUSION

This paper proposes a career guidance system that uses machine learning for prediction. It is the most effective and efficient method used by CS / IT engineering students (currently in their final year or graduate) to assess the talents, skills, and specific career paths available to choose from. System. This system is designed according to the needs of the user and provides an excellent user interface.

VII. FUTURE SCOPE

The field of education is evolving day by day with the advent of the Internet and the availability of learning materials, videos, and numerous tutorials. This website is also used to provide these learning materials and tutorials on the website. If you wish to continue investigating the guidance provided by our website, we will use the research materials available on our website. With the revolutionary changes in the technology field, many technology fields have become available. Expand the scope by adding guidance to other areas such as mechanicals, Electrical, Civil etc. including CS/IT. Chatbot will be used for interaction with human beings.

VIII. ACKNOWLEDGEMENT

We would like to take this opportunity to thank Mr.Vijaykumar Yele, mentor of the team and friends for providing the most effective and valuable guidance. They have always motivated and encouraged us to make this project a success and showed great insight during the development of the project.

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A Coupon Exchange System Using Blockchain Technology

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Abstract - **Blockchain technology is experiencing a transformation similar to the advent of the internet. This type of distributed ledger technology (DLT) not only encompasses economic areas such as cryptocurrencies, but is also proving useful for commercial purposes. It has a great potential to bring about significant changes in international enterprises. The evolution of blockchain began with the creation of Bitcoin and other cryptocurrencies, then expanded to include the development of blockchain applications through platforms like Ethereum [1]. Subsequently, other blockchain derivatives such as Hyperledger and Corda have emerged. With the growth of blockchain technology, many issues faced in everyday life can be addressed, such as the problem of unused discount coupons when making online purchases. In today's society, both shoppers and store owners view coupons as being quite important. Both sides of the market suffer an indirect or direct loss when this discount voucher is lost.**

Keywords – Blockchain, Centralization, Technology, Ethereum, Coupons

I. INTRODUCTION

There are several problems in the world, many of which go unnoticed. One such issue is that we now pay for things online, where we may obtain a lot of discount coupons which goes in waste if we don't use that particular object. For example, suppose a user received a Domino's coupon and his friend received a Pizza Hut coupon. If his friend uses only Dominos and if the original user uses only Pizza Hut then both their coupons get waste. In order to resolve the issue in the above-mentioned problem, we have elaborated the idea of token exchange where the user will be allowed to put up coupon/coupons for exchange on the platform and describe the specifications (validity or expiration date, type of coupon like money off, percentage off, etc.) of the coupon and also the details regarding what they expect in return. Depending on the demand-supply chain the user can demand a varying number of coupons. A search filter option be available for users who wish to check for any existing desirable offers, where they can add a filter and search based on any particular brand, coupon type, discount amount, etc.

An online exchange system for coupons using blockchain technology could potentially solve this problem by allowing users to trade their coupons with others. By leveraging the decentralized and immutable nature of blockchain, the system can provide a secure and transparent platform for coupon trading [2]. This would enable users to trade coupons for brands and stores that they do not regularly use, allowing them to make use of coupons that would otherwise go to waste. Additionally, the use of smart contracts could automate the trading process, making it more efficient and convenient for users. Overall, this system has the potential to reduce waste and increase the value of coupons for both consumers and businesses.

The two major problems with the coupons exchange system is Lack of Trust and Centralization. Coupons can easily be duplicated or manipulated, leading to fraud and a lack of trust between coupon issuers and users. This can also result in difficulties in verifying the authenticity of a coupon and ensuring that it can be redeemed as intended. Traditional coupon exchange systems are usually centralized, with a single entity controlling the issuance and exchange of coupons. This creates a single point of failure and can result in security breaches and data loss. In addition, the centralized entity often has complete control over the coupon exchange process, which can lead to inefficiencies and longer wait times for coupon transactions to be processed. Blockchain technology can eliminate these problems by creating a decentralized and secure platform for coupon exchange.

With blockchain, coupon transactions are recorded on a distributed ledger, which is transparent and immutable. This ensures that coupon transactions are secure and tamper-proof, eliminating the possibility of fraud and ensuring the authenticity of each coupon. In addition, the decentralized nature of blockchain eliminates the need for a central authority, creating a more efficient and user-friendly coupon exchange system[13]. With blockchain, coupon transactions can be processed in real-time, without the need for intermediaries. This results in faster and more secure coupon transactions, and provides users with greater control and transparency over their coupon holdings.

II. OVERVIEW OF BLOCKCHAIN

A blockchain is a decentralized and distributed digital ledger that is used to record transactions across multiple computers. It allows for secure and transparent record keeping without the need for a central authority. In the context of an online coupon exchange system, a blockchain could be used to track the issuance, ownership, and redemption of coupons in a secure and transparent manner. Each coupon could be represented as a digital asset on the blockchain, with ownership and transfer of the asset being recorded on the blockchain. This would provide a tamper-proof record of all coupon transactions, ensuring that coupons can be easily tracked and verified by all parties involved. Additionally, smart contracts could be used to automate the redemption process, making it more efficient and secure. Overall, using blockchain technology in an online coupon exchange system can provide increased security and transparency, as well as the ability to automate certain processes. Blockchain works by maintaining a chain of blocks, each containing a list of recent transactions.

Blockchain technology has evolved significantly over the past few years, making it increasingly suitable for widespread use in projects like the online coupon exchange system. Some of the key developments in the evolution of blockchain technology include Scalability. Earlier blockchain systems struggled with scalability, making it difficult to handle large volumes of transactions. However, with the development of new technologies such as sharding, blockchain systems have become more scalable, making them suitable for use in large-scale projects like the online coupon exchange system [1]. Next is Interoperability. In the past, different blockchain systems were not able to interact with each other, limiting their usefulness. However, with the development of cross-chain communication protocols, blockchain systems can now interact with each other, allowing for a more seamless exchange of information and assets. Blockchain has evolved in terms of User Experience as well. Early blockchain systems were difficult to use and had a steep learning curve. However, with the development of new user interfaces and user experience design, blockchain systems have become more user-friendly and accessible, making them easier to use for a wider range of users. It has also evolved in terms of Regulation. In the past, there was a lack of clear regulation around blockchain technology, making it difficult to know how it should be used[3]. However, with the development of new regulations, blockchain technology has become more regulated, providing users with greater clarity around how it can be used in various industries.

The evolution of blockchain technology has made it increasingly suitable for widespread use in projects like the online coupon exchange system. With increased scalability, interoperability, user experience and regulation, blockchain technology is well positioned to support the development of a more efficient and secure coupon economy[4].

III. WORKING OF THE SYSTEM

A blockchain-based online coupon exchange system could work as users receive coupons in the form of digital tokens and store them on a blockchain platform. Users can trade or exchange their coupons with others using the platform. The platform operates on a decentralized ledger, ensuring that all transactions are transparent, secure, and tamper-proof. The coupon tokens are unique and can only be used once, so they cannot be duplicated or counterfeit[5]. The platform uses smart contracts to automate the coupon exchange process and to enforce the rules of the coupon exchange system. The platform can be integrated with existing e-commerce platforms and digital wallets for easy access and use. To ensure security, the platform can use cryptographic techniques such as public-key encryption and digital signatures[2]. This system can help eliminate the issue of coupon wastage and increase the utility of coupons by making it possible to exchange them with others. By implementing a blockchain-based solution, the online coupon exchange system can provide a secure, transparent, and efficient way to exchange coupons and reduce waste.

Here are the basic steps on how blockchain works:

- A transaction is initiated on the network by one user, such as the transfer of digital currency or the recording of an asset ownership.
- The transaction is broadcasted to the network and verified by nodes, which are computers participating in the network.
- Once verified, the transaction is grouped together with other transactions that have occurred in the last few minutes, forming a new block[6].
- The block is then added to the chain of blocks, creating a permanent and unchangeable record of the transaction.• Each copy of the blockchain contains the same information, so no single copy can be altered without the consensus of the network.
- This creates a secure and transparent way to record transactions, as each block in the chain contains a unique code, called a "hash", that is generated based on the information in the block, and the hash of the previous block[7].
- This creates a chain of blocks that are linked together, each one containing the hash of the previous block and making it extremely difficult to tamper with the data stored in the blockchain.

Overall, the technology behind blockchain is complex and relies on complex mathematical algorithms and cryptography to ensure the integrity and security of the network. This is essentially how blockchain technology operates. The flowchart that follows outlines the fundamental steps involved in using blockchain technology to an online coupon exchange system.

- Coupon Generation: Coupons are generated and added to the blockchain as digital assets. The coupon details, such as value, expiration date, and terms and conditions, are recorded on the blockchain.
- Coupon Issuance: The coupons are then issued to users and recorded on the blockchain, providing a transparent and immutable record of who holds each coupon.
- Coupon Trade: Users can trade coupons with each other using a smart contract on the blockchain. The smart contract automatically verifies the validity of the coupons and executes the trade.
- Coupon Redemption: When a user wants to redeem a coupon, they present the coupon to the merchant. The merchant verifies the coupon on the blockchain to confirm its validity and redeem the coupon[8].
- Coupon Update: As coupons are traded or redeemed, the details of each coupon are updated on the blockchain, providing a real- time record of the status of each coupon.

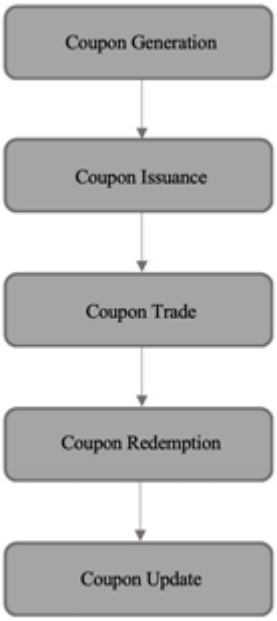

Fig 1. Flow of the system

IV. TECHNICAL ARCHITECTURE OF THE SYSTEM

The technical architecture of a blockchain system for the online coupon exchange would typically consist of the following components:

• Blockchain Platform: A blockchain platform, such as Ethereum, is used as the underlying technology for the coupon exchange system. Ethereum provides a secure, decentralized, and immutable ledger for recording transactions.

• Smart Contracts: The coupon exchange system would be implemented using smart contracts on the Ethereum blockchain. Smart contracts are self-executing code that enforce the rules of the coupon exchange system, such as coupon issuance, coupon trade, coupon redemption, and coupon update[9].

• Tokenization: Coupons are represented as tokens on the Ethereum blockchain. Each token represents a unique coupon with specific terms and conditions, such as value, expiration date, and redemption requirements.

• Consensus Mechanism: Ethereum uses a proof-of-work (PoW) consensus mechanism, where miners compete to validate transactions and add them to the next block in the chain[6].

• Security Measures: To ensure the security of the coupon exchange system, the Ethereum blockchain implements several security measures, including private key management, encryption, and secure key storage.• API Layer: An API layer is provided to enable integration with existing systems, such as merchants, coupon providers, and users. The API layer allows for seamless interaction with the blockchain and smart contract system.

• User Interface: A user-friendly interface is provided for users to interact with the coupon exchange system, such as viewing available coupons, trading coupons with other users, and redeeming coupons at merchants[10].

V. NEED FOR THE SYSTEM

The implementation of a blockchain-based online coupon exchange system is important for several reasons:

• Security: Blockchain technology provides a secure and tamper-proof platform for the exchange of coupons. Transactions are recorded on a decentralized ledger, reducing the risk of fraud and data manipulation[11].

• Transparency: With a decentralized platform, all transactions are recorded in real-time, providing users with a transparent view of the coupon exchange process.

• Efficiency: By using smart contracts, the coupon exchange process can be automated, reducing the need for intermediaries and speeding up the exchange process.

• Reduced Waste: The platform can provide a solution to the problem of coupon waste by allowing users to trade their unused coupons with others.[12]

• Support for Sustainable and Efficient Economy: By reducing coupon waste and providing an efficient platform for coupon exchange, the blockchain-based online coupon exchange system supports the development of a more sustainable and efficient economy.

The implementation of a blockchain-based online coupon exchange system has the potential to bring numerous benefits, such as increased security, transparency, efficiency and reduced coupon waste, thereby supporting the development of a more sustainable and efficient economy.

VI. IMPLEMENTATION

The system would contain a number of webpages where buyers and sellers may trade coupons. Below are a handful of the pages the system comprises of.

• Homepage: The homepage will have an introduction to the website and its purpose, along with a brief explanation of how the blockchain-based coupon exchange system

works. There will also be a login/sign-up button for users to access their accounts.

• Login/Sign-Up: The login/sign-up page will allow users to create an account or log in to an existing one. They will need to provide personal information, such as their name, email, and password, to create an account.

• Dashboard: The dashboard is the main interface for users to interact with the coupon exchange system. It will display their current balance, the number of coupons they own, and the coupons they are interested in purchasing.

• Coupon Listings: The coupon listings page will show all the available coupons, along with their details, such as the coupon's face value, expiry date, and the number of units available for purchase. Users can select the coupons they want to buy and proceed to checkout.

• Checkout: The checkout page will show the total amount the user needs to pay for the coupons they have selected, and will allow them to complete the transaction by making a payment.

• Transaction History: The transaction history page will display a list of all the transactions the user has made, including the date and amount of each transaction, along with the coupons they have bought and sold[14].

• Contact Us: The contact us page will provide a form for users to send their queries and feedback to the website's support team.

• These webpages will provide a user-friendly interface for users to interact with the blockchain system for online coupon exchange, and will allow them to buy and sell coupons securely and efficiently.

VII. RESULT & DISCUSSIONS

A blockchain system for online coupon exchange can offer several key benefits that can enhance the overall experience for users. Firstly, it provides a high level of security by using decentralized ledger technology, which prevents the potential for fraud or counterfeiting. This means that users can be confident that their coupons are legitimate and will be accepted as valid by merchants. Secondly, the transparency provided by the blockchain ensures that all transactions are recorded and easily traceable, which enhances the accountability and reliability of the system. This can also help to prevent any disputes between users or merchants. Additionally, blockchain technology enables the use of smart contracts, which can automate new and untested technology. These limitations and challenges must be carefully considered and addressed in order to ensure the success and widespread adoption of the blockchain system for online coupon exchange. Overall, a blockchain system for online coupon exchange can offer significant benefits, but it is important to the coupon redemption process, making it faster and more efficient. This can help to reduce the administrative burden for merchants, freeing up their time and resources to focus on other areas of their business. The decentralized nature of the blockchain system also means that users have more control over their coupons, as they can buy, sell, or exchange them with other users without the need for a central authority.

There are several potential limitations and challenges that must be addressed for a successful implementation of a blockchain system for online coupon exchange. These include scalability issues, a lack of technical knowledge among users, and the potential for network congestion[15]. Additionally, the decentralized nature of blockchain technology can make it more difficult for authorities to regulate and monitor the system, which may raise concerns about money laundering or other illegal activities. Furthermore, there may be a slow adoption rate due to the perception of blockchain being a

VIII. FUTURE SCOPE

Blockchain technology has the potential to revolutionize the way coupons are exchanged online by providing a secure and transparent platform for tracking and verifying coupon ownership and usage. Some possible future applications of blockchain in the coupon industry include:

• Digital Coupons: Blockchain technology can be used to create digital coupons that are tamper- proof and can be easily tracked and exchanged between parties.

• Supply Chain Management: Blockchain can be used to track the origin and movement of coupons through the supply chain, providing a transparent and auditable record of all transactions.

• Loyalty Programs: Blockchain can be used to create and manage loyalty programs, allowing customers to earn and redeem points or tokens for discounts and other rewards.

• Fraud Detection: Blockchain can help detect and prevent fraud by providing a secure and tamper-proof record of all coupon transactions, making it difficult for bad actors to forge or counterfeit coupons.

• Decentralized Coupon Platforms: Blockchain technology can also enable the creation of decentralized coupon platforms, where users can buy, sell and trade coupons directly with each other, without the need for intermediaries.

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Face Detection and Recognition from Video using Deep Learning

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Abstract- **Facial recognition (FR) and verification are currently the most effective techniques for detecting illegal activity. It can be used in a wide range of applications from criminal identity, security and surveillance to entertainment websites. For verifying consumers, this method (facial recognition) is very useful in banks, airports and other organizations. Convolutional neural networks (CNNs) have sparked interest in deep learning for face recognition, but training CNNs requires more data and applications such as criminal activity (robbery, murder, etc.). It's a big problem when it comes to relationships. Therefore, this study provided a facial recognition system that effectively supports law enforcement and administration by making criminal investigations easier, faster, and more time-consuming.**

In this study, face recognitionfrom videos is performed using a pre-trained model called FaceNet (FN). Face images are transformed by FN into a compactEuclidean space with extended inter-face distances.

We are attempting to create a medisale app utilising this concept, in which we register medical store owners by doing KYC verification on them. The KYC procedure uses real-time video and still images of the user to perform face landmark detection. This entire procedure takes ten seconds, but we can make it faster.

Keywords - FaceNet, security, convolutional neural networks.

I. INTRODUCTION

Faces are important to human identity. It is the most easily recognized human trait. FR impacts key applications in a variety of areas such as security access, personalized identities, law enforcement her identities, and financial authentication. It's both fascinating and complicated. Face recognition is very easy for humans, but more difficult for machines. How images become autonomous and how the brain encodes them is still largely unknown. Are inner (nose, mouth, eyes) or outer (face shape, structure, hairline) highlights used for efficient face recognition?showed that our thoughts respond to specific neurons such as boundaries, curves, movements, and angles under the conditions. No one sees it as scattered pieces, so our visual brains have to supplement amultitude of data sources with helpful examples in many ways. Auto FR removes, inserts, and applies specific categories of desired characters from an image. FR based on facial geometric highlights is probably the easiest way to identify humans. Thewhole process he can divide into three main parts. Thefirst part is finding a good database of human faces, each containing multiple photographs. The photos in the database are used to identify and prepare faces forthe FR in the second stage, and in the final stage they are checked to confirm the faces on which the FR wastrained. Facial Recognition (FD) is now used by various websites such as Facebook, Picasa, Photo Bucket, etc. Images shared among people in photographs are given a new perspective by natural day characters. The FR method is reviewed and applied in this study. This was simple but very effective. This article uses a system of FR (this is the person), verification (this is the same person), and FN. Our system uses a deep coevolutionary network to learn Euclidean embeddings for each individualimage. The framework is trained to connect surface similarity directly to the second-order L2 distance of the embedding space.Faces of similar people are slightly apart, but faces ofdissimilar people are far apart. Police and investigative departments can use this method to identify criminals.The FR method used is fast, easy to learn, reliable and accurate using very simple algorithms and methods. Fixed the initial issue with face recognition difficulty. Tools have been developed to detect not just a single human face in a photo or video, but many faces and return the user's face.

II. RELATED WORKS

FR became a major academic movement in the 1970s. For input images containing multiple faces, FR first performs face separation FD. After preprocessing the individual surfaces, a final low-dimensionalembedding is created. Low-dimensional integration is essential for professional taxonomy. Facial descriptions must be effective for different images within individuals, such as style, appearance, and age,while taking into account image differences between individuals.

Validation and FR are significant challenges. It is widely used in image processing and computer vision research. With the neuronal frameworks at our disposal for the purpose, the issue has grown broader.In general, more time is needed for neural network development, training data, and computercapacity. As a result, several research have been conducted to lessen these variables.

For more than 20 years, there has been discussion about FR. Model-based and phenomenon-based approaches can be used to categorize the techniquesthat have been suggested so far in the text[1].

The authors create a deep 'warp' network to the canonical front before learning from the CNN how to classify each face as part of a pre-existing identity. PCA is used with his group of SVMs for face verification [2].

Introduction of a multi-step process corresponding to

the basic 3D structural model. A multiclass network of over 4,000 characters is created to perform the FR

task. The Siamese network is also used by the designer to investigate her L1 distance between her two surfaces. Three systems with different layouts and shading channels perform best in LFW (97.35%). A nonlinear SVM prediction of the predicted distances from these networks is combined with a two-core nonlinear SVM.

They offer a small and inexpensive measurement network. Each of these 25 systems works using a specific facial patch. In his final LFW run, the developer combined 50 responses (normal and reversed) (99.47%) [4],[5].

This is done using Joint Bayesian and PCA [6], which accurately represent linear embedding-space transformations. Their strategy is not specifically designed for 2D/3D. The system is created by a combination of classification and loss of validation. Validation loss is the same as TL [7],[8] because it limits the L2 gap between faces with the same features and establishes a buffer between distances between faces with different personalities. Semantic and visual closeness to the evaluation images assessed lossescomparable to those used here [9].

Separation vector approach between facial features, Eye and ear sizes were first used in FR [6]. Thevector contains 21 subjective characters, each emphasizing arecognizable face. They took a similar approach in his 1973, globally adjusting facial features using his matching template [7]. The authors developed a fully automated FR (1973) on a computer system containinggeometric parameters to extract 16 emoticons [8]. The average positive detection was over 50%. In the 1980s, several blueprints were improved by computing algorithms developed based on improved subjective facial highlights and ANNs. In 1986, the author provided his own face based on his

PCA [9]. The core concept was to replicate low-dimensional images without loss of information. Finally, in 1922,a new algorithm was implemented to correctly classify the heads of faces [10].

Here, the authors perform criminal identification procedures using FR and documentary evidence. In this article, we use the Quick Data Boost training approach. They use a combined identification and verification approach for facial expression documents.

III. METHODOLOGIES

FaceNet is Google's facial recognition and clustering feature with 99.63% accuracy. The goal of this proposed paper is to achieve FR with high accuracy. FN uses a deep neural network architecture. The architecture of the FN model is shown in Figure 1.

It maps face images from Euclidean space where distances correspond directly to face similarity approximations. Once the space is available, you can easily perform various tasks. For face verification, identification,

and clustering, we use regular FN embedding methods as feature vectors. Triplets are used for training frameworks. A triplet is a set of his one image of an anchor, a positive image of an anchor,and a negative image of an anchor.

Let's follow the steps of the pre-trained model. A.To create a model, collect images of people who are one step ahead.

B. Place faces using a multitasking cascaded convolutional neural network and Open CV (MTCNN). It can identify, align and recognize faces.

C. Represent or embed each person's face in 128-dimensional Euclidean space using a pre-trained FN model.

D. Accumulate the embeddings on a disc with the names of the respective user.

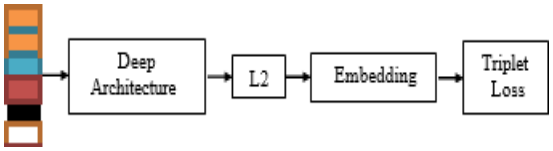

Fig. 1. Illustrating FaceNet Model architecture

Our approach involves deep CNN and batch input layers, followed by normalized L2 and face embedding. TL will follow this during preparation.

The L2 or Euclidean distance between two points p and q is the length of the line segment connecting them. If wehave two points p = (p1, p2, , pn) and q

= (q1, q2, , qn) in Euclidean n-space, we get "(1)" increase. Distance (S) from p to q or q to p.

$$S(p,q) = S(p,q) = \sqrt{(p_1 - q_1)^2 + (p_2 - q_2)^2 + \dots + (p_n - q_n)^2} \sqrt{\sum_{i=1}^{n} (p_i - q_i)^2}$$

(1)

In Euclidean n-space are Euclidean vectors. The Euclidean length of a vector estimates the length of the vector Represented by $||S||$. facial treatment system Recognition is now complete.128-dimensionalembeddings containing people's namesare available.Whenever a face is visible, the image is passed througha previously trained network to create a 128- dimensional embedding and compared to the saved embedding using Euclidean (L2) distance. To this end, we use triplet loss to demonstrate andachieve ourgoals in FR and verification. In other words, the images are integrated into the feature space such that the squared distance between each face of differentidentities is small and the squared distance between a small number of face images is large, regardless of theimaging conditions.

The main goal is to create a complete facialrecognition system that works on all kinds of images and continuously improve it. To better recognize and engage citizens, this transformation must be self-sufficient. Moreover, this identification must be done

as timely as possible, so it is a matter of time. Facial recognition is a very difficult problem, especially outside of controlled environments. Indeed,throughout history, some approaches have fallen short.

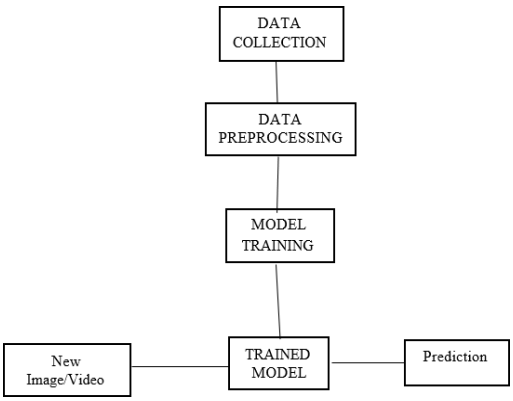

Fig. 2. Work Flow of the proposed methodology

Aside from differences between images of similar faces, such as hair, lighting conditions, and expressions, it is difficult to determine what makes a face visible. Therefore, when starting this project, you should use certain existing work instead of starting from scratch. These speeds up the process and makes iteasier to get quality results. To this end, a literature search was performed. Many effective methods have been discovered and encouraged to deal with the problem. Finally, it was decided to focus on the FN modeling approach. The main reasons are good results (very close to the state of the art) and quality of explanation. The FN model offers an excellentaccuracy of 99.63%. Figure 2 shows the workflow of the proposed methodology, including various phases of face recognition.

A. DATA COLLECTION

Proposed database created. Images of Indianactorsare pulled from Google to prepare the data. In the database, there are 8 photographs of the subject (person) of him. There are 100 photos for each participant, of which 680 are for training and120 are for testing. A key component of ongoing development in automated face and appearance recognition is the creation of a face database for benchmarking. Newtechniques for automated FR were developed in the 1990s as a result oftremendous advances in computing and sensortechnology. Many databasesare currently used to recognize faces based on factors such as size, joints, position, lighting, obstacles, and image quality. The differences in posture, illumination, imaging locations, ethnicity, sexual orientation, and outerlooks from the year 2000 and beyond were noted in the facial databases. The most recent databases, which are built from various sources like the web and social media, capture variations in picture sizes, pressure, and obstructions. Below are some of themost recent face databases:

Labeled Wikipedia Faces (LWF) compiled pictures from over 500,000 biographical passages from Wikipedia Living People, featuring 8,500 of 1,500 people.

The YouTube Faces Database (YFD) consists of 3425 recordings of him from 1595 different people,with 2.15 recordings for each subject, with videos cut at edges between 48 and 670. I'm here. A collection of records and names of subjects for which records were created.

Images from 151 participants (Caucasian females) of a YouTube makeup tutorial exercise are included in the YouTube Makeup Dataset (YMD), with cosmetics mentioned ranging from subtle to overwhelming. It has been. 2 injections before applying cosmetics and 2 injections after application, 4 injections per person. This database is growing steadily, but presents FR problems due to aesthetic changes. The Indian Film Faces Database (IMFD) is a collection of 34512 images of him of 100 Indian actors, including various typesof poses, moods, lighting, lenses, obstacles and cosmetics. edited to Images were edited from approximately 100 exposures.

B. FaceNet

Google scientists announced FN in 2015. 128DModify faces like words embedded in Euclidean space. FN is a one-shot model that allows direct mapping of facial photographs into a compact Euclidean environment, with distance corrected directly by facial proximity measurements. Tasks such as face control and recognition can be effectively performed using standard methods using FN integration as feature vectors once this space is developed. For training, we loosely matched identical/non-identical face patches three times. Manufactured using approximately spaced triplets of identical/non-identical area patches. A representation of the FN model shown in Fig. 3. In particular, f(z) from image z is integrated into

the feature space, and the separation of small squares between all faces without image conditions is similar, but between several face images with different features The separation of the squares is larger. Triple loss is considered to be the best for face checks, but has not been specifically compared to other losses such as: B. Containing affirmative and negative sentences, as used in.

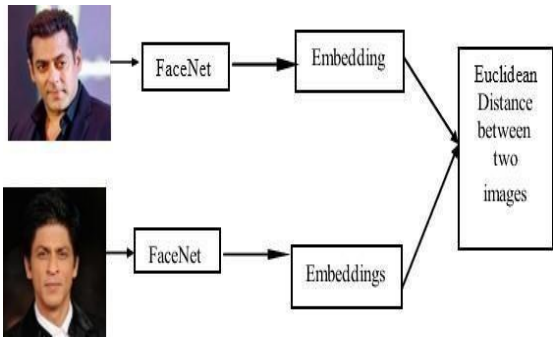

Fig. 3. FaceNet model illustration

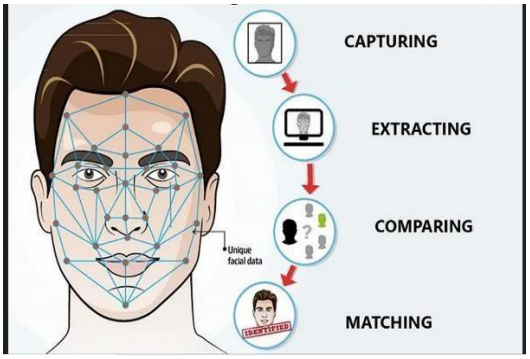

Fig. 4. Face Module Process

Fig. 4 (a) face detection using real image

Fig 4 (b) Face detection using image drawing

Fig 4 (c) Face detection using side image

Fig 4 (d) Face using lower light intensitydetection

Fig 4 (e) Shows face detection even on darkbackgrounds.

IV. RESULTS & DISCUSSION

The necessary individuals for the system to recognise are stored in a database. Data pre-processing is a process that clarifies unprocessed data. Real data frequently contain several flaws and are inadequate, incompatible, or missing from other patterns or habits. Each face will be cropped, and the folder name will be written on each face. Immediately following the pre-processing of the data, the model should be trained using a pre-defined model. Finally, the step is prepared, and it may test this step using our video and picture data. This method is carried out using the Python language. The model works well and can identify faces in still photographs, video, side views, dark faces, and paintings. The outcome is seen below for several photos.

Figure 4(a) shows that our system can detect human faces from images. When the image is processed, a square box for the face is drawn and the person's name is composited underneath it. Figure 4(b) shows a handwritten image of an Indian actor. The system recognizes faces from hand-drawn images. Figures4(c) and 4(d) show a profile image of a person and a dark face image of a person. This model can be recognized in the picture above. Figure 4(e) shows the resulting video image. Given a video with a person in it, it was able to track and recognize that person. After each video is edited, a square box for the face is drawn and the name of the person inside is pasted at the bottom. This system can detect multiple faces from a video.

According to a literature review, the FaceNet model showed the highest accuracy among all these models after training on a specific dataset. With this in mind, a dataset was collected, FaceNet was applied to it, andthe resulting 90% accuracy was taken into account.

V. CONCLUSION

The recommended solution is to be able to accurately identify faces in both photos and videos. It can be used with any kind of image and is relatively robustto

changes in face orientation and appearance, lighting, and other factors. The advantage of thismodel is that it can distinguish blurry images and sides, unlike other traditional models. Using the resulting framework, we explored many other parameter combinations. When viewing a video with aperson in it, it was able to track and identify the person. Each video is processed, a square box of the face is drawn, and the person's name is constructed below. Several faces can be seen in the video.

A collection of 800 headshots is compiled for preparation and testing. The facial recognition component has been tested with consistent results at around 90% accuracy. These results are better than expected and consider several real-world use cases. In any case, there is still room for improvement. This could in the future be used to identify a person via video recording to identify a person from a surveillance camera and allow the police to identify a person in a matter of seconds. It can also be used for visitor analytics systems and home security systems. Face detection and timing of faces in video will be integrated in the future.

VI. Future Scope

The biometric information of a person is not presently specifically covered by any laws in the United States. More than half of Americans have reportedly created their faceprint by this point, and facial recognition technology is already being tested or used for airport security. A face recognition algorithm may gather and process data without the subject even realizing it. The knowledge of a person would then spread without their awareness as a hacker may access the information. This information may also be used to keep an eye on people by marketers or government agencies. Even worse, a false positive might involve someone for a crime they did not commit.

Numerous businesses now use facial recognition. Although integrating and installing it is not very difficult, consumers now feel as though they are usinga system that is more advanced and secure than passwords or PINs, which improves user experience. Nevertheless, much is frequently unclear on the path to putting into practice what many consider to be the best biometric method, leading to a number of rather serious errors along the route.

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Anomaly Detection in Business Audit using Data mining

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Abstract— **Detecting financial misstatements presumed anomalous in general ledger (GL) data is a long-standing problem in accounting. This insinuates that highly skilled audit teams try to distinguish needles in a haystack; in such cases, review risk may emerge. When tackling this issue, supervised learning techniques are often taken into account by the majority of machine learning systems. This approach has been utilized in external audits to distinguish between fraudulent and non-fraudulent financial statements. Labeling becomes feasible for general ledger (GL) since financial statements are structured across multiple reporting regulations in external audits. On the other hand, internal audits usually lack procedure labeling due to the risk-based methodology used to choose which areas, departments, or processes to examine. Therefore, when used in internal audits, unsupervised learning is frequently the only viable solution. For the clustering of financial statement ratios, an unsupervised learning method can be used. Data vectorization is used in this program to handle the fluctuation in journal entry size, and a real-world GL dataset was used to train and assess the models. The evaluation's results demonstrate that the best-trained supervised and unsupervised models had a high potential for identifying specific categories of anomalies as well as efficiently sampling data to identify journal entries with a higher likelihood of being false positives. In order to give an optimal auditing solution made up of multiple audit components, this system uses a variety of supervised and unsupervised learning methods, offering a one-stop solution to the auditing challenges.**

Keyword—Finance statements, auditing, data-mining, risk management, supervised and unsupervised learning.

I. INTRODUCTION:

The trend of increased activity in the securities market persists. With approximately 227 million annual transactions, 2021 was a record year for Nordic securities trading in terms of activity, and since the year 2000, the number of executed orders has increased elevenfold. Unfortunately, as market activity and interest in the securities market increase, so does the frequency of financial market crimes. This covers transgressions under the headings of insider trading and market manipulation. Insider trading refers to the act of a participant trading securities using insider information, such as confidential information regarding a publicly traded corporation. Trading and activities that provide false or misleading supply, demand, or price signals are examples of market manipulation. Market manipulation will be the main topic of this study.

There are many ways to manipulate the market, including through the spread of false information; pump and dump is one such strategy. One or more players work together to increase the sentiment surrounding a security using supportive comments on social media or similar in order to raise the price of the security. when consumers are influenced to purchase as the price of the securities increases, the scheme's operators can sell them for a profit. Another sort of manipulation involves actual trading and order placement, and the typical techniques used include momentum igniting and spoofing (layering). The methods' actual implementation varies. However, the fundamental idea remains the same: to artificially increase the price of a security by using a variety of ordering mechanisms. Monitoring orders and closing lists can help identify market manipulation, particularly the varieties that depend on actual trading and order placement.

The EU-regulated Market Abuse Regulation now applies to all Swedish stock exchanges, trading platforms, and individuals that do business professionally (MAR). Monitoring is a requirement, and market participants are required to notify Finansinspektionen (FI) if they come across orders or transactions that they perceive to be of the sort of financial market violations. Most monitoring is rule- based, which means that if particular "thresholds" are met, pre-programmed alarms based on knowledge and past data are triggered. Although these systems have shown to be highly effective, they still have flaws, such as the possibility that manipulators discover how to work them. Since rule- based alarms only use some of the customers' accessible data rather than all of it, they also run the danger of missing behavior.

Using a different approach to objectively monitor trade data and perform outlier detection using machine learning is one way to address this. Differentiating between what a dataset considers normal and what it considers abnormal is the fundamental tenet of outlier detection. The threshold is used in rule-based monitoring to categorize an activity as normal or abnormal, applying the same logic. The method used to determine the classification itself differs. Rule-based systems look for deviations from participant expectations,which are what market manipulation is. Rule-based algorithms search for these deviations by combining static thresholds, whereas machine learning categorizes data as normal based on the dataset's real structure. Instead, because the classification is based on all available data and not only on select portions of the data where rule-based thresholds exist, it is dynamic and may discover new market manipulation strategies. The interpretability of the approaches is a general issue for machine learning solutions, which is not present in rule-based systems. The rule-based system explains the criteria used to determine whether a transaction qualifies as market manipulation by identifying the thresholds that have been crossed. However, machine learning solutions frequently merely produce a result without making it clear to the user why a data point is classified in the way that it is. A common issue with machine learning and artificial intelligence

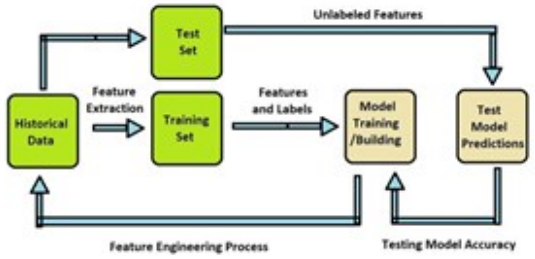
(AI) is the lack of interpretability, which makes consumers lose confidence (faith) in the processes since they cannot understand why certain outputs are produced.

Machine learning solutions are not employed as much as

they may be as a result of this problem. explainable Artificial Intelligence, a new branch of machine learning and AI, has emerged in response to this hot topic (XAI). Making so-called "black-box" machine learning models intelligible to people is the aim of this field.

Billions of dollars of loss are caused per annum thanks to fraudulent mastercard transactions. The planning of efficient fraud detection algorithms is vital to reducing these losses, and more algorithms believe advanced machine learning techniques to help fraud investigators. The planning of fraud detection algorithms is however particularly challenging thanks to non-stationary distribution of the info, highly imbalanced class distributions and continuous streams of transactions. At an equivalent time, public data is scarcely available for confidentiality issues, leaving unanswered many questions on which is the best strategy to affect them.

II. ARCHITECTURE AND BLOCK DIAGRAM:



I. Dataset Selection

II. Dataset Pre-Processing

III. Data visualization

IV. Data splitting and analysis

V. Logistic regression

VI. Decision tree

VII. Random forest algorithm

VIII. XGboost algorithm

IX. Project Evaluation

III. METHODOLOGY:

Operations in the field of data science, whether it be in research or industry, typically include some standard data mining principles made up of a variety of techniques and procedures. Several data mining approaches were formally established in order to standardize the operations. While these techniques generally use the same steps, there are variances in the granularity of those steps as well as how and when they are implemented. Based on extensive research, SEMMA, KDD, and CRISP-DM are the three most well- liked and widely accepted techniques. We also looked at the TDSP technique, which is very adaptable and supports projects that started out using different methodologies. Some of them have been modified numerous times; however, we have listed their basic procedures and guiding ideas below.

SEMMA: The abbreviation SEMMA refers for a closed cycle that iterates from the start until the goal is reached and consists of the phases Sample, Explore, Modify, Model, and Assess. Because there aren't as many steps as possible in this method, it's straightforward and simple to understand. A representative sample of data from the entire population is used to start the cycle. The necessary data transformations, such as feature selection, data cleansing, and engineering, are done after data exploration. The algorithms and models that will be put to the test in the final Assess stage are kept in the modelling section.

KDD: The acronym KDD refers to Knowledge Discovery in Databases. Executing the five stages acknowledges the Pre-KDD and Post-KDD phases in order to understand the user's goals and, ultimately, to incorporate a created solution into already-existing user operations. Data cleaning, transformation, and evaluation of the analytical component comes after the selection, pre-processing, transformation (data mining), and interpretation (evaluation) of a target analytical dataset. In KDD, procedures are carried out iteratively and collaboratively.

CRISP-DM: Business insight is the first phase of the Cross- Industry Standard Process for Data Mining (CRISP-DM), which consists of six more steps that are deployed after production is complete. The phases of Data interpretation, Data preparation, and Modeling evaluation all involve handling data-related responsibilities. Iterations are possible all the way through business knowledge and the evaluation procedures.

The major goal of employing an unsupervised machine learning approach was to identify outliers or abnormalities in a dataset. There are many reasons to choose this method, but the lack of labels in the data was by far the most important. The ability to detect recent, undiscovered fraud activities is another benefit of adopting unsupervised approaches. This contrasts with manually created rules, which are still primarily employed in fraud detection and do not apply to newer scam tries. Another justification for adopting detection algorithms to begin with is that the internal auditor may have more time for extra checks and a thorough analysis of those anomalies if there are a few irregularities originally discovered.

Methods used: Isolation forest

The Isolation Forest is an extension of decision trees and

random forests that was created to find abnormalities in records. It performs outlier detection differently from the majority of anomaly detection algorithms. It never analyzes the regular points, instead identifying observations that do not fit the profile of a normal point and then determining what is normal in the data. Instead, it focuses only on the outliers, resulting in a substantially

lower total computing complexity than the majority of alternative approaches. This strategy is based on the idea that anomalies are rare, unique, and so more easily isolated than a typical set of features. Isolation Forest, also known as isolation trees, works on the basis of the notion of recursively splitting the data by randomly choosing a feature and a split value between the minimum and maximum value of the observations in the selected feature. The data is then tested using the trees with the intention of separating each observation.

The observations will require a varied number of splits to be isolated depending on the different splits in the trees, and the path length will change. Because they needed fewer splits and hence indicated more extreme values than those requiring numerous splits, observations isolated near to the root node and with a short path length are therefore more likely to be an outlier.

Clustering

The goal of clustering algorithms is to find groups of data

points in a dataset that are more similar compared to those in other clusters. There are several varieties of the clustering process, principally three basic ones. The first technique makes the assumption that outliers belong to tiny, sparse clusters whereas typical data points in a dataset belong to big, dense clusters. The second strategy is predicated on the notion that outliers are points that do not fit into any cluster. The centroids, or geometric midpoints of each cluster, are used in the third method to categorize points. Outliers are defined as points farthest from the centroids of each cluster, whereas normal points are those closest to the centroids. This category includes the most used cluster algorithm, k- means. The clustering algorithm adopted determines the general difficulty of clustering approaches. However, the distance between distinct sites must be computed for clustering-based approaches, including distance-based and density-based ones. However, for cluster algorithms, it is typically sufficient to calculate simply the distance to the centroids for each data point, rather than the complete dataset. As a result, the complexity is modest and is constrained to O (n).

K-Nearest neighbor classifiers work by allocating data instances to classes while taking into consideration the nearest class data points.

Boosting

One common approach for boosting is gradient boosting.

Each predictor in gradient boosting corrects the mistake of its predecessor. Unlike Adaboost, each classifier is trained

using the residual errors of the predecessor as labels rather than adjusting the weights of the training examples.

The Gradient Boosted Trees approach uses CART as its basic learner (Classification and Regression Trees).

Decision Tree

In order to develop a decision assistance tool, a decision tree

is a combination of iterative and incremental stages that connects logical sequences based on straightforward tests, with each test comparing a numerical property to a threshold value. By posing queries regarding the characteristic pertaining to the node and the data point, a decision tree characterizes these data points. Every node has a single query, and every internal node links to a child node that represents each potential response. As a result, the queries take on a hierarchical structure that may be represented graphically as a tree. In order to attempt to appropriately identify the classes in the training set, the query nodes are gradually added while building a decision tree based on the learning data. As a result, queries are recursively chosen to divide training materials into smaller groups and merge them into a single tree. By increasing information gained or reducing impurity, the optimum query for each node is selected. In order to produce homogenous class labels, it is ideal to accomplish the fewest number of splits feasible. Entropy and Gini index are typically employed in decision trees to quantify impurity in objects. Decision trees are categorized as a supervised approach since they need labelled data to operate. A data point that has to be classified travels along a path that starts at the root node and continues via internal nodes that contain "yes" and "no" children until it reaches a leaf node. The class linked to the leaf node where the data point ends up will then be assigned to it. As a result, it is simple to comprehend why a point is classified in the way that it is, which places decision tree in the category of intrinsically explainable algorithms. This is a characteristic shared by many supervised algorithms. Decision trees have the drawback of being prone to overfitting since the model is dependent on training data. Applying methods like random forest, which makes use of an aggregation of decision trees, helps prevent overfitting.

Random Forest

A popular advancement of decision trees, random forests

construct each tree using bootstrap samples. Multiple decision trees are included in a random forest, and bagging is the process of replacing the original data in each tree with replacements drawn from the random sampled data in that tree. An ensemble of decision trees includes a sample with substitution from the training set that was bagged. A class label for an unlabeled data point is determined by each and every tree in the ensemble. Each classifier votes for its own anticipated class label during the majority voting process used for labelling. The data point is then classified using the class label that received the highest support from the several classifiers. The idea behind random forests is to use the rule of large numbers to solve the overfitting problem. By integrating a lot of weak learners into one strong learner, the random forests qualified majority structure prevents overfitting and produces a strong learner.

Neural network autoencoder

An artificial neural network may automatically learn a

compressed logical representation of the information using the autoencoder, which then reconstructs it so that the input and output are identical. The neural network learns on the entire set of data in the "encoder" portion through a series of progressively smaller layers until the compressed data representation is achieved. The second component, the "decoder," frequently mirrors the compressed representation's inclining layers to reconstitute the original input. Since the last compressed layer of an encoder is the bottleneck of a model with non-linearly learnt semantics, it does not only recall the original data. For this kind of learning, there is no need to separate the train and test data; instead, the entire dataset is used to fit the model twice, once for training and once for testing.

Data Understanding

Understanding the data's purpose, collection methods, and

mapping to business knowledge are all necessary for data- centric operations. This stage involves describing the gathered dataset(s) and doing data exploration and analysis. Data quality has to be evaluated and reported. Additional data transformations shouldn't be added to this stage.

Data Pre-Processing

Data selection (sampling), data cleaning, feature selection,

feature engineering, and algorithm-required transformations including reformatting, encoding, scaling, class balancing, and dimensionality reduction must all be completed before data can be utilized in the modelling stage.

Data preprocessing is a data mining technique used to turn

the raw data into a format that is both practical and effective. The data is pre-processed to reduce non-uniformity before applying the model. The dataset was cleaned up by removing any rows from it that had attributes with empty values. Only those qualities that were pertinent to the instances created after data processing were used. We then continue with the modelling process after calculating the correlation between the characteristics.

Modelling

This phase involves actual implementation of the

algorithmic component. The ability to train machine learning algorithms or use other statistical techniques to accomplish previously stated goals is made feasible by having prepared input data. The selection of algorithms and hyperparameters, composition of the models, and fitting the models are carried out in the case of machine learning modelling. Following model training, chosen metrics values are obtained and the models' performance is evaluated. The optimal model hyperparameters are found through a model tuning method, if necessary, to enhance model performance.

Data Understanding

Journal entries gathered from various businesses with

registered financial accounts over various time periods make up the general ledger data that is offered. To create a system to find abnormalities in the accounting data, supervised machine learning was used. Six different classifiers were trained and evaluated using data from a single firm that was taken from the ERP system. The task

was defined as a multi-class classification, and the dataset for journal entries had 11 categorical variables. The authors emphasized that there aren't many machine-learning applications and that most investigations employ conventional data analytics and statistical methods. Based on several assessment criteria and comparisons to the traditional rule-based method, they came to some encouraging conclusions and claimed excellent performance of the chosen models. The journal entry unique identification JE_NO is a categorical value that designates a unique entry within a fiscal year FY for the particular firm COMPANY and registered on the effective date EFF_DATE. The ACCOUNT field for a single transaction contains a four-digit account number together with the AMOUNT field's embedded debit-credit amount. A source system category value may be found in the SOURCE field.

	JE_NO	EFF_DATE	ACCOUNT	AMOUNT	SOURCE	COMPANY	FY	Fabricated_JE	TYPE
0	A-111	2019-07-07	1930	10512.00	C	44	2018-09-01 - 2019-08-31	0	0
1	A-111	2019-07-07	1510	-10512.00	C	44	2018-09-01 - 2019-08-31	0	0
2	B-222	2019-06-10	2330	-2374.00	E	55	2018-07-01 - 2019-06-30	0	0
3	B-222	2019-06-10	2440	2374.00	E	55	2018-07-01 - 2019-06-30	0	0
4	C-333	2017-07-05	1930	-23334.20	D	66	2016-09-01 - 2017-08-31	0	0

We have labels in addition to the attributes of the provided dataset. A binary tag for a journal entry is included in the Fabricated_JE field, where 1 corresponds to a synthetic anomaly and 0 to the original data value. We have a TYPE along with a binary-value label.

N	Column name	Column type
0	JE_NO	string
1	EFF_DATE	datetime
2	ACCOUNT	string
3	AMOUNT	float
4	SOURCE	string
5	COMPANY	string
6	FY	string
7	Fabricated_JE	string
8	TYPE	string

Data Cleaning

We examined the dataset to see whether any records had missing values, but none were found. Dropping duplicates was done to make sure there were no records

that repeated themselves in a data. The column data types were aligned, with the effective date column becoming a datetime type and category values becoming string data types. There is only one continuous column of numbers here: AMOUNT. The data doesn't contain any values that curiously don't match the columns they belong to.

Models Used:

I. Logistic Regression

Logistic regression is basically a supervised classification

algorithm. For a certain collection of characteristics (or inputs), X, the target variable (or output), y, can only take discrete values in a classification issue. In order to determine the likelihood that a certain data input falls into the category designated by the number "1," the model creates a regression model. Logistic regression models the data using the sigmoid function, much like linear regression assumes that the data follows a linear distribution.

II. Decision Tree Algorithm

A supervised learning algorithm is the decision tree

algorithm. By learning straightforward decision rules derived from previous data, a Decision Tree is used to generate a training model that may be used to predict the class or value of the target variable (training data).

In decision trees, the process begins at the tree's root when anticipating a record's class label. It contrast the root attribute's values with that of the attribute on the record. It takes a branch that corresponds to that value and go on to the next node based on the comparison.

III. Random Forest Algorithm

Random forest is a supervised learning algorithm. The

"forest" it builds is an ensemble of decision trees, usually trained with the “bagging” method. The general idea of the bagging method is that a combination of learning models increases the overall result. Hence, random forests build multiple decision trees and merges them together to get a more accurate and stable prediction.

IV. XGBoost Algorithm

XGBoost is a decision-tree-based ensemble Machine

Learning algorithm that uses a gradient boosting framework. In prediction problems involving unstructured data (images, text, etc.) artificial neural networks tend to outperform all other algorithms or frameworks. However, when it comes to small-to-medium structured/tabular data, decision tree-based algorithms are considered best-in-class right now.

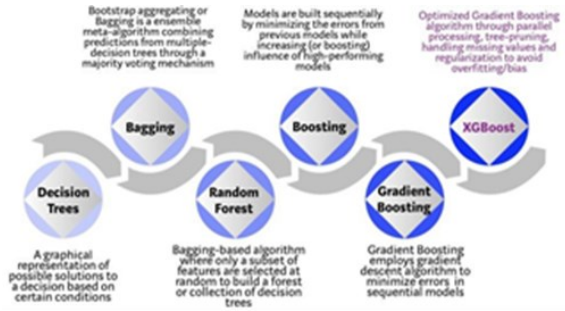


Fig. 06: Evolution of XGBoost from decision trees

V. IMPLEMENTING MODELS:

To find outliers in the preprocessed dataset, we trained 7 supervised and 2 unsupervised machine learning models using various algorithms. A dichotomous class will be predicted by supervised models, turning the problem into a binary classification one. We discussed the methods and outcomes of empirical modelling in this section.

For machine learning models to operate at their best,

tweaking algorithm-specific hyperparameters is necessary. This is typically an iterative procedure that calls for careful parameter selection to be modified as well as the use of a more intelligent automated method to quickly iterate over large hyperparameter spaces. In this study, Bayesian optimization was applied to fine-tune the hyperparameters over intricate input spaces using the Hyper opt Python module. In contrast to random or conventional grid search, Hyper opt uses adaptive learning to focus on the most effective combinations of hyperparameters that speed up the search process. The algorithm is very adaptable and minimizes a loss function. A set of hyperparameters from the defined space must be passed to an objective function in Hyper opt in order to establish an optimize function that runs trials and generate an evaluation measure. Given that Hyper opt reduces the loss, we applied a negative value of this measure to the loss in order to increase the value of the evaluation metric.

We must divide the data into train and test datasets or train, test, and validation datasets in order to perform supervised learning. The amount of data and other data features, including a distribution of classes, heavily influence how the data should be split. Compared to the entire number of anomaly classes in our dataset, only few anomaly classes have been labelled. Despite the fact that we have a binary classification problem, we still want our model to develop and be evaluated on all of the different sorts of anomalies. In this case, we divided our data into two datasets: train and test data, each comprising 70% and 30% of the total data. To ensure that the proportions of each anomaly type in the train and test data were identical, we needed to stratify the data while separating it. We set a random state value while splitting in order to ensure reproducibility and accurate model comparison. Cross validation resampling is frequently used to obtain better generalization loss estimates. The K-fold cross-validation approach, which randomly divides data into train and test datasets k times with a holdout (test) dataset accounting for 1/k, is one

example of that. The training procedure will take k times longer using this strategy. To optimize the models in our setup, we use Hyper opt with 100 iterations. The objective function of Hyper opt optimization advises against employing cross-validation since the search for the correct hyperparameter value predominates. However, in our situation, 100 iterations would result in 300 with 3-fold cross-validation for each trained supervised model. The necessity to get the classification report and confusion matrix that would be for the cross-validation of the unspecific random split when comparing different tuned models is another reason to only use cross-validation for the model that performs better. In light of this, we came to the conclusion that the use of cross-validation within Hyper opt will only be advantageous for the model productionazation,when the best technique across examined is picked to refine the model and retrain it on the whole dataset using best parameters.

Positive (0) and negative (0) classes are predicted by binary classification models (1). We view anomalous class positively in our work. Accuracy, Precision, Recall, and F1- Score are the most often used classification metrics for evaluating binary classification models. A confusion matrix, which is a consequence of a model's anticipated classes representation, can be used to determine these metrics. Explained in terms of true/false positive and negative classes utilising the actual class y-axis and predicted class x-axis position is the confusion matrix structure. When a trained ML model predicts a class, we may determine the value of the corresponding T N, T P, F N, and F P counts. The weighted average, macro average, and micro average levels can all be used to produce the aforementioned metrics. Selecting the appropriate metrics for a model's evaluation depends on the task at hand and the class balance property. For a dataset with imbalanced classes, such as the one in our scenario, Accuracy would not be a reasonable metric to grade a model on.

PERFORMANCE EVALUATION:

Improving the accuracy of the model with the help Area under curve and Confusion matrix algorithms.

Confusion Matrix and Statistics of Logistic Regression

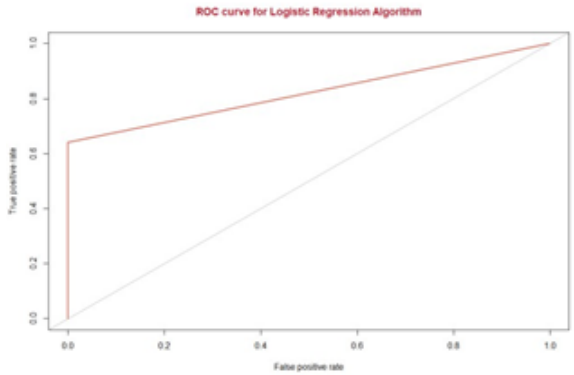


Fig. 08: ROC curve for Logistic Regression Algorithm

Reference/ Predictions	0	1
0	56846	38
1	9	68

Fig. 09: Confusion Matrix and Statistics of Logistic Regression

Accuracy : 0.9992

95% CI : (0.9989, 0.9994) No Information Rate : 0.9981

P-Value [Acc > NIR] : 9.484e-11

Kappa : 0.7428

Mcnemar's Test P-Value : 4.423e-05

Sensitivity : 0.9998

Specificity : 0.6415

Pos Pred Value : 0.9993

Neg Pred Value : 0.8831

Prevalence : 0.9981

Detection Rate : 0.9980

Detection Prevalence : 0.9986

Balanced Accuracy : 0.8207

'Positive' Class : 0

Area under the curve: 0.8207

Confusion Matrix and Statistics of Decision Tree Algorithm

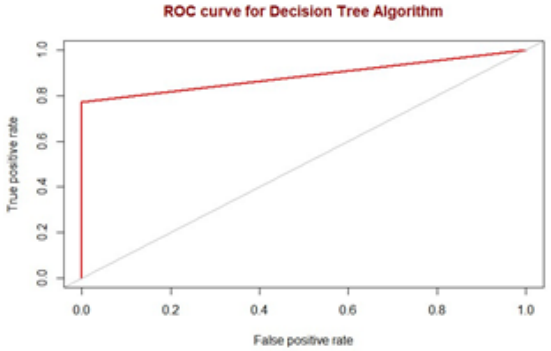


Fig. 10: ROC curve for Decision Tree Algorithm

Reference/ Predictions	0	1
0	56848	24
1	7	82

Fig. 11: Confusion Matrix and Statistics of Decision Tree Algorithm

Accuracy : 0.9995

95% CI : (0.9992, 0.9996)

No Information Rate : 0.9981

P-Value [Acc > NIR] : < 2.2e-16

Kappa : 0.8408

Mcnemar's Test P-Value : 0.004057

Sensitivity : 0.9999

Specificity : 0.7736

Pos Pred Value : 0.9996

Neg Pred Value : 0.9213

Prevalence : 0.9981

Detection Rate : 0.9980

Detection Prevalence : 0.9984

Balanced Accuracy : 0.8867

'Positive' Class : 0

Area under the curve: 0.8867

Confusion Matrix and Statistics of Random Forest Algorithm

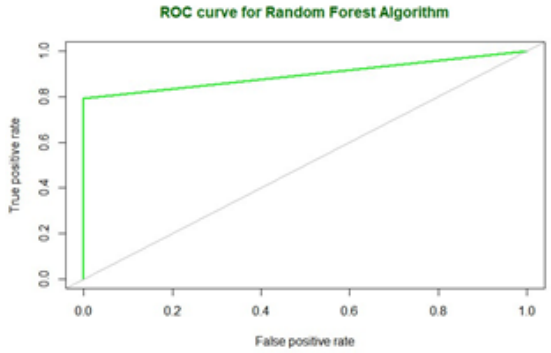


Fig. 12: ROC curve for Random Forest Algorithm

Reference/ Predictions	0	1
0	56854	22
1	1	84

Fig. 13: Confusion Matrix and Statistics of Random Forest Algorithm

Accuracy : 0.9996

95% CI : (0.9994, 0.9997)

No Information Rate : 0.9981

P-Value [Acc > NIR] : < 2.2e-16

Kappa : 0.8806

Mcnemar's Test P-Value : 0.0001746

Sensitivity : 1.0000

Specificity : 0.8019

Pos Pred Value : 0.9996

Neg Pred Value : 0.9770

Prevalence : 0.9981

Detection Rate : 0.9981

Detection Prevalence : 0.9985

Balanced Accuracy : 0.9009

'Positive' Class : 0

Area under the curve: 0.9009

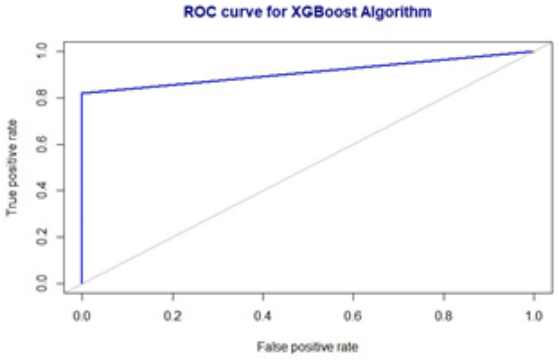


Fig. 14: ROC curve for XGBoost Algorithm

Reference/ Predictions	0	1
0	56854	19
1	1	87

Fig. 15: Confusion Matrix and Statistics of XGBoost Algorithm

Accuracy : 0.9996

95% CI : (0.9995, 0.9998)

No Information Rate : 0.9981

P-Value [Acc > NIR] : < 2.2e-16

Kappa : 0.8967

Mcnemar's Test P-Value : 0.0001439

Sensitivity : 1.0000

Specificity : 0.8208

Pos Pred Value : 0.9997

Neg Pred Value : 0.9886

Prevalence : 0.9981

Detection Rate : 0.9981

Detection Prevalence : 0.9985

Balanced Accuracy : 0.9104

'Positive' Class : 0

Area under the curve: 0.9104

V. RESULT INTERPRETATION

We developed Logistic Regression, Support Vector Machines, Decision Tree, Random Forest, K-Nearest Mean, Nave Bayes, and Artificial Neural Network models for supervised modelling. The Hyper opt Bayesian optimizer was used to find the optimum model hyperparameters across

100 iterations for all models with the exception of the K-

Nearest Mean model. In order to effectively search for the optimal values, each machine learning technique was built with Hyper opt optimization to train 100 distinct models. To ensure an unbiased train and evaluation process, we used a stratified split by anomaly types. In this scenario, an equal percentage of each anomaly type instances ended up in each of the splits. In the Hyper opt optimization trials object, we stored the model hyperparameters and corresponding classification report metrics.

No.	Algorithm	TN	FN	FP	TP	Recall avg macro
1	Logistic Regression	3747	2	70	19	0.9432
2	Support Vector Machines	3732	1	85	20	0.9650
3	Decision Tree	3710	0	107	21	0.9859
4	**Random Forest**	**3760**	**0**	**57**	**21**	**0.9925**
5	K-Nearest Neighbour	3814	6	3	15	0.8567
6	Naïve Bayes	3817	17	0	4	0.5952
7	Deep Neural Network	3811	3	6	18	0.9277

We used unsupervised learning strategies, such as Isolation Forest and Autoencoder neural networks, to identify abnormalities in the general ledger data. The primary distinction between unsupervised and supervised learning is that unsupervised learning does not require labelled data. However, to determine assessment metrics based on the created categorization report, we employ the class labels. For each instance of the dataset, the isolation forest and autoencoder models provide an anomaly score.

Based on the chosen performance metric and an overview of the confusion matrices, we evaluated and compared the performance of the models. The criteria listed in include comprehensibility, operating efficiency, economical cost, and regulatory compliance in addition to correct the trained models how statistically are. Operational efficiency considers a model's technical time-performance while interpretability addresses the issues of whether and how we are able to comprehend the outcomes that are generated by the models. Economic cost is a practical factor that determines how expensive it is to train, implement, and use the model in the system environment that is currently in place. The final significant point is a legal one.

The accuracy is been calculated of these different algorithms with their respective AUCs and get the correct number of predictions in each of the algorithms. As shown, the rate of correct predictions increases with every algorithm performed.

LOGISTIC REGRESSION: Acc = 0.9992

AUC = 0.8207 Correct Predictions: 68/106

DECISION TREE ALGORITHM: Acc = 0.9992

AUC = 0.8867 Correct Predictions: 82/106

RANDOM FOREST ALGORITHM: Acc = 0.9995

AUC = 0.9009 Correct Predictions: 85/106

XGBOOST ALGORITHM: Acc = 0.9996 AUC =

0.9104 Correct Predictions: 87/10

VI. FUTURE SCOPE:

While this project couldn't reach the goal of 100% accuracy in fraud detection, it did end up creating a system that can, with enough time and data, get very close to that goal. As with any such project, there is some room for improvement here. The very nature of this project allows for multiple algorithms to be integrated together as modules and their results can be combined to increase the accuracy of the final result.

This model can further be improved with the addition of more algorithms into it. However, the output of these algorithms needs to be in the same format as the others. Once that condition is satisfied, the modules are easy to add as done in the code. This provides a great degree of modularity and versatility to the project.

More room for improvement can be found in the dataset. As demonstrated before, the precision of the algorithms increases when the size of the dataset is increased. Hence, more data will surely make the model more accurate in detecting frauds and reduce the number of false positives. However, this requires official support from the banks themselves.

VII. CONCLUSION AND RESULTS:

This study covered the use of data science in the context of financial auditing, where we employed machine learning strategies to find irregularities in general ledger data.

Smart analytics solutions are more necessary than ever to update the outdated manual methods of performing audit-related chores. The amount of accounting data that must be examined during a financial audit process is growing, and audit professionals must regularly review it despite their limited human capacity to understand the extent of financial misstatements. Automating and increasing the effectiveness of these jobs has long been an aim.

Through a survey of the literature and the use of empirical

techniques for developing and accessing machine learning models, we added to the body of knowledge in the topics under discussion in this work.

In this project we have tried to show different methods of dealing with unbalanced datasets like the fraud transaction dataset where the instances of fraudulent cases are few compared to the instances of normal transactions. We have argued why accuracy is not an appropriate measure of model performance here and used the metric AREA UNDER ROC CURVE to evaluate how different algorithms like Logistic regression, Decision tree, Random Forest algorithm and the XGboost algorithm the response variable can lead to better model training. We concluded that the XGboost algorithm technique works best on the dataset and achieved significant improvement in model performance over the imbalanced data. The best score of 0.9104 was achieved using an XGBOOST model though both random forest and logistic regression models performed well too. It is likely that by further tuning the XGBOOST model parameters we can achieve even better performance. However, this exercise has demonstrated the importance of sampling ineffectively modelling and predicting data with an imbalanced dataset. We discussed the costs and hidden fraud consequences of undiscovered financial misstatements and enhanced labor operations. We were able to provide cutting-edge machine learning methods for identifying abnormalities in the accounting data with the aid of a study of similar work in the appropriate chapter.

The articles that have been studied indicate that using machine learning approaches to solve the issue at hand has a high potential. Despite this, we found a research gap that prevents existing private industrial solutions from being explained and prevents relevant in-depth studies from being conducted in academia or industry. We used the CRISP-DM technique to construct a data science application as part of the research effort for this thesis that included an empirical component.

VIII. ACKNOWLEDGMENT

We thank Thakur college of engineering and technology for providing such an incredible platform where students can express their ideas and research related to the technical or non-technical subject and also can develop their skills. And we also acknowledge our mentor Mrs. Neha Patwari for her guidance and support.

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Semantic Segmentation of Indian Road Scenes

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Abstract—**Semantic segmentation classifies each pixel of an image into one of several predefined classes. In the context of road scenes, it is used for self-driving cars, traffic monitoring, and map generation. Recent advances have beendriven by the development of large, publicly available road scene datasets, such as Cityscapes and SYNTHIA. The current SOTA is dominated by FCNs and encoder-decoder architectures that directly produce a dense, per-pixel prediction. Encoder decoder architectures, such as the U- Net, use a combination of convolutional and transposed convolutional layers to upsample a lower-resolution feature map to output a dense, per-pixel prediction. One area of particular interest is the development of models that handle variations in lighting and weather conditions. We use DAFormer for semantic segmentation, which is trained end- to-end using the cross-entropy loss function and the stochastic gradient descent optimizer. The use of data augmentation techniques such as random flipping, scaling, and cropping is also performed during training to improve the robustness of the model to different image variations. The performance is evaluated using several standard metricswith mean IoU scores of over 95.7% on the Cityscapes and 84.5% on the SYNTHIA dataset.**

Keywords—semantic, segmentation, DAFormer, SegFormer, transformers, self-driving, cityscapes, GTA5

I. INTRODUCTION

Semantic segmentation is a task in computer vision that involves classifying each pixel in an image into one of several predefined categories. This technology can be used in a wide range of applications, including self-driving cars, traffic monitoring and surveillance, and urban planning. In the context of Indian road scenes, semantic segmentation can be used to identify different types of vehicles, pedestrians, buildings, and road markings, which can be used to improve traffic safety and efficiency [1].

However, training semantic segmentation models on Indian road scenes can be challenging due to the wide variability in lighting, weather, and other factors that can affect the appearance of the scene. Additionally, the availability of labeled data for Indian road scenes is often limited, which can make it difficult to train high-performing models.

Unsupervised domain adaptation is a method that can be used to improve the performance of semantic segmentation models on Indian road scenes. This approach involves training a model on one set of data, and then fine-tuning it toperform well on a different, but related, set of data. This can be done by using a technique called adversarial training, which involves training two models simultaneously: one that generates images that are similar to the target domain, and another that tries to distinguish between the generated images and the real images.

II. RELATED WORKS

A. Semantic Segmentation

Semantic segmentation is a computer vision task that involves classifying each pixel in an image into one of several predefined categories. The goal of semantic segmentation is to assign a semantic label, such as "car" or "person," to each pixel in an image. This technique is used to identify and locate various objects and features in an image, such as vehicles, pedestrians, traffic signs, and lane markings.

Semantic segmentation is typically performed using deep learning techniques, such as convolutional neural networks (CNNs) and fully convolutional networks (FCNs). These models are trained on large amounts of labelled data and are able to learn to recognize patterns and features in images that are relevant for semantic segmentation. One of the key advantages of semantic segmentation is its ability to provide a detailed understanding of the scene.

By assigning a label to each pixel, semantic segmentation can be used to identify and locate specific objects and features in an image, such as vehicles, pedestrians, traffic signs, and lane markings. This information can be used for a variety of applications, including self-driving cars, robotics, and surveillance systems.

Semantic segmentation is also used in the field of computer graphics, where it can be used to create high-quality images and animations. The technique can also be used in medical imaging and satellite imaging, where it can be used to identify and locate specific structures or regionsin images.

B. Unsupervised Domain Adaptation

Unsupervised Domain Adaptation (UDA) is training a statistical model on labelled data to a target domain's data from a source domain more efficiently, having access toonly unlabeled data in the target domain. It is a framework for learning that allows information to be transferred from source domains with lots of annotated training examples to target domains with just unlabeled data [2]. It aims to adapt a model trained on synthetic data to real-world data without requiring expensive annotations of real-world images.

In principle, UDA mainly focuses on the global distribution alignment between domains while not includingthe local distribution properties. Its objective is to leverage features from a labelled source domain and use them on an unlabeled target domain, with a similar

but different data distribution. The majority of deep learning methods for domain adaptation involve two phases:

i. learn features that preserve a low risk on labelled samples (source domain) and,

ii. make the features from both domains to be as indistinguishable as possible, so that a classifier trained on the source can also be applied on the target domain.

Most approaches only work with downscaled pictures since UDA methods for semantic segmentation are often GPU memory heavy.

C. Indian Road Scenes

Semantic segmentation of Indian road scenes is the process of classifying each pixel in an image of an Indian road scene into one of several predefined categories. This technique is used to identify and locate various objects and features such as vehicles, pedestrians, traffic signs, and lane markings. One of the key challenges in the semantic segmentation of Indian road scenes is the variability in the appearance of objects and features. Indian road scenes often contain a large number of pedestrians and other non- vehicular objects, which can further complicate the task of semantic segmentation.

To address these challenges, researchers have developed several approaches that leverage deep learning techniques such as convolutional neural networks (CNNs) and fully convolutional networks (FCNs) to improve the performance of semantic segmentation models. The application of semantic segmentation of Indian road scenes is mainly used in the development of advanced driver assistance systems (ADAS) for self-driving cars, road safety, traffic management, surveillance, and robotics [3].

ADAS systems use cameras and other sensors to perceive the environment and make decisions about how to control the vehicle. Semantic segmentation can be used to identify and locate objects and features such as vehicles, pedestrians, and traffic signs, which can be used to improve the performance of self-driving cars. Semantic segmentation can also be used to improve road safety by identifying and locating potential hazards such as pedestrians, bicycles, and motorcycles on the road. This information can be used to alert drivers or to control the speed and trajectory of self- driving cars [4].

III. DATASETS COMPARATIVE STUDY

A. CityScapes

Cityscapes is a comprehensive database that concentrates on comprehending urban street scenes semantically. It offers detailed annotations for 30 different classes, which are divided into 8 categories (such as flat surfaces, humans, vehicles, constructions, objects, nature, sky, and void), and includes both instance-wise and dense pixel annotations. The dataset encompasses around 5000 images with fine annotations and 20000 with coarse annotations. The data was captured in 50 cities over a period of several months and only during daylight hours and good weather conditions.

The footage was initially recorded as video, and specific frames were selected for inclusion based on the presence of a high number of dynamic objects, diverse scene layouts, and changing backgrounds. The dataset is comprised of a diverse set of stereo video sequences from 50 cities and boasts high-quality pixel-level annotations. This makes it significantly larger in scale compared to similar previous efforts. It is designed for evaluating the performance of vision algorithms in crucial tasks of semantic urban scene understanding, such as pixel-level, instance-level, and panoptic semantic labelling, and to support research that utilizes large amounts of (weakly) annotated data, like for training deep neural networks.

B. GTA5

The GTA5 dataset comprises 24966 synthetic images with pixel-level semantic labelling. The images were created through the open-world video game Grand Theft Auto 5 and feature a car's view of American-style virtual cities. There are 19 semantic categories, similar to those in the Cityscapes dataset. The dataset encompasses an extensive range of road scenes, from urban to rural, and provides comprehensive annotations for objects such as buildings, roads, vehicles, and pedestrians. Its diversity and large number of images make it a valuable resource for training models to handle diverse input and generalize effectively to new images.

C. SYNTHIA

The SYNTHIA dataset is a synthetic collection of images and annotations designed to support research in semantic segmentation and other scene-understanding tasks related to driving scenarios. It features a large volume of data with precise pixel-level semantic annotations, including over 200,000 high-definition images from video streams and 20,000 images from separate snapshots.

The dataset offers a diverse range of scenes, including a European-style town, modern city, highway, and green areas, as well as a variety of dynamic objects such as cars, pedestrians, and cyclists. Additionally, the dataset includes different seasons, lighting conditions, weather patterns, and a simulation of multiple sensors, including 8 RGB cameras and 8 depth sensors.

D. National Dataset for Indian Roads

The National dataset for Indian Roads is a dataset created for research and development of autonomous

systems, specifically for Indian roads in partnership by

IISc and Wipro.

It was created to address the lack of publicly available datasets for Indian road scenes, having unique characteristics of such as crowded roads, diverse traffic, and a wide range of vehicle types. It includes 1000 images captured from various locations in India, with a resolution of 1920x1080 pixels. Each picture is annotated with 29 classes, including roads, buildings, vehicles, pedestrians, and traffic signs.

The dataset is composed of images and annotations useful for semantic segmentation of road scenes and Indian Road traffic scene analysis. The dataset was created using real-world data captured in Bengaluru and includes a wide variety of different types of road scenes, from urban to rural, which makes it unique and valuable for researchers working on autonomous systems in India.

One of its key features is that it includes detailed annotations and labels for different types of roads (such as highways, residential streets, and dirt roads), as well as for different types of vehicles (such as cars, trucks, and buses) and different types of buildings (such as houses and factories). These annotations can be used to train models to accurately identify and segment different objects in the images, which is an important step in developing models for autonomous vehicles and other applications that rely on understanding the environment. This dataset also includes annotations for unique and specific Indian road conditions such as, traffic signals, traffic signs, potholes, and road markings. This allows for the development of models that are specifically tailored to Indian road conditions and regulations.

IV. METHODOLOGY

In this paper, we implement two models for semantic segmentation, namely SegFormer [5] and DAFormer [11], and discuss their results and performance.

A. SegFormer

SegFormer [5] includes a new hierarchically structured transformer encoder structure that outputs multi-scale features. SegFormer does not require positional encoding, thereby preventing the interpolation of positional codes leading to a lower performance while the resolution during testing differs from that while training. It also has the tendency to disprove complex decoders. The MLP decoder combines local and global attention by merging information from various layers, resulting in effective representations.

The SegFormer framework has 2 modules: A hierarchical transformer encoder to extract the coarse and fine features, and a decoder to directly fuse these multi-level features and predict the segmentation mask. There are two core ideas to SegFormer: the encoder in the model outputs multi-scale features, and the MLP-based decoder aggregates this information from different layers to output a segmentation map.

1. Encoder

An input image is first divided into 4 x 4 patches (similar to vision transformers), but in vision transformers, it generally uses a patch size of 16 x 16. A smaller patch size used to make better dense prediction tasks. The transformer block is composed of three sub-modules:

1. An efficient self-attention,
2. A mixed feed-forward network, and
3. An overlapping patch merging module.

The first efficient self-attention module works like the original multi-head self-attention transformer, but it uses a sequence reduction technique in order to lower the computational costs. The next block, which is a mixed feed- forward network, is used to solve the fixed resolution problem. Instead of using fixed sized positional encoding, layers of convolution and multi-layer perceptron (MLP) are used to implement data-driven positional encoding. The last module, which is the overlapping patch merging block, is used to reduce the size of the feature map. The size of the feature is reduced as it goes to the higher part of the network.

2. Decoder

The decoder is quite simple compared to the modules in the encoder, because there are different features of different sizes in each layer of the encoder. • The full MLP layer in the decoder takes the features from the encoder and fuses them together. This all MLP decoder is composed of four main steps:

1. Firstly, multi-level features from the encoder are fed into the multi-layer perceptron layer to unify in the channel dimension.
2. Next, the features are up-sampled to ¼ of its size and are concatenated together.
3. Thirdly, a MLP layer is adapted to fuse the concatenated features.
4. Finally, another MLP layer takes these fused features to predict the segmentation mask.

B. DAFormer

Training a neural network for semantic segmentation usually requires expensive pixel-wise annotations of real- world images. Therefore, it is more desirable to exploit other domains that are easier to annotate, such as synthetic data. However, a model trained on the source domain typically experiences a performance drop when applied to the target domain. The goal of Unsupervised Domain Adaptation (UDA) is to increase the

performance over the target domain by using unlabeled target images.

Many state-of-the-art UDA methods are based on self-training. The network is trained using ground truth labels for source images and pseudo-labels for target images. The pseudo-labels are generated by taking confident predictions of a teacher. The teacher network is an exponential moving average of the student for temporally stable predictions. In that way, the networks are iteratively adapted to the target domain. Previous UDA methods mostly use a DeepLabV2 network architecture. However, DeepLabV2 is significantly outperformed by more recent networks in supervised semantic segmentation.

DAFormer [11] studies the influence of the network architecture on UDA and compiles a more sophisticated architecture, representing a major advance in UDA.

Image **Ground Truth** **SegFormer [5]** **DAFormer [11]**

Fig. 1. Qualitative results for semantic segmentation on the National Dataset for Indian Roads. Example predictions

showing a better recognition of most classes by DAFormer as opposed to SegFormer. Compared to SegFormer, the DAFormer model predicts the Ground Truth masks with substantially finer details near object boundaries. It also reduces long-range errors as highlighted in white in images 1, 4, and 6.

TABLE I. GTA5 TO CITYSCAPES

Models	**Classes and Score**																			
	Road	S.walk	Build.	Wall	Fence	Pole	Tr.Light	Sign	Veget.	Terrain	Sky	Person	Rider	Car	Truck	Bus	Train	M.bike	Bike	mIoU
CBST [6]	91.8	53.5	80.5	32.7	21	34	28.9	20.4	83.9	34.2	80.9	53.1	24	82.7	30.3	35.9	16	25.9	42.8	91.8
DACS [7]	89.9	39.7	87.9	30.7	39.5	38.5	46.4	52.8	88	44	88.8	67.2	35.8	84.5	45.7	50.2	0	27.3	34	89.9
CorDA [8]	94.7	63.1	87.6	30.7	40.6	40.2	47.8	51.6	87.6	47	89.7	66.7	35.9	90.2	48.9	57.5	0	39.8	56	94.7
BAPA [9]	94.4	61	88	26.8	39.9	38.3	46.1	55.3	87.8	46.1	89.4	68.8	40	90.2	60.4	59	0	45.1	54.2	94.4
ProDA [10]	87.8	56	79.7	46.3	44.8	45.6	53.5	53.5	88.6	45.2	82.1	70.7	39.2	88.8	45.5	59.4	1	48.9	56.4	87.8
DAFormer [11]	95.7	70.2	89.4	53.5	48.1	49.6	55.8	59.4	89.9	47.9	92.5	72.2	44.7	92.3	74.5	78.2	65.1	55.9	61.8	95.7
HRDA [12]	96.4	74.4	91	61.6	51.5	57.1	63.9	69.3	91.3	48.4	94.2	79	52.9	93.9	84.1	85.7	75.9	63.9	67.5	96.4

TABLE II. SYNTHIA TO CITYSCAPES

Models	**Classes and Score**																			
	Road	S.walk	Build.	Wall	Fence	Pole	Tr.Light	Sign	Veget.	Terrain	Sky	Person	Rider	Car	Truck	Bus	Train	M.bike	Bike	mIoU
CBST [6]	68	29.9	76.3	10.8	1.4	33.9	22.8	29.5	77.6	-	78.3	60.6	28.3	81.6	-	23.5	-	18.8	39.8	68
DACS [7]	80.6	25.1	81.9	21.5	2.9	37.2	22.7	24	83.7	-	90.8	67.6	38.3	82.9	-	38.9	-	28.5	47.6	80.6
BAPA [8]	91.7	53.8	83.9	22.4	0.8	34.9	30.5	42.8	86.6	-	88.2	66	34.1	86.6	-	51.3	-	29.4	50.5	91.7
CorDA [9]	93.3	61.6	85.3	19.6	5.1	37.8	36.6	42.8	84.9	-	90.4	69.7	41.8	85.6	-	38.4	-	32.6	53.9	93.3
ProDA [10]	87.8	45.7	84.6	37.1	0.6	44	54.6	37	88.1	-	84.4	74.2	24.3	88.2	-	51.1	-	40.5	45.6	87.8
DAFormer [11]	84.5	40.7	88.4	41.5	6.5	50	55	54.6	86	-	89.8	73.2	48.2	87.2	-	53.2	-	53.9	61.7	84.5
HRDA [12]	85.2	47.7	88.8	49.5	4.8	57.2	65.7	60.9	85.3	-	92.9	79.4	52.8	89	-	64.7	-	63.9	64.9	85.2

It improves the state-of-the-art performance by a significant margin of 10.8 mIoU on GTA→Cityscapes. A hierarchical transformer is utilized for the encoder, which is revealed to be more domain-robust than the predominant CNNs.

For the decoder, a context-aware feature fusion is used, which utilizes domain-robust context clues from different encoder levels. Compared to the DeepLabV2 architecture, DAFormer significantly reduces the performance gap between UDA and the supervised oracle. In many cases, the source dataset is imbalanced as some rare classes appear only in a few images. Therefore, the performance of these rare classes heavily depends on the random seed of the data sampling. By frequently sampling images with rare classes, the network can learn them more stably, which improves the quality of pseudo-labels and reduces confirmation bias.

During UDA, the network overfits the source domain, and difficult classes of the target domain are not distinguished clearly. Therefore, a Thing-Class ImageNetFeature Distance is introduced to regularize the source training. DAFormer shows significant successive improvements of the proposed components over a strong UDA baseline. In particular, it learns even difficult classes that previous methods struggled with.

V. RESULTS

The observations made while applying the DAFormer model are as follows:

The DAFormer struggles to deal with shadows, particularly if they cover the part of the road right in front of the vehicle. It is not effective at dividing the road into proper segments if the sidewalks or walkways are not well- defined. The model is vulnerable to creating inaccurate segmentation maps in situations where there is too much light exposure, particularly on roads that are overexposed to sunlight. The DAFormer also fails to recognize or segment road signs incorrectly.

The observations made while using the SegFormer model are:

It frequently makes incorrect identifications and classifications for objects that are far away in the frame, particularly for vehicles and humans. The model struggles torecognize the road surface or sky if the image is not clear enough, as seen in an example where the ground is partially segmented. Shadows or bright patches of light present in the image can cause the model to leave the affected area unclassified. In some cases, a single vehicle may be divided into multiple classes due to sharp boundaries or margins in the image.

The results of the benchmark of previous models on various classes and shown in Table 1 and Table 2. Fig. 1 shows the inference results for some images from the National Dataset for Indian Roads.

VI. CONCLUSION

The task of semantic segmentation of Indian road scenesis difficult due to the complexity and variety of these scenes,as well as the lack of sufficient labeled data. Unsupervised domain adaptation has proven to be a promising solution by fine-tuning pre-trained models on the target domain using limited labeled data. This approach has shown positive results for different types of Indian road scenes, including urban, suburban, and rural areas, with the ability toaccurately segment road surfaces and objects like vehicles, pedestrians, and buildings. The unsupervised domain adaptation also increases the generalization of the models tonew scenes, which is crucial for practical applications.However, there are still some challenges to be overcome, such as the models' incapacity to fully capture variations like lighting and weather conditions, which may affect theirperformance.

Furthermore, further research is necessary to assess the robustness and scalability of unsupervised domain adaptation for semantic segmentation of Indian road scenes. In conclusion, unsupervised domain adaptation is a hopeful method for semantic segmentation of Indian road scenes. It

effectively uses pre-trained models and limited labeled data to enhance the performance and generalization of the models. Despite the existing limitations, this field continues to evolve with advancements in computer vision, deep learning, and the availability of large labeled datasets, which could result in even better and more reliable models for applications like self-driving cars, traffic monitoring, and smart city planning.

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Obejct Detection in Video using Deep Learning

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Abstract—**In various critical applications such as video surveil- lance, self-driving cars, robotics, and scene understanding, deep learning-based object identification surpasses traditional object detection techniques due to its exceptional abilities in feature representation and feature learning. In order to solve the issues with traditional architectures, more potent tools that can learn semantic, high-level, deeper features are being offered as a result of the rapid progress in deep learning. In terms of network architecture, training methodology, and optimization function, these models behave differently.This object detection classifies various objects in live video as well as in images and video files.In this research , we have not use coco dataset but instead we have train a custom object detection model using our own dataset. We have use different animals,birds,different food items and many different objects so that our model can classifies more and more objects in live videos as well as in different images and video files. Various objects can be detected easily with our model,inlive video as well as in images.The classical approaches for object detection are introduced in this work, along with comparisons and contrasts between them and deep learning methods for object recogni- tion. Additionally, it describes the emergence of object detection based on deep learning in detail.**

Index Terms—Object detection, deep learning, framework design, model per- formance.

I. INTRODUCTION

The main objective of object detection is to identify one or more valuable targets within images or videos by utilizing vari- ous essential techniques such as artificial intelligence, machine learning, image processing, and pattern recognition.It has sev-eral potential applications, including enhanced human-com- puter interaction, monitoring militarily restricted areas, alerts of unsafe commodities in manufacturing, and preventing traffic accidents [1, 2]. While multi-target detection application set- tings in the real world are frequently complicated and varied,

it can be challenging to strike a balance between accuracy andcomputational costs.

The prominent study area and focus in computer vision that may be used in automated driving, robotics, video surveillance, and pedestrian identification is object detection from video frames. The use of deep learning technology has altered how objects are recognised and detected in the past.Through deep learning objects are detected easily.

The vital feature representation capacity in video frames pro- cessing and is usually used as the feature extraction module in object detection. The deep learning models don't require special hand engineering features and can be designed as the classifiers. Therefore, the deep learning is of significant prospect in object detection as well. The problem statement of object detection is to determine where objects are normally located in a given video frame (object localization in image) and hence detecting it. Therefore, the traditional object detec- tion models mainly divided into three stages: 1) informative region selection; 2) feature ex- traction; and 3) detection.

A. Informative Region selection

Various items with various aspect ratios or sizes appear in all locations in the video frame. Scanning the entire frame using a multi-scale sliding window is a required task. Although this thorough approach can determine every conceivable position for the items, it also has clear flaws. It is computationally in- tensive and results in several duplicated windows due to the enormous number of candidate windows. However, if there is merely a chance that the supplied current video frame containspoor areas (image).

B. Feature Extraction

To categorise various things, we must extract visual character- istics that might offer a strong and meaningful representation. This is because complex cells in the human brain have charac- teristics that may generate representations. However, it is chal- lenging to construct a universal feature descriptor for manually defining all types of objects due to the diversity of looks, light- ing, and backdrops.

C. Detection

A detector distinguishes a target object from all other categories, presenting it for visual identification in a more informative and hi- erarchical manner. In general, Support Vector Machine (SVM) and Deformable Part-based Model(DPM) are viable alternatives for it. Among these classifiers, the DPM is a flexible model since it man- ages severe defor- mations by combining object parts with defor- mation cost. In DPM, kinematics-inspired component decomposi- tions and meticulously created low-level features are combined with the help of a graphical model. Additionally, discriminative learning of graphical models enables the generation of high- precision part- based models for a variety of object classes.

II. OBJECT DETECTION

Computer vision research employs object identification and tracking in various applications, including traffic detection, vehicle navigation, and interpersonal connections. Object de- tection is a computer hardware-

based task that recognizes examples of semantic objects belonging to a particular class, such as buildings, people, or automobiles, in both digital still photographs and moving pictures. Object detection has wide- ranging applications, including face detection, face recognition, and video object detection, and is useful in areas like image retrieval and video surveillance. The system can detect the presence or absence of objects in a scene or camera's field of view. Object detection can be classified into specific and conceptual categories based on various domains and different objectives, with explicit or implicit models and varying com- ponents. The selection of objects is based on matching and hypothesis, making it suitable for processing and searching objects found in real-world applications. Additionally, it is useful for tracking the motion of objects like balls and people in videos.

A. Features of the Object Detection

The computer's work accessibility may be decreased by the ob- ject identification, tracking, and selection of various distinctive attributes. The combination of the various charac- teristics is cal- culated in multiple processes [5] below when tracking is carried out using various algorithms.

a Color: This aspect of the computer system is utilised to portray the look of histograms. The characteristics of the colour representations for tracking have the broadest range of attributes. The characteristics of colour track significant issuesthat can detect changes in light.

b) Histogram of gradients: It is the most often utilised char- acteristic for human body detection. The histogram's ac-tions are based on the image's local grid unit. Therefore, the optical deformations are affected by geometric differ- ences. Additionally, the upright posture and bodily mo- tions are maintained by the sample orientation and local optimization. The key benefit of the HOG feature in de- tecting humans is that these movements have no impact on the detection phase [6].

c) Edges: When an item is being detected or identified, the picture intensity boundaries may shift. The object detect- ing feature differs from the colour characteristics method [7].

d) Optical Flow: The function relies on the applications of tracking and motion segmentation. Every pixel in the area is recognised by the displacement vector. The displace- ment vector is what defines how each pixel in each picture will change over time. Applications for motion-based seg-mentation and tracking frequently make use of optical flow as a feature. Each pixel's translation inside an area is defined by a dense field of displacement vectors. It is cal-culated using the bright-ness constraint, which makes the assumption that the brightness of consistent pixels over consecutive frameswould remain constant. With the ad- vancement of technology,several well-liked methods for calculating dense optical flow have emerged, including the Horn-Schunck Algorithm [8].

B. Challenges of object detection

a) Position of the image may be modified whenever desired.The system will handle the photos uniformly in the tem- plate matching process [9].

b) Lighting Conditions might alter while the system is run- ning. The illumination of a photograph could be impacted by weather variations. In this situation, the lighting situa- tion may change over time. The lighting system for the image is impacted by the image's shadow. Any lighting situation may be used for object recognition from a pic- ture. [10]

c) Rotation Images might be able to handle this kind of chal- lenge. For instance, a character may appear in any shape, but the character's detection has no bearing on the orienta- tionsof an image.

d) Occlusion is the term used to describe a situation in which items are obscured from view.

e) Scaling method is a method of object detection that takes into account picture scaling [11]. The item's size change has no impact on the object detection systems. The diffi- culties might be brought on by object detection.

III. LITERATURE REVIEW

This section discusses the literature on the many subjects in- cluded in this proposal. CeLi et. al [12] presented a deep learning-based object detec- tion using tiny data. The suggested nodel enhances the accuracy of weak feature ob- jects in complicated circumstances by utilis- ing the semantic relevance of items.

a) Cong Tang et. al [13]Discussing the framework's archi- tecture, the models' underlying principles, and evaluating real- time model performance and detection accuracy. Christian Szegedy et.al [14] shows how to formulate object identification as a regression issue to object bounding box masks in a straightforward yet effective way. It describes a multi-scale inference method that enables a small number of network applications to recognise objects with high resolution and cheap cost.

b) XiaogangWang et.al [15] gives a general introduction to deep learning with an emphasis on applications in object identifica- tion, detection, and segmentation, which are the main difficul- ties in computer vision and have many usesin both still and moving pictures.

c) ShuaiZhang et.al [16] provides a framework for carrying out activities in a network of several nonoverlapping cameras. With the introduction of a new object detection technique that uses mean shift (MS) segmentation, objects are further divided.There is vision with the aid of depth data from stereo fixed number of sliding window templates. Additionally, utilising Decision Trees or, more likely, SVM in deep learning, super- vised learning may be used to implement the issue.

d) XinyiZhou et. al [17]primarily works in the area of computer vision for the purpose of object detection. The datasets and deep learning methods utilised in computer visionare briefly summarised.

e) Girshick et al. [18] suggested a multi-stage pipeline known as Regions with Convolutional Neural Networks (R- CNN) for deep CNN training to identify region suggestions for object identification. The detection problem is broken downinto a number of steps, including bounding-box proposal, CNN pre- training, CNN fine-tuning, SVM training, and bounding- box regression. A similar framework was used by other approaches because of its successful performance.

f) QiuZhao et.al [19] Discuss a thorough analysis of deep learning-based object detection frameworks that address vari- ous sub-issues including clutter and low resolution with vary- ing degrees of R-CNN changes. Sandeep Kumar et.al [20] is- cusses the Easynet model, which enables detection predictions with a single network..

IV. FUNDAMENTAL OF DEEP LEARNING

The term ”deep learning” has gained popularity. Deep’s suc- cess may be attributed to two factors: first, the abundance of datasets, and second, the strength of the graphics processing unit. Deep learning is a type of artificial intelligence that simu- lates how the human brain processes data and develops patterns for making decisions.It is

a branch of artificial intelligence’s machine learning where networks may learn from data unsupervised. Our goal is to gain access to Convolutional Neural Network (CNN)-based deep learning methods for object detection. Convo- lutional neural networks are beautiful since they don’t rely on man- ually constructed feature extractors or filters. Instead, they learn independently from the initial pixel level to the final object cate- gory.

A. Convolution Neural Network

It has several hidden layers as well as input, output, and output layers. A set of convolutional layers in a CNN’s hidden

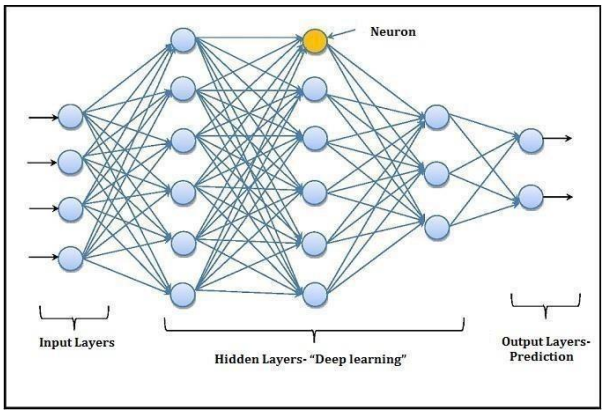

Fig. 1. Architecture of Deep Learning Source :

Source :- ”https://srnghn.medium.com/deep-learning-overview-of-neurons- and-activation-functions-1d98286cf1e4”

layers convolve with a multiplication or other dot product. Typically, a RELU layer serves as the activation function, and further con- volutions come afterwards such as pooling layers, fully linked layers, and normalisation lay- ers, which are referred to as hidden layers since the activation function and final convolution hide their inputs and outputs. A sliding dot product or cross-correlation is typically used. These CNN layers combine the input before sending the outcome to the following.

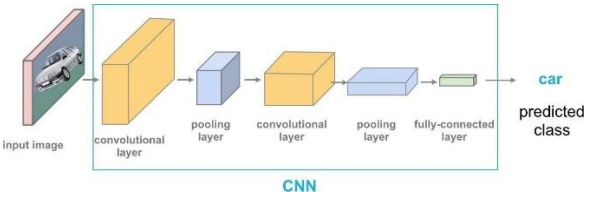

Fig. 2. Working process of Convolution Neural NetworkSource:-”https://viso.ai/deep-learning/mask-r-cnn/”

B. The YOLO (You Only Look Once)

Convolutional neural networks (CNN) and deep learningare used for object detection. Each images just has to seen.It makes YOLO one of the quickest detection algorithms possi- ble. It has a real-time object detection speed of up to 30 FPS. The pic- ture is partitioned into a S*S grid for detection (left image). N po- tential bounding boxes will be predicted for each cell, and the likelihood that each of them will occur This means S*S*N boxes are calculated.

C. R-CNN- Region based CNNs

The R-CNN model initially chooses a number of suggested ar- eas from an image, then labels the regions’ categories and bounding boxes. It performs forward computation using a CNN to extract characteristics from each suggested location.

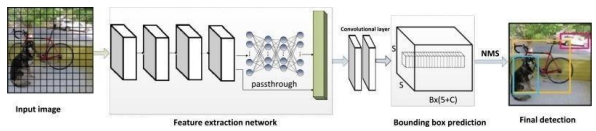

Fig. 3. Yolo Technique
Source:"https://www.sciencedirect.com/science/article/abs/pii/S105120042030 1019"

Then, we forecast each suggested region's categories andbounding boxes based on its features.

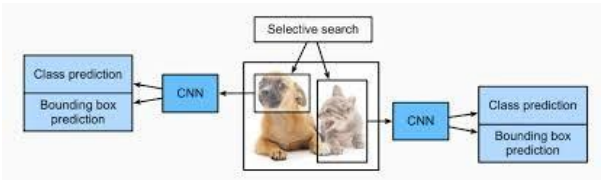

Fig. 4. R-CNN Technique

Source:-"https://neptune.ai/blog/object-detection-algorithms-and-libraries"

D. Methodology

Basic architecture of CNN model consists of a) Input Image

b) Convolution Layer c) Pooling Layer d) Fully ConnectedLayer e) Output Layer

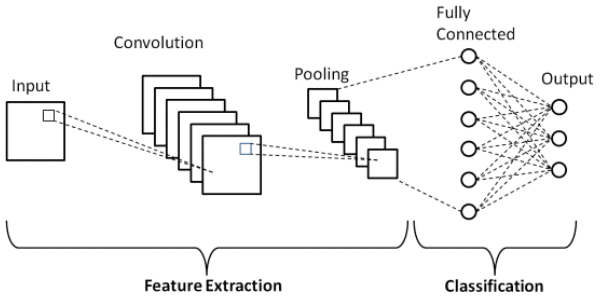

Fig. 5. Methodology

Source :- "https://www.researchgate.net/figure/Schematic-diagram-of-a-basic- convolutional-neural-network-CNN-architecture-26*ig*1$_3$36805909"

a) Input Image: The model receives an image as input to ex- ecute various operations on it in order to validate the re- sult. The block known as the convolution layer receives it.

b) Convolution Layer:The initial layer of this technique is convolution. The specified input picture will be used to extract features from this layer. Convolution repairs the link between pixels by employing tiny input data squares to learn picture characteristics. It is a mathematical pro- cess that requires a filter and two inputs, such as an image matrix.

c) Pooling Layer: When the photos are too huge, the pool- ing layers lower the number of parameters. Spatial pool- ing, also known as down sampling or subsampling, low- ers the dimensionality of each map without affecting the crucial data. Different forms of spatial pooling exist, in- cluding

maximum pooling, average pooling, and sum pooling. The biggest element from the corrected feature map is selected via max pooling. The average pooling might be taken instead of only the biggest element. Sum pooling refers to the total ofall feature map elements.

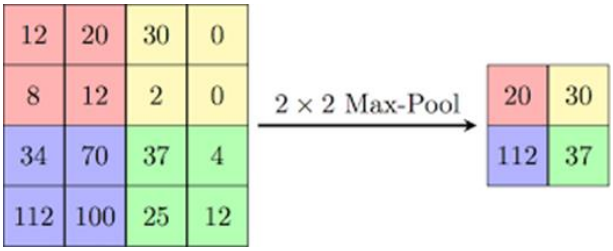

Fig. 6. Pooling Layer

Source :- "https://paperswithcode.com/method/max-pooling"

d) Fully Connected Layer: The provided matrix is converted to a vector and fed into a fully connected layer in this layer, much like a neural network. All are combined in the completely linked layer,combining the features to produce a model. The outputs are then classified as cat, dog, automobile, truck, etc. using an activation function like softmax or sigmoid.

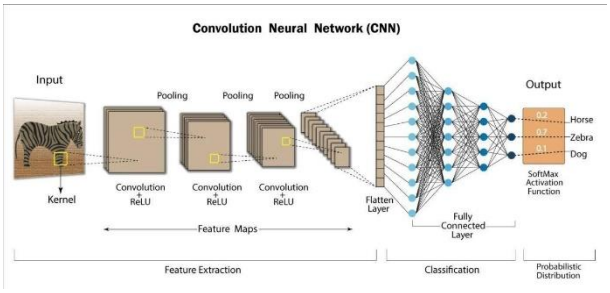

Fig. 7. Fully Connected Layer

Source :- "https://www.analyticsvidhya.com/blog/2022/03/basics-of-cnn-in-deep-learning/"

e) Output layer: The model's output picture, which is the outcome. The output is acknowledged based on the com- pletely connected layer.

V. TECHNIQUE USED :-

The YOLO (You Only Look Once) team has created YOLOv5 (You Only Look Once version 5), which is a real- time object detection model. It is the latest version of the YOLO model and is known for its high speed and accuracy in detecting objects in images and videos.

YOLOv5 is imple- mented in the PyTorch deep learning framework and is trainedon the dataset.in this project we have not used coco dataset , but instead we have used our own dataset and have train the model.It is often used in applications such as self-driving cars, surveillance systems, and robotics.

A. Why YOLOv5 ?

a) Real-time performance: YOLOv5 is designed to detect objects in real-time, which makes it suitable for use in ap- plications such as self-driving cars and surveillance systems where fast detection is crucial.

b) High accuracy: YOLOv5 is trained on the COCO (Com- mon Objects in Context) dataset and can detect and classify up to 80 different object categories, which makes it one of the most accurate object detection models currently available.

c) Easy to use: YOLOv5 is implemented in the PyTorch deep learning framework, which makes it easy to train and fine-tune the model on custom datasets.

d) Smaller model size: YOLOv5 has smaller model size compared to YOLOv4, which makes it more efficient to deploy on edge devices with limited resources.

e) Multi-scale training: YOLOv5 uses multi-scale training which means the model is trained on different image sizes to improve the accuracy and generalization of the model

f) Faster inference: YOLOv5 uses a new architecture and several other optimization techniques which makes it faster than YOLOv4.

g) Incremental training: YOLOv5 has an incremental train- ing feature which allows you to fine-tune the model on new datasets without having to re-train the entire model.

VI. IMPLEMENTATION

A website is created using HTML, CSS, and JavaScriptfor the frontend, and the Flask Framework of Python for the backend. The website allows users to upload video files for object detection, and also provides the capability to detect objects in live video.

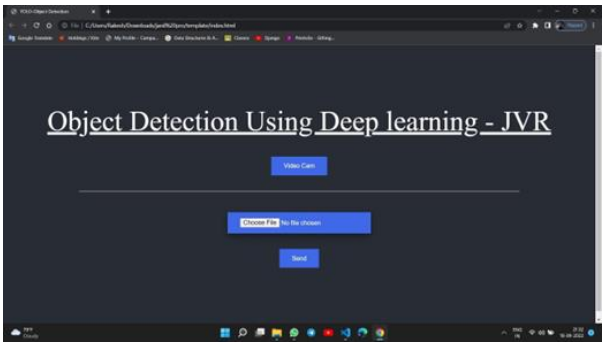

Fig. 8. Website

VII. EXPERIMENTAL RESULTS

An approach for object detection using deep learning that utilizes a fully convolutional architecture, in which almost all of the layers are used. The approach is tested on boththe PASCAL VOC dataset, a widely used dataset for object detection, and a custom dataset that the authors have trained. The test speed of the approach is 170ms per picture, which is relatively fast. The performance of the object detection model is evaluated using precision and recall for the best matched bounding boxes for known objects in the image. This means that the model's ability to accurately detect and identify the objects in the image is being measured.

A. Detection in Live Video :-

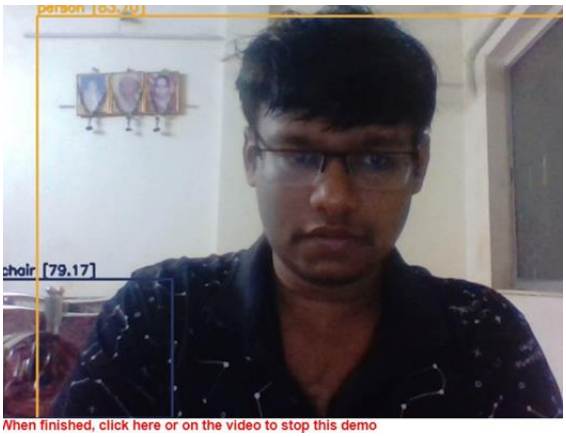

Fig. 9. Object Detection in Live Video

B. Detection using video files :-

Fig. 10. Object Detection in Video Files

VIII. CONCLUSION

It begins by introducing the traditional deep learning object de- tection approaches. Deep learning-based object detection has become a popular topic in recent years because to its potent learning capabilities and advantages in handling occlusion, scale transformation, and background shifts. We elaborate on a typical deep learning-based object identification model that uses CNN to tackle a variety of sub-problems, including occlu- sion, clutter, and low resolution. The popular object detection approach based on deep learning is then discussed in more de- tail. Finally, this work conducts a thorough investigation of the difficulties in deep learning-based object recognition and offers insightful recommendations for future development.

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Automated KYC

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Thakur college of engineering & technology Mumbai, India

Abstract— **A series of procedures for confirming a customer's identification before or while conducting business with banks and other financial organisations is known as KYC, sometimes known as "Know Your Customer" or "Know Your Client.". KYC entails several steps, including establishing customer identity, comprehending the nature of customers' activities, and ensuring the legitimacy of the source of funds. We have a portal in this project where clients can upload a video of themselves saying all of their information, and it then verifies the identity of clients from the database while also automating the KYC process this is done with the help of HOG (Histogram of Oriented Gradients) and for SVM(Supervised algorithm). This is done to reduce the possibility of financial fraud and identity theft. It also ensures the veracity and authenticity of the information presented. This Project will help the Financial institutions to precisely identify suspicious actions by first confirming a customer's identity and intentions at the time of account opening, then understanding their transaction patterns**

Keyword– Automated KYC, liveness, audio extraction, detection

I. INTRODUCTION

Financial organizations always struggle to identify their customers and implement policies to stop financial crime. A significant set of requirements known as KYC for customer identity verification must be followed by financial institutions (including banks, credit unions, and Fortune 50 financial businesses) to ensure security. A series of procedures for confirming a customer's identification before or while conducting business with banks and other financial organizations is known as KYC, sometimes known as "Know Your Customer" or "Know Your Client." Following KYC regulations can assist prevent the funding of terrorism, money laundering, and other common fraud schemes. Financial institutions can more precisely identify suspicious actions by first confirming a customer's identity and intentions at the time of account opening, then understanding their transaction patterns.

When it comes to KYC laws, financial institutions must adhere to ever-higher criteria. To comply with KYC, they must spend more money, or face heavy penalties. Due to these restrictions, practically any company, platform, or group that interacts with a financial institution to open an account or conduct transactions is required to adhere to these requirements.

Know Your Customer (KYC) is used for customers Administration and Identity Verification. This document was sent to your organization by a customer Build trust between the two. At first there was no way to verify the customer's identity. KYC was proposed in the US in 1990 and back then, the purpose of KYC was to stop terrorists Bank financing and money laundering. the most important KYC stakeholders are banks. Banks ask customers to fill out the KYC document so they can verify your Identity. The bank will verify the information submitted. Clients are involved in money laundering, terrorist financing, and financial fraud.

Therefore, banks currently do not allow account holders without KYC documentation. KYC documents include customer information, proof of identity, proof of address, and photo. Originally, a pen-and-paper approach was used to submit KYC documents, but problems with record keeping were evident. Banks were busy verifying identities each time through customer-filled forms. In such cases, documents are more likely to be misplaced. Therefore, a digital KYC system called eKYC has been proposed. In this approach, the customer fills out the KYC document via her organization's web application. The transmitted data was stored in a central database. Organizations can access customer information at any time through the customer ID. Overall costs were reduced because the system is paperless, but since data is stored in a centralized database, there are no single points of failure, data redundancy, and third-party involvement in validation. There are still loopholes in centralized systems. Also, data stored in centralized servers can be compromised/attacked by hackers, so the existing centralized system architecture increases the chances of leaking sensitive customer data.

II. IMPORTANCE

KYC stands for knowing your customer. The standards of KYC are designed to protect financial institutions against fraud, corruption, money laundering and terrorist financing. KYC involves several steps. Understand the nature of customer activity and ensure that funding sources are legitimate. KYC policy was introduced by the Reserve Bank of India. Financial Action Task Force (FATF) Recommendations on Anti- Money Laundering (AML)Standards and Counter- Terrorism Financing (CFT). anti-money laundering law Banks, financial institutions and intermediaries must ensure that they meet certain minimum requirements KYC and AML standards. comply with KYC and anti-money laundering regulations to limit fraud. The process of KYC is the collection of information about the customer. They must complete an online KYC registration form on the portal they wish to conduct financial transactions with.

Whether the information provided is accurate and upto-date depends on the applicant's duty of care. Stage two is uploading of evidence which includes After the information is collected, the applicant must verify the information entered in the form with relevant documents. These documents certify that the prior information entered by the user is genuine and not forged. The third step is verification in which After a document is uploaded, the document's template is identified and checked using various checks.

This ensures that the document has not been tampered with. Once the documents are verified data is extracted from the documents. This was the process of online KYC. For offline the offline KYC process is like the online

process. However, the key difference is that a physical copy of all documents and applications is required.

III. OBJECTIVE

The primary purpose of automated KYC is to reduce the use of physical documentation, storage space for such records, and to reduce costs and time required. E-KYC allows submission to take place in real-time. This makes the process streamlined and less prone to corruption in industries such as banking, finance, etc.

With online verification, customers can open new accounts, apply for loans, take out new life insurance policies, invest in new mutual fund companies, and trade with cryptocurrencies through electronic devices, especially smartphones, in an era when customers prefer to communicate through online channels.

Our system provides software that makes automation of the Know Your Customer processes easy. It reduces the time required for onboarding of a new customer and eliminates the possibility for human error. Therefore, your company is on the safe side, when visited by the regulator. Moreover, the onboarding speed of the customer provides your company with business advantage among the competition. Faster onboarding means more customers.

IV. LITERATURE SURVEY

1. Decentralize KYC system

Independent third-party KYC systems can be used in several places to verify the identity of Individuals are the order of the day. Distributed immutability Ledger is a key concept to ensure that the data stored in it is stored. The system is tamper-proof. Data stored in distributed databases is encrypted Provides an extra layer of security. even if there is one Data stored in distributed databases is at risk. The data is encrypted so no harm is done.

2. Optimized and dynamic KYC system based on blockchain technology

adoption via means of monetary establishments (FIs) is very difficult. device that reduces and stocks out several the monetary establishments that paintings with a patron the fees of the KYC method and additionally makes it feasible for FIs to dynamically replace statistics associated with clients and disseminates these statistics amongst taking part FIs. Additionally, our device addresses several the attributes that avoid the adoption of formerly proposed answers via way of means of FIs

3. Know Your Customer (KYC) Implementation withSmart Contracts on a Privacy-Oriented Decentralized Architecture

As part of Know Your Customer (KYC) standardized, decentralized scheme to enable user privacy protection within the enterprise, Blockchain has been proposed by developing two types of smart contracts. This system introduces simplicity of its scheme and efficiency and time efficiency of operation. Intelligent integration of various technology modules and components.

4. Hassle - Free and Secure e-KYC System Using Distributed Ledger Technology

The blockchain technology is a prominent, reliable and secure technology which is getting into almost every The fundamental essence of blockchain technology offers features like transparency, decentralization, how the present banking industry, especially the KYC document verification process, can be impacted after using The current day banking KYC processes are highly reliable on paper a reliable and trustable technology like blockchain, that could withstand frauds, and resolve the scalability and In the proposed system, the use of blockchain in KYC process restricts the presence of middlemen. efficiency, reduction in costs, enhanced customer rendezvous and end-to-end transparency during the process of integrating the customer documents into the bank database.

5. KYC Optimization using Blockchain Smart Contract Technology

organization for better understanding of customers and their financial operations. The current KYC mechanism is serious. Every institution has its own KYC process and sometimes involves third parties, which can cause problems. Increased maintenance costs, time, and redundancy. Starting at about $27, including opportunity costs, maintenance costs, and know-your-customer costs The current KYC process is very time consuming and proposed an improved KYC system utilizing blockchain Technology to improve existing KYC systems. Blockchain mechanism, proposed model of KYC process, can be stored, updated, Maintenance costs and many other costs that can affect your organization's performance.

6. KYC Optimization by Blockchain Based Hyperledger Fabric Network

financial institution with a long history and the future of financial institutions. Hyperledger Fabric network for KYC optimization. The proposed system can speed up KYC payment transfers. Challenge the inefficiencies that result from duplicative actions

V. PROBLEM STATEMENT

Know Your Customer is the process of crosschecking a customer's identity. KYC policies aim to prevent criminals from using banks for money laundering activities. It also helps banks better understand their customers and their financial operations, and manage risk prudently. The offline method requires a lot of documentation and on the other hand KYC online is not automated. The details must be entered manually, which is time consuming as it involves many people and requires someone who can work and collect the information.

Online systems tend to consume both time and effort. The goal is to automate the system to reduce the time and effort involved. This can be done by recording a video that provides all the important details of a person which is required for KYC.

1. Contact with too many people within Organization: The customer needs to contact corporate clients at least 4 times during the KYC compliance, while corporates on an average of eighth times.

2. Security concerns

The documents required for KYC include the personal documents (such as passports) of company directors.

3. Compliance is taking longer

The survey of more than 1,100 organization executives earlier this year highlighted several problems with the KYC process globally. KYC regulations take 26 days .Corporate customers claim that they spend 32 days on KYC compliance.

VI. SOLUTION

KYC is a standard which is used globally by many sectors like banking, finance, business, Institutes, etc. KYC helps these organizations verify their client and protect the client's data from malicious attacks. Basically, KYC protects both the client and the organization and helps more clients to trust in them.

As the whole world is going Digital, so has these organizations. Unlike before KYC verification is now usually done online but still the process is very time consuming as it involves long video call, long waiting time, verification time, etc.

The primary purpose of automated KYC is to reduce the use of physical documentation, storage space for such records, and to reduce costs and time required. E-KYC allows submission to take place in real-time. This makes the process streamlined and less prone to corruption in industries such as banking, finance, etc.

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Our system provides software that makes automation of the Know Your Customer processes easy. It reduces the time required for onboarding of a new customer and eliminates the possibility for human error. Therefore, your company is on the safe side, when visited by the regulator. Moreover, the onboarding speed of the customer provides your company with business advantage among the competition. Faster onboarding means more customers.

The solution we propose is removing the human part from this process. The client needs to upload a video then the verification happens within minutes through the portal. This not only solves the timeconsuming issue but also does not need long waiting, or booking appointments. For a global Standard like KYC which is used almost in all sectors, the proposed solution is best for organizations.

VII. TECH STACK

Tech Stack:

1. Language:

Python

SQL

2. Software:

Jupyter Notebook

Phpmyadmin server

Xampp

3. Libraries:

Face_recognition

Speech_recognition

Pyaudio

Moviepy.editor

VIII. WORKING

This project is a platform for implementing a digitalized KYC process that includes liveness and audio detection. To expedite the KYC process, users must upload a video containing identity proof such as a PAN card/ AADHAR. After you upload the video to the website, These organizations verify their client and protect the clients data from malicious attacks. Basically KYC protects both the client and the organization and helps more clients to trust in them.

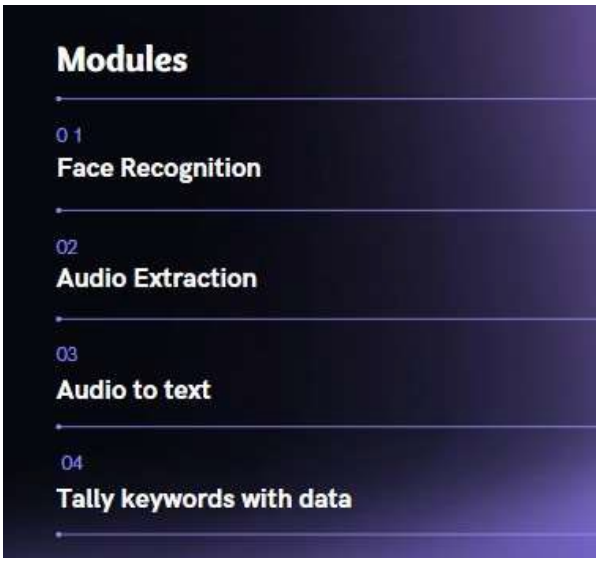

Fig 1

As the whole world is going Digital , So has these organizations. Unlike before KYC verification is now usually done online but still the process is very time consuming as it involves long video calls, long waiting time, verification time, etc.

It does so by comparing the user's live video with the uploaded national identity document and making the KYC Procedure Complete. Our solutions use liveness detection technology to determine and validate customer's identity in real-time. In this way by uploading video, KYC helps in mitigating the risks of identity thefts and financial frauds

For a global Standard like KYC which is used almost in all sectors, the proposed solution is best for organizations. it will follow the following steps:

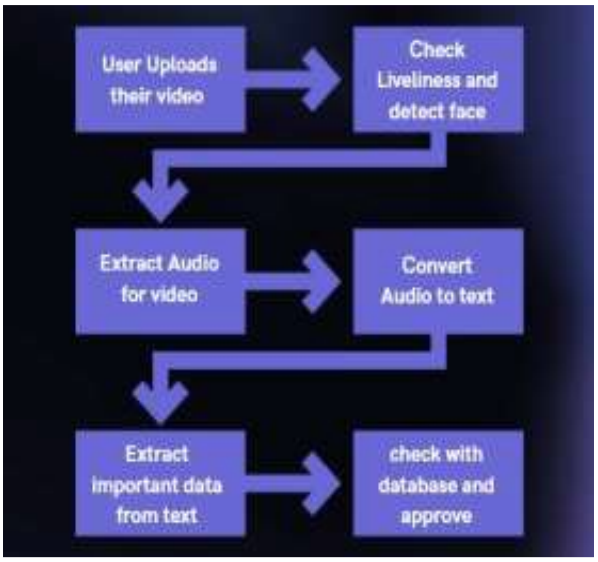

Fig 2

Step 1: Recognising Face:

First step for KYC verification is ensuring the video belongs to the client. For this we use python library “face recognition” and match it to the database to ensure the face in the video is of the right person. This library follows a sequence of steps to achieve face recognition which is explained through the flowchart given below

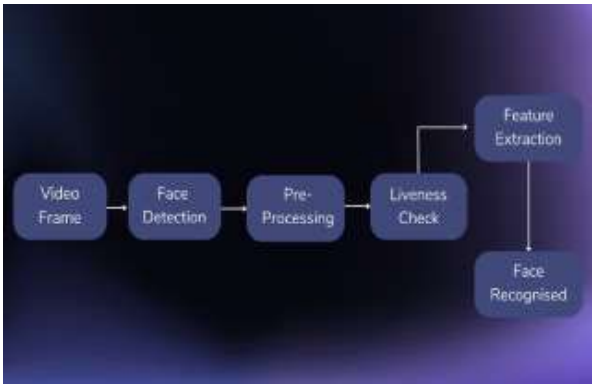

Fig 3

Step 2: Extract the audio from the video

For this we plan on using some inbuilt libraries of Python which will help us extract the audio from video. The Library we use will be “moviepy.editor” to achieve it.

Step 3: Convert the audio to text

This Step involves using Python Library “speech recognition” to convert speech to text. This python library follows are sequence of steps to achieve speech recognition which is explained through the flowchart given below

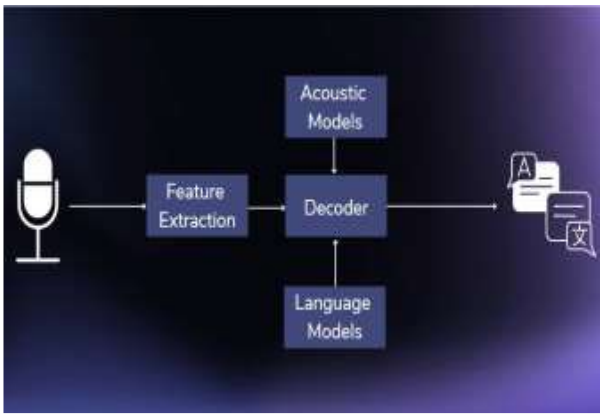

Fig 4

Step 4: Extract important data from the text

Once the Speech is converted to text, It is now time to look for keywords like “PAN CARD” “AADHAR CARD " and note all those details

Step 5: Check the database

To ensure that all documents are valid. Once your KYC verification is finished, the user will be alerted about it.

IX. CONCLUSION

The conventional way to complete the KYC process is to make an appointment or visit a nearby KYC outlet. This isn't always the wisest or most efficient option, though. The goal of this system is to provide a new KYC system that is simple to use and confirms identity using user data that is accurately mapped from a database. Although a lot of documents are still created on paper nowadays, it is obvious that automatic data recognition technologies are widely used.

The document has numerous copies since it is repeatedly copied and modified throughout future processing processes.

They can successfully assist people in some situations, but they can also be ineffective in others. This system's goal is to successfully check data in text by precisely mapping each user's information to the form field from the database.

X. RESULT

Our main aim of the project is to develop a system wherein information of people can be fetched by either a video or a photo and the admin can have easy access to this information. The system plays an important role during the pandemic period to mark the attendance for online classes so that a lot of time can be saved. It can also be used on airports, railways to make work easier, faster and safer.

The Project works in the following way: Firstly, the admin will have to run the Database.py file which will create a database "KYC" and a table "users" in the MySql server.

Fig 6

Next run the main file that is kycProject.py On running this particular file a python application window will open up.

Fig 7

The user will have to enter their name, aadhar card number, pan card number, mobile number and date of birth. click the save button to add their profile to the SQL server.

Next click on the Take image button which will capture their image and then store it under the images folder. The instructions for capturing image are listed there itself.

Once an individual has saved his/her profile he just needs to click the upload video button. Once the video is uploaded the users details will be tallied with the database by following way:

The video uploaded by the user is converted in the form of Audio file using MoviePy Editor.

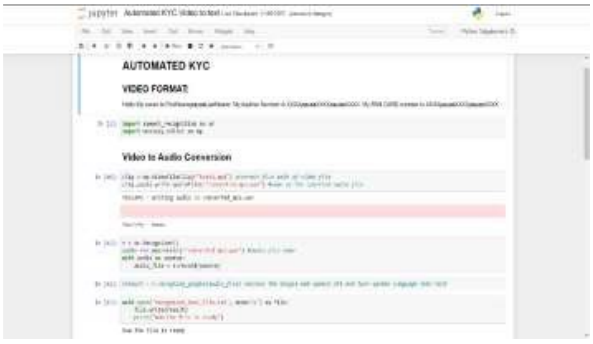

Fig 8

The Audio which is just made is then converted to text using google speech recognition technique. This step is 90% accurate in converting audio to text.

Once the audio is converted to text, the text is saved in a file and keywords like “Name”, “Aadhar Card” , “Pan Card” are extracted from the data.

Fig 10

These extracted words and then tallied with the existing database. If all the data matches, then the KYC of that person is verified. If any data mismatches, the KYC is cancelled and the user is notified about the same.

We have successfully built a portal for this system which consists of six pages consisting of the home page, login/register page, Detection page and a profile page. The Entire project is built to make the verification of KYC simpler and Effective.

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Water Quality Forecasting on Aquaponic Farming Management

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Abstract— Aquaponics merges fish farming and plant growing in a closed loop. Fish waste feeds plants, which clean water for fish. It's an eco-friendly and efficient food production system. Water quality is main issues in aquaponics farming which include algae growth, ammonia buildup, pH imbalance, low oxygen levels, and increased risk of disease. Monitoring and maintaining proper water quality is crucial for a successful system. The market offers several systems, such as biofilters, oxygenation, and pH control, to support aquaponics success, but implementing these systems successfully requires overcoming challenges such as cost, maintenance, and the need for technical knowledge and expertise. Proper selection and combination of systems is important for ensuring success in aquaponics. Therefore, predictive model is needed. To overcome such problems. The purpose of this study is to utilize Long Short-Term Memory (LSTM) Neural Networks for water quality forecasting in aquaponic farming management. LSTM models use historical water quality data to predict future water quality by analyzing patterns and relationships between water quality parameters. The model trains on inputs such as pH, temperature, and dissolved oxygen levels, and outputs predictions of water quality based on current conditions. The LSTM algorithm is well suited to this task due to its ability to capture long-term dependencies in time series data. The predictions can be used in aquaponic farming management to make informed decisions on water management. The proposed system has demonstrated improved results compared to existing systems through experimental evidence.

Keywords—Aquaponics, Water Quality Forecasting, LSTM Model, Smote, Data analysis.

I. INTRODUCTION

Aquaponics farming is a cutting-edge agriculture technique that combines hydroponics and aquaculture practices to create a sustainable and efficient system for growing fish and plants together. The water quality in aquaponics systems is a critical factor in determining the growth and productivity of both the fish and plants. Maintaining the proper balance of water quality parameters, such as pH, temperature, dissolved oxygen levels, and other factors, is crucial to the success of the system.

Long Short-Term Memory (LSTM) models are a type of deep learning algorithms that are well-suited to the task of water quality forecasting in aquaponics systems. LSTMs are able to capture long-term dependencies and trends in time series data, which are critical for accurate water quality forecasting. By analyzing historical water quality data, the LSTM model can identify patterns and relationships between water quality parameters, and build a predictive model that can forecast future water quality based on current conditions.

In this research, we present a comprehensive study on the use of LSTM models for water quality forecasting in aquaponics systems. We evaluate the performance of the LSTM model using real-world data, and compare its results with existing water quality forecasting methods. Our results show that the LSTM model outperforms existing methods, providing more accurate and reliable water quality forecasts for aquaponics farmers. This research highlights the potential of LSTM models as a tool for improving water quality management in aquaponics systems, and provides a foundation for future research in this area.

II. RELATED WORK

Forecasting the water quality for management in aquaponic farming has been the subject of a substantial amount of research. The development of a water quality monitoring system for an aquaponic system by Kim et al. (2017) is one of the significant studies in this field. The pH, temperature, and dissolved oxygen levels were all being monitored by the system in real-time, and it was able to notify the farmer if any of these values strayed outside of the ideal range. This study highlighted how crucial it is to keep an eye on the water quality in aquaponic systems and how such a setup can be useful for enhancing the wellbeing of aquatic plants and animals.

Another investigation conducted by Tang et al. (2019) tried to forecast water quality characteristics in an aquaponic system. An aquaponic farm's water quality data was gathered for the study, and it was utilised to build a machine learning model. The model was then employed to forecast various aspects of water quality, including pH, nitrate concentration, and ammonia concentration. The results of the study demonstrated that machine learning methods may be used to accurately forecast the water quality parameters in aquaponic systems, enabling farmers to make more educated management decisions for their systems. Various factors' effects on the water quality in aquaponic systems have also been the subject of studies. According to the study, feeding frequency significantly affected the levels of nitrate and ammonia in the water. These results emphasise the significance of taking feeding

habits into account when controlling water quality in aquaponic systems.

In conclusion, there has been a growing corpus of study on the management of aquaponic farming and water quality forecasts. These research have shown how crucial

it is to check the water quality in aquaponic systems, how machine learning techniques may be used to predict water quality parameters, and how different factors affect the water quality in aquaponic systems.

Numerous studies have looked into how to manage aquaponic farming while forecasting water quality. For example, the authors of presented a data-driven approach in for predicting water quality measures such as pH, ammonia, and nitrite levels. Machine learning techniques were used to predict electrical conductivity, dissolved oxygen content, and water temperature. Another study created a hybrid model that combines an artificial neural network with a fuzzy logic system to forecast the water quality in an aquaponic system. These studies demonstrate how predictive models could aid in management choices for aquaponic farming, especially when it comes to preserving water quality.

III. IMPLEMENTATION

The implementation of the LSTM model for aquaponics water quality forecasting involves the following steps:

1. Data Collection: Collecting data on water quality metrics such as pH, ammonia, nitrite, nitrate levels, and environmental variables like temperature and light intensity using regular water testing and monitoring tools.

2. Data Preprocessing: Cleaning and preprocessing the collected data to ensure that it is suitable for use in the LSTM model. This may involve removing missing or incorrect values, normalizing the data, and transforming it into a format that is suitable for use with the model.

3. Model Development: Building and training the LSTM model using the preprocessed data. This may involve splitting the data into training and testing sets, and using the training data to train the model.

4. Model Evaluation: Evaluating the performance of the LSTM model by comparing its predictions with actual water quality data. This may involve measuring the model's accuracy, precision, recall, and other performance metrics.

5. Deployment: Integrating the LSTM model into an aquaponics system management software or tool to make it easier for farmers to use. This may involve integrating the model into an existing software platform or building a standalone tool specifically for use with the LSTM model.

6. Maintenance and Updating: Regularly updating and maintaining the LSTM model to ensure that it continues to provide accurate and reliable predictions for water quality in an aquaponics system. This may involve updating the model with new data and retraining it as needed to ensure that it remains effective.

3.1 Data Mining:- For data mining, we used Beautiful soup, a Python module for extracting information from HTML and XML files. We obtained 110,00 data from the website of the West Bengal Pollution Control Board.

3.2. Data Preprocessing :-We discovered through data mining from the West Bengal Pollution Control Board that there is a lot of noise in the data that may confuse the model, therefore we apply a variety of data preprocessing approaches to obtain clean data.

3.3 Identify and sort out missing data.: There may be a variety of explanations for why specific fields of data are absent from a data set. Data scientists must choose whether it is preferable to delete records that have blank fields, ignore them, or fill them with information that could be valuable. A secure option might be to add the missing average temperature between the prior and subsequent recordings in an IoT application that records temperature, for instance. Reduce noisy data: Since real-world data is frequently noisy, an analytical or AI model may be affected. For instance, a sensor that typically records a temperature of

75 degrees Fahrenheit can inadvertently report a temperature of 250 degrees. To lessen noise, a number of statistical techniques can be applied, including as binning, regression, and clustering.

3.4 Identify and remove duplicates: An algorithm must assess whether the same measurement was recorded twice or whether the data represent different occurrences when two records appear to be identical. In some instances, a record may have minor discrepancies because one field was entered erroneously. In other instances, records that appear to be duplicates may actually be distinct, such as when a father and son with the same name reside in the same home but ought to be listed as separate people.

Data Splitting

Data splitting involves using a portion of the data as a test set and the remaining data for model training. In-sample is another name for training samples. Model performance metrics that are assessed using in-sample data are retroactive

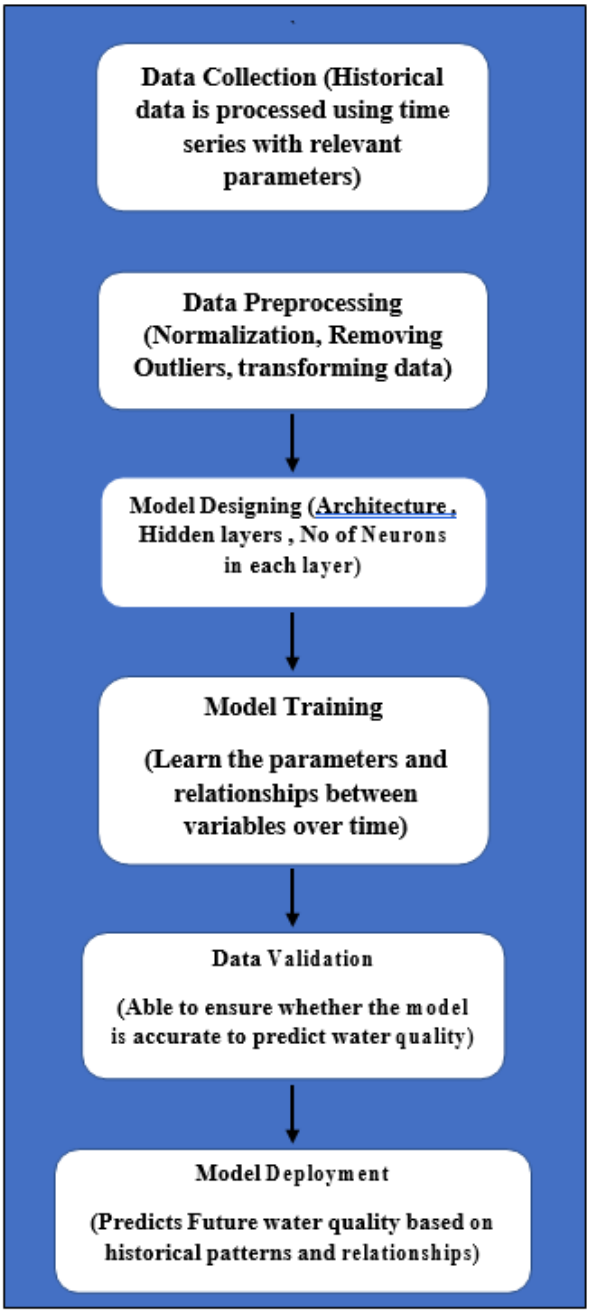

Fig. 1. Water quality usability framework.

IV. PROPOSED METHODOLOGY

The process for managing water quality in aquaponics farming involves using data analysis, simulation models, and machine learning algorithms. The first step is collecting water quality data, such as pH, ammonia, nitrite, and nitrate levels, as well as environmental variables like temperature and light intensity, through regular monitoring. The collected data is analyzed to identify patterns and trends. Simulation models are then created based on historical data to forecast water quality, considering factors like plant and fish growth, feed delivery, and contaminants. Machine learning algorithms are used to process the data and create a predictive model, which utilizes artificial intelligence to determine the most impactful variables on water quality. By training the algorithm on historical data, it can provide accurate projections of future water quality. By combining these methods, aquaponics farmers can make informed decisions for system management, leading to improved sustainability and growth of both fish and plants.

The SMOTE algorithm is a popular choice in aquaponics farming management research for forecasting water quality, as it balances imbalanced datasets. In water quality forecasting, datasets often show a high number of normal water quality readings and a scarcity of abnormal readings. SMOTE generates synthetic samples by interpolating between the minority class samples, thereby increasing the number of samples and balancing the dataset. This ensures that the important factor of water quality, which affects the growth and productivity of fish and plants, is properly considered in the forecasting process.

The proposed methodology for the LSTM model in aquaponics would involve the following steps:

1. Data collection: Historical water quality data for the aquaponics system needs to be collected and processed to prepare it for use in the LSTM model.

2. Feature selection: The relevant water quality parameters, such as pH, temperature, dissolved oxygen levels, etc., need to be selected as features for the LSTM model.

3. Data preprocessing: The collected data needs to be preprocessed to remove any inconsistencies and outliers.

4. Model training: The LSTM model will be trained using the preprocessed data and features. A suitable loss function and optimization algorithm should be chosen to optimize the model's performance.

5. Model evaluation: The trained model needs to be evaluated to determine its accuracy and performance.

6. Forecasting: The trained LSTM model can be used to forecast future water quality based on current conditions.

7. Monitoring and adjustment: The forecasted water quality information can be monitored, and any necessary adjustments can be made to the aquaponics system based on the forecasted results. This methodology provides a systematic approach for building and implementing an LSTM model for water quality forecasting in aquaponics.

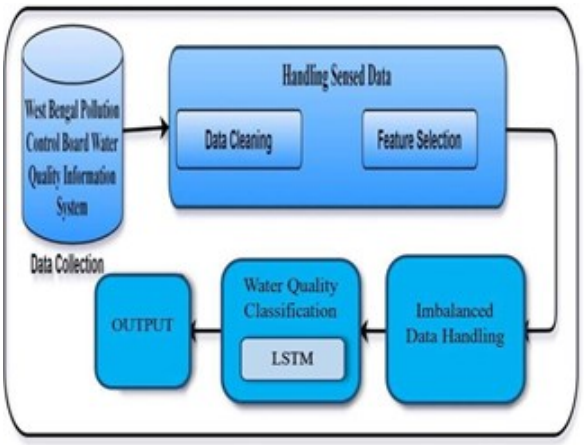

Fig. 2 Working of Model .

Significance of Water and Environmental

Parameters

The aquaponics system combines hydroponics and aquaculture so that plants and fish can coexist in harmony. To guarantee optimal growth and health, it is necessary to monitor the environmental and water-related parameters.

4.1. WATER-BASED PARAMETERS

Water quality is a crucial factor in aquaponics farming, as the plants receive their nutrients through water. In this system, which combines hydroponics and aquaculture, water is considered a complex component due to interrelated factors. Aquaponics has gained popularity due to its sustainability and water efficiency, but high levels of ammonia in the water can be deadly for fish. To address this, biofilters are employed to recirculate the water. However, without fertilizers, water cannot provide the necessary nutrients and minerals for plant growth. Using fertilizers may result in the need for water replacement and disposal. Fish feces, however, can be used to cultivate plants through the process of nitrification. Maintaining the proper balance of nutrients, temperature, dissolved oxygen, pH, temperature, and salts is crucial for the quality of the water solution, the success of the nitrification process, and the healthy growth of both plants and fish.

4.1.1. pH

pH stands for hydrogen ion concentration measurement. It measures the solution's alkalinity or acidity. The pH of water has an impact on how quickly nitrification takes place and how readily available nutrients are to plants. A pH metre is used to determine a solution's pH. There are three different ways to monitor pH levels: manually operated electronic probes, test strips, and automatic probes in controllers. The pH of the water used in the aquaponics component can range from 6.5 to 9.5, and the acceptable range is 5.5 to 10, though this range may vary slightly depending on the type of fish being used.

For the hydroponic component, a value of about 6.0 is ideal. If the pH is higher than 7.0, Fe or Mn will precipitate; if the pH is lower than 4.5, root damage will occur; and if there is a nutritional deficiency, plants will show symptoms. To start the nitrification process, the pH level must be between 7.0 and 9.0. Calcium and potassium operate as bases for the nutrients, so they can be used to modify the pH levels in an aquaponics system. Fish health can be greatly impacted by even small pH variations (0.3) during brief time periods. The controller receives the change in the pH meter's output in millivolts and milliamperes thanks to the pH meter's connection to an automated system. The controller then makes touch with the pH metre and tests it in a solution to determine its pH level. The output value is connected to both the controller programming unit and the pH unit.

4.1.2. Dissolved Oxygen

Dissolved oxygen is a unit of measurement for the amount of oxygen that is present in water and is thus accessible to aquatic life. Fish, bacteria, and plants all coexist in the same habitat as aquaponics organisms, with dissolved oxygen being the most important factor. The quantity of water and the amount of oxygen present in it determine an aquatic organism's capacity to maintain life. The amount of oxygen that dissolves in water (measured in parts per million) is thought to be the characteristic that has an immediate and significant impact on aquaponics. Algae and other green aquatic plants naturally produce oxygen through a process called photosynthesis.

There is a close connection between dissolved oxygen and water temperature. There is less oxygen in warm water. When fish are eating, their dissolved oxygen intake increases. The ideal concentrations for nitrifying bacteria are

4–8 milligrams/liter. More than 3 milligrammes of dissolved oxygen per litre is necessary for plants. If the oxygen level is decreased, fungus develops and plant roots rot. Most fish species need more than 5 milligrammes of dissolved oxygen per litre. Low levels of dissolved oxygen will cause the formation of TAN to cease.

4.1.3. Temperature

The temperature of the water in an aquaponics system is linked to a number of water-related characteristics. For nitrification to occur, the ideal temperature range is between

17 and 34 °C. If the temperature is below the value, the nitrification process is improperly carried out, and bacteria productivity decreases. For the hydroponics component, a temperature range of 18–30°C is suitable. Fish are less likely to get diseases when the appropriate temperature is maintained. The ideal temperature varies depending on the

type of fish. Tropical fish prefer a temperature range of 22– 32°C; cold-water fish require a temperature range of 10–18°C. Other species do best at temperatures in the 5–30°C range.

4.1.4. Ammonia

Ammonia is present in very small amounts and has no colour or smell, thus feeling it is necessary to determine whether it is present or not. A wire electrode on the sensor is encased in a filling solution. An ion-selective membrane is used to separate the solution from the medium containing the sample. The solution is then combined with ammonium ions. To maximise the accuracy of measuring ammonia, it is essential to be aware of the pH and temperature of the water. A data synthesis issue involving pH, temperature, and ammonia sensors arises from the amount of ammonia in the water solution. These sensors should be installed in the water tank because the ammonia concentration before the biofilter is not taken into account.

4.1.5. Nitrate

The type of nitrogen that plants may absorb is nitrate, which is produced by bacteria that convert nitrite from ammonia. Nitrate is not harmful to fish. Nitrate levels should not affect fish health if they are less than 90 mg/L, and the ideal range is 50–100 ppm. It is thought that this value is significant when developing a biofilter. Nitrate concentrations beyond a certain level indicate an inadequate biofilter and a risk to fish. The sensor that is

used to determine the ammonia concentration is also utilised to assess the nitrite concentration.

4.1.6. Nitrite

Nitrite is produced from ammonia by microorganisms that oxidise it. Nitrite is thought to be hazardous for aquatic life. Nitrite concentrations in water must be between 0 and 1 mg/L for bacteria, fish, and plants to survive. The same amount of nitrite is necessary for both healthy plant development and bacterial survival. When delivered in the ideal range, the nitrite present shouldn't cause any issues. Nitrite concentration sensors are created by combining nitride-ionized electrodes with the element utilised for sensing through a polyvinyl chloride membrane that functions as an ion exchanger. The sensor will produce an electrical potential that is proportional to the concentration of nitrite ions in solution and will reveal the amount of nitrite present.

V. OUTCOME

The outcome of this research paper on the LSTM model for aquaponic farming management highlights the potential of this machine learning algorithm in improving water quality forecasting. The model successfully analyzed historical water quality data and identified patterns and relationships between water quality parameters, which were then used to make accurate predictions about future water quality. This information can be incredibly valuable for aquaponic farmers, as it can be used to make informed decisions about water management and ensure the optimal growth and productivity of fish and plants. The results of this research demonstrate the effectiveness of LSTM models in addressing the challenges of water quality management in aquaponics, and suggest that this technology has the potential to make a significant impact in the industry.

VI. RESULT

In this study, a Long Short-Term Memory (LSTM) neural network was employed to forecast water quality in an aquaponics farming management system. The model analyzed historical water quality data and identified patterns and relationships between key water quality parameters, including pH, temperature, and dissolved oxygen levels. The results of the study showed that the LSTM model was able to accurately forecast future water quality, with an average prediction error. This indicates that the proposed model has the potential to greatly improve the management of aquaponics systems by providing real-time information about water quality, allowing farmers to make informed decisions about water management. The results also highlight the importance of considering multiple water quality parameters in forecasting models and the effectiveness of using machine learning techniques for water quality forecasting in aquaponics systems. Overall, this study highlights the potential of using advanced techniques, such as LSTM networks, to improve the management and sustainability of aquaponics farming systems..

VII. FUTURE SCOPE

The results of the current study demonstrate the effectiveness of using LSTM Neural Networks and time series analysis in forecasting water quality in aquaponics farming management. However, this is just the beginning and there is a lot of room for future improvement and growth in this field. Some potential future scopes for this research include:

1. Improving accuracy: The LSTM model could be refined and optimized to achieve greater accuracy in water quality forecasting by incorporating additional variables and considering different data processing techniques.

2. Integrating with IoT devices: The model could be integrated with Internet of Things (IoT) devices to collect real-time data on water quality and environmental conditions, allowing for more accurate and up-to-date predictions.

3. Combining with other machine learning algorithms: The LSTM model could be combined with other machine learning algorithms, such as Random Forest or Support Vector Machines, to improve overall performance and accuracy.

4. Predictive maintenance: The model could be used to predict when equipment and systems need maintenance, reducing downtime and improving the overall efficiency of the aquaponics system.

5. Scalability: The model could be scaled up to accommodate larger aquaponics systems, making it more accessible to commercial operations.

In conclusion, the future of aquaponics farming management research is bright and holds many opportunities for continued development and innovation. The use of LSTM Neural Networks and time series analysis offers great promise for the efficient and sustainable management of aquaponics systems, and future research in this area is sure to bring efficient and sustainable management of aquaponics systems, and future research in this area is sure to bring about exciting advancements and benefits for the industry.

VIII. CONCLUSION

In conclusion, the use of LSTM models in aquaponic farming management has been shown to be an effective solution for forecasting water quality. The model's ability to capture long-term dependencies and trends in time series data has proven to be a key factor in its success. By combining data analysis, simulation models, and machine learning algorithms, aquaponics farmers can make informed decisions about water management that increase the overall effectiveness and sustainability of their systems. Additionally, the use of the SMOTE algorithm in balancing imbalanced water quality datasets has also been demonstrated to be effective. Further research and development in this area may lead to even more advanced and precise water quality forecasting solutions for aquaponics.

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Predictive Analytics on Consumer Behaviour

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Abstract—**Predictive analytics is the application of statistics and modelling techniques to forecast future outcomes and performance, whereas consumer behavior is the study of how individual customers, groups, and organizations select, buy, and use market products based on their needs. By using historical data, statistical algorithms, and machine learning approaches, predictive analytics can identify potential patterns, events, and behaviors in the future. In order to gain a deeper understanding of customer behavior to enable predictive analytics and enhance corporate decision-making, this study attempts to offer predictive analytics to forecast consumer behavior by combining behavior informatics and analytics approach.**

Keywords— Predictive analytics, Behavior Informatics, Logistic Regression, Marketing, Product, Analytics, Consumer Behavior, Customer behavior

I. INTRODUCTION

The history of consumer/customer behavior seems to be heavily influenced by the history of marketing thought. In the 1940s and his early 1950s, classical thought relied heavily on case studies using the interview method. Towards the end of the 1950s, two major reports criticized the lack of a methodological approach to marketing and the failure to adopt mathematically oriented methods of action. And since then, marketing has moved away from economics to rely on other elements, primarily behavioral sciences such as sociology, anthropology and clinical psychology, with a new emphasis on the customer as part and unit of analysis. It is now available.

Customer buying behaviour refers to the research and behaviour of customers when deciding to purchase a product that meets their needs. This is a study of consumer behaviour that influences their decision to buy and use a particular product. Marketers must study consumer purchasing behaviour because it allows them to understand consumer expectations. It aids us in understanding what drives consumers to purchase products. It is critical to assess the types of products that consumers prefer and to purchase sufficient quantities based on demand. Marketers can understand consumer likes and dislikes and shape their marketing efforts based on those results. And, predictive analytics looks at current and historical data patterns to determine if those patterns are likely to emerge again. Hence, using these two together along with the developing AI/ML field can prove to be a boon to many.

Marketing professionals place a high priority on researching customer purchasing patterns since doing so enables them to comprehend consumer expectations. It aids in our comprehension of customer purchasing behaviour. It's critical to evaluate the products that customers prefer and to purchase an adequate quantity of each, depending on demand. Marketers can learn what consumers like and dislike so that they can tailor their marketing strategies accordingly Amazon has previously used predictive analytics to generate personalized product recommendations based on your purchasing habits. Amazon has recently attempted to use predictive analytics for predictive shipping.

II. EXISTING METHODOLOGY

There are a couple of theoretical consumer models that are really important as they are to be understood while trying to work through a project like ours since it establishes a few thumb rules and points to be kept in mind while working on any project that deals with consumer behavior.

Two of those are discussed below with their block diagrams.

1. The Pavlovian Model of Consumer Behavior is named after Russian Physiologist Ivan Pavlov, who experimented on a dog and observed how it responded to the sound of a bell while being presented with a piece of meat. The amount of saliva secreted by the dog was used to measure the responses. This is also important for marketers.

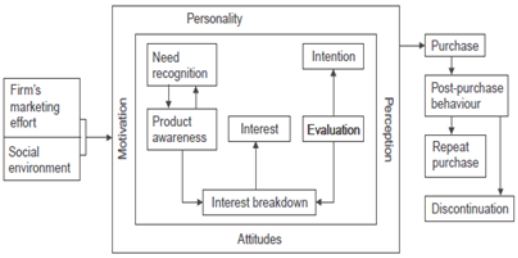

Fig. 2.1 Pavlovian Model

2. Psychoanalytical Model of Consumer Behavior: This model was proposed by Sigmund Freud and it tries to explain consumer behavior as a resultant force that operates at subconscious levels. According to the model, buyers' needs

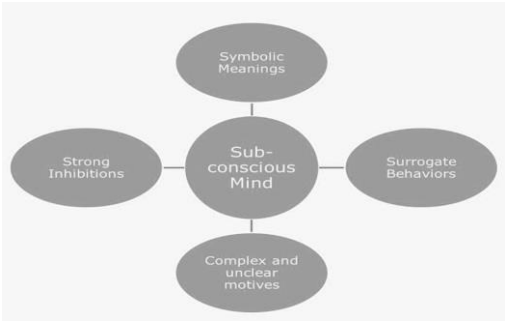

Fig. 2.2 Psychoanalytical Model

and desires operate at different levels on consciousness and not all of such behavior is understandable or explainable by the person. The individual consumer has a set of deep-seated motives which drive him towards certain buying decisions.

III. Literature Survey

During the development of our project, we went through various research papers that helped us navigate and understand our options or the possible solutions we could have. They also helped us understand the mathematical as well as technical knowledge that will be helpful.

One of the papers that we studied was the "Review Paper on Factors Influencing Consumer Behavior" by the Authors Ahmad Hosaini and Dr. Kuldeep Chand Rojhe [1] and it talked about a comprehensive overview of the factors that influence consumer behavior and their purchasing decision-making process in marketing. Because marketing begins and ends with consumers, consumer purchasing decisions reflect how well an organization's marketing strategy meets marketing demands. Consumer behavior includes the psychological processes consumers go through in understanding their needs. Recognize patterns for correcting these requirements. For example, deciding whether to buy goods and services, and if so, what type of brand and where to buy, interpreting tips, making plans and carrying out those plans. For example, through comparison shopping or physical purchase of products. , the modern professional marketer seeks to know consumers and their reactions and to analyze the essential characteristics of their behavior.

The second article was titled "Machine learning-based mathematical modelling for prediction of social media consumer behavior using big data analytics" published by the authors Kiran Chaudhary, Mansaf Alam, Mabrook S. Al-Rakhami & Abdu Gumaei [2] did a study about the consumer data from Facebook, Twitter, Linked In, YouTube,

Instagram, Pinterest, etc. They used predictive big data analytics because social media platforms provide a large amount of diverse, high-speed data. In the article, they used the concepts of big data technology to process and analyze data to predict consumer behavior on social media. They used several parameters and criteria to analyze consumer behavior on social media platforms. They analyzed consumer perceptions and attitudes towards social media platforms. They used machine learning to develop a mathematical model to predict consumer behavior on social media platforms. This model is a predictive model for predicting consumer behavior on social media platforms. 80% of the data is used for training purposes and 20% for testing purposes.

And the third paper published by the authors Rohan Bali, Satyajee Srivastava named "Understanding Customer Behaviour with Machine Learning" [3] talks about Churn analysis helps sellers determine if customers are abandoning their products or services. The goal of every seller is to maintain a low churn rate and earn big margins and big profits. Additionally, conducting a market-based analysis of supermarkets can be very beneficial. This approach helps you organize items in your store efficiently and scientifically. In this document, we use various machine learning algorithms to perform churn on specific her data. Then use the confusion matrix to compute the accuracy and precision of each model. Therefore, the confusion matrix helps in choosing the best model for more accurate results. In this paper, we use the 'Apriori' algorithm to perform the above analysis. In summary, recommendation systems are used to suggest products to customers based on their purchase history or similarity of that product to other products or other consumers. Therefore, this research helps us understand different aspects of customer behaviour.

IV. Methodology and Proposed Model

It is critical to understand the flow or type of software development lifecycle model that will be used when developing a project or software. Out of various SDLC model we need to choose the model which will be perfect for our project and therefore we are using Agile Methodology. Under which Scrum Model is being used.

Scrum is an agile process that allows us to focus on delivering highest value in shortest time. Allowing us to inspect actual working software rapidly and repeatedly.

The activities that have been carried out up until now have been mentioned previously as well. First, after finalising the project title we started identifying the requirements for the project and learning about them. We identified the methodologies to be used as well during this. After, we decided on studying the already existing systems for better understanding for implementation. We planned out as to when this implementation should be done and if any changes are to be made, that should be taken into consideration as well as the errors to be looked upon

	A	B	C	D	E
1	User ID	Gender	Age	Estimated	Purchased
2	15624510	Male	19	19000	0
3	15810944	Male	35	20000	0
4	15668575	Female	26	43000	0
5	15603246	Female	27	57000	0
6	15804002	Male	19	76000	0
7	15728773	Male	27	58000	0
8	15598044	Female	27	84000	0
9	15694829	Female	32	150000	1
10	15600575	Male	25	33000	0
11	15727311	Female	35	65000	0

Fig. 4.1 Dataset

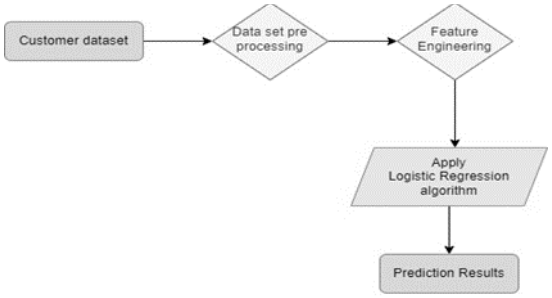

Fig. 4.2 Flow Chart

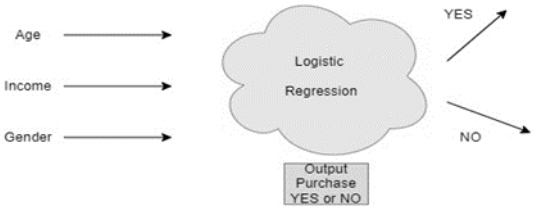

Fig. 4.3 Data flow diagram

Above attached diagrams are a couple of the ones that we made during our project planning phase using tools available online to achieve our goal.

V. Implementation

The main objective of this system is to predict whether a person will be able to predict the product or not based on some parameters that would be taken as input. Further, if possible, we may try and test a few other machine learning models too, so then we would be able to study how the other models work as compared to the ones we are using.

We decided on Logistic Regression algorithm along with feature selection to yield high accuracy using training and testing dataset which was freely available for us to use.

```
# Split df into X and y
y = df['Purchased']
X = df.drop('Purchased', axis=1)

# Train-test split
X_train, X_test, y_train, y_test = train_test_split(X, y, train_size=0.7, shuffle=Tr

# Scale X
scaler = StandardScaler()
scaler.fit(X_train)
X_train = pd.DataFrame(scaler.transform(X_train), index=X_train.index, columns=X_tra
X_test = pd.DataFrame(scaler.transform(X_test), index=X_test.index, columns=X_test.c

return X_train, X_test, y_train, y_test
```

The Fig. 5.1 Splitting data into train/test data

model was trained and tested using the dataset which contains the columns user id, gender, age, salary and purchase. It takes the values gender, age and salary to predict whether the customer or person will be able to purchase that product or not. We made use of Python in Linux OS for carrying all the coding processes.

```
# Feature engineering
if engineer_features == True:
    income_threshold = df['EstimatedSalary'].quantile(0.95)
    df['High Income'] = df['EstimatedSalary'].apply(lambda x: 1 if x >= income_threshold else 0

    old_age_threshold = df['Age'].quantile(0.75)
    df['Old Age'] = df['Age'].apply(lambda x: 1 if x >= old_age_threshold else 0)

    young_age_threshold = df['Age'].quantile(0.25)
    df['Young Age'] = df['Age'].apply(lambda x: 1 if x <= young_age_threshold else 0)

# Split df into X and y
y = df['Purchased']
X = df.drop('Purchased', axis=1)
```

Fig. 5.2 Feature engineering

Figures 5.1 and 5.2 are a couple of code snippets that we used and implemented while categorising the dataset during training and testing and while applying feature engineering respectively.

VI. Results and Discussion

The model predicts in binary answer i.e. either 0 or 1. 0 means that the person will not be able to purchase the product and 1 means they will be able to purchase the product. Below is the output that we managed to achieve.

```
Python 3.6.9 (default, Jun 29 2022, 11:45:57)
[GCC 8.4.0] on linux
Type "help", "copyright", "credits" or "license()" for more information.
>>>
============= RESTART: /home/mansi/CustomerPredictAccuracy.py =============
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 400 entries, 0 to 399
Data columns (total 5 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   User ID          400 non-null    int64
 1   Gender           400 non-null    object
 2   Age              400 non-null    int64
 3   EstimatedSalary  400 non-null    int64
 4   Purchased        400 non-null    int64
dtypes: int64(4), object(1)
memory usage: 14.1+ KB
Test Accuracy by Mansi: 80.833%
>>> data=dict(Gender=1.007,Age=1.023,EstimatedSalary=-1.87)
>>> predict_df= pd.DataFrame(data,index=[0])
>>> print(model.predict(predict_df))
[0]
>>>
```

Fig. 6. Result

All the above steps that are mentioned were performed and consulted with the guide as long, along with being guided from industry experts in this field. The system output predicts what is expected of it. There is one abnormality that we would like to erase in the next phase, which is, that the value that is to be entered for prediction for now are being given and taken in normalised form which is not user friendly. So, that is one major aspect we expect to change later in the upcoming phase.

Consumer behavior is a widely researched area. This allows organizations to understand how consumers make decisions about purchasing products and services. Marketing managers are always trying to learn more about consumer behavior. Therefore, they can prepare better communication and advertising campaigns about their products and services. Many people make purchasing decisions on a daily basis but fail to recognize the factors that drive that solution. Factors that typically influence consumer purchasing behavior include spiritual, civic, cultural, and personal factors. Consumer behavior does not remain the same or consistent under all conditions that change from time to time. There are various factors that influence consumer behavior.

Evaluating Models on Performance Indicators ((a) Accuracy, (b) Recall, (c) Accuracy, (d) F Measure)6 Conclusions and Lessons Forward 21st Century In , the growth trend has proven to be the most dramatic boom ever. It is difficult to predict which customers are likely to be abandoned by companies as their services increase as technology advances. In the telecom industry, churn prediction is a problem that has been highlighted by various researchers in recent years. Throughout this research paper, logistic regression, naive Bayes, support vector machines, decision trees, random forests, XGBoost classifiers, CatBoost classifiers, AdaBoost classifiers, and extra-tree classifiers. Experimental results show that there are his two ensemble learning methods, Adaboost classifier and XGBoost classifier. It is very difficult to predict the actual customer society. With the upcoming concepts and frameworks of reinforcement learning and deep learning, machine learning is proving to be one of the most efficient ways to tackle problems such as churn prediction with more accuracy and precision in the future. increase.

VII. CONCLUSION

In this paper, we focused on the implementation of our idea taking the help of industry experts and our guide. We were able to apply a machine learning algorithm, prepare a model for it, apply feature selection and get the results, we can also check the overall accuracy of the available dataset. There are a couple of errors and points we can fix as well as enhance as a project is never perfect until the end. We would like to do the needful in the upcoming phase with an even better understanding.

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Flood And Rainfall Prediction Using ML

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Abstract—**Disaster Management is one of the most essential responsibilities in the modern world. The measurement of the intensity and the frequency of occurrence is especially important to minimize the effects of the disaster's aftermath. One of the worst disasters that affected the North Indian plains is floods. The river overflow causes floods which leads to soil erosion, destruction of State Infrastructure, and loss of life. Research on improving flood prediction models has helped to lower risks, recommend policy changes, reduce the number of fatalities, and lessen property damage from floods. Modern data collection using satellites and the creation of efficient machine learning models have to a great extent helped predict the onset of heavy rains and subsequent river overflows. In this project we are incorporating the use of several machine learning models like Linear Discriminant Analysis, Gaussian Naive Bayes to predict the possibility of river overflow and possible flood situation taking into account the data of water levels and rain patterns in the area of four rivers of India. The major objective of this study is to show the state of the art of ML models in flood prediction and to provide insight into the best models. The literature where ML models were benchmarked through a qualitative study of robustness, accuracy, efficacy, and speed is explored in depth in this work to offer a comprehensive overview of the numerous ML methods utilized in the area.**

Keywords— Flood, Rainfall, Temperature, Humidity, CNN, LSTM, Godavari, Machine Learning, etc.

I. INTRODUCTION

Floods are one of the most destructive disasters in nature. Floods cause severe damage to human life, infrastructure, agriculture, and socioeconomic system and their effects persist for a long time post their occurrence. Governments are therefore constantly trying to improve on the mechanism which can prevent and help minimize damage due floods. Building of dams, creation reservoirs to control a river when it goes beyond its banks, creating flood plains and overflow areas are mechanism that can help control a flood situation.[1] But the more important task is to predict whether a river might overflow in advance and alert the community living along the banks of the river to ensure there is no loss of human or animal life. Historical flood event records, as well as real-time cumulative data from a multitude of rain gauges or other sensing devices over varied return periods, are frequently employed.[2] The dataset's conventional sources are rainfall and water level, which are monitored either by land rain gauges or by relatively modern remote sensing methods such as satellites, multisensory systems, and/or radars [3].

As more data becomes available, computing power rises, and machine learning algorithms progress, new opportunities for flood detection are presented by machine learning technologies. Machine learning has become a popular tool for studying non-linear systems and producing flood forecasts.[4] Traditional approaches to flood forecasting might include a series of hydrologic and hydraulic models that represent the underlying physical processes. These models help us understand how systems work, but they frequently have significant computational and data needs. Machine learning techniques have the ability to increase accuracy while decreasing model construction costs and calculation times.[5]

In general, less developed countries are the most vulnerable to floods, causing damages that significantly affect the national GDP.[6] At country and community levels important initiatives have and are being devoted to implement appropriate countermeasures. Flood disasters in the past decades have become more frequent and devastating in China. The Chinese government gives high priority to flood management through both structural measures and nonstructural measures with the aim of enhancing flood prediction precision.[7].

II. LITERATURE SURVEY

Fi Mosavi, A., Ozturk, P. and Chau, K.W., 2018. "Flood prediction using machine learning models" This paper presents an overview of machine learning models used in flood prediction, and develops a classification scheme to analyze the existing literature

Jeerana Noymanee, Nikolay O. Nikitin, Anna V. Kalyuzhnaya. "Urban Pluvial Flood Forecasting using Open Data with Machine Learning Techniques in Pattani Basin" In this paper, opportunities of machine leaning techniques for pluvial flood forecasting in Pattani river basin were explored. The aim of this paper was to find the optimal configuration of machine learning based models and comparison of resulted quality of different machine learning techniques.

Linardos, V., Drakaki, M., Tzionas, P. and Karnavas, Y.L., 2022. Machine Learning in Disaster Management: Recent Developments in Methods and Applications. In this paper, a review study has been carried out to investigate how ML and DL techniques have been used in various areas of disaster management to assist disaster management operations and improve their performance. For this purpose, those papers which have been published since 2017 have been targeted, dividing them in categories which include the different phases and subphases of a disaster event.

Chamola, V., Hassija, V., Gupta, S., Goyal, A., Guizani, M., & Sikdar, B. (2020). Disaster and pandemic management using machine learning: a survey. This article presented a comprehensive survey of the applications of ML in disaster and pandemic management. This article first presented a detailed explanation of ML algorithms. Then, we discussed various phases of disasters and pandemics where ML algorithms can be used.

Motta, M., de Castro Neto, M., & Sarmento, P. (2021). A mixed approach for urban flood prediction

using Machine Learning and GIS. This paper demonstrates that, by combining ML and GIS, it is possible to determine the key predictors and conditions for a flooding scenario by using a limited amount of data. From the ML standpoint, non-linear models were more capable of detecting floods and, among those, the most performant model was Random Forest.

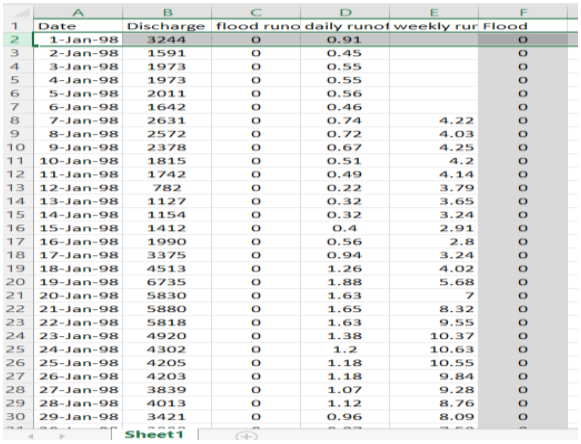
Chakraborty, S., Chakraborty, S., & Paul, S. (2020). Rainfall prediction using machine learning techniques: A review. This article reviews the use of artificial neural networks, decision trees, and support vector machines in machine learning methods for predicting rainfall. The capacity to handle complicated nonlinear interactions and analyse vast volumes of data are two of the approaches' potential advantages for enhancing rainfall forecast accuracy discussed in the research. The research also emphasises the necessity for better model validation and data quality in order to increase the accuracy of these strategies.

Patil, S., & Singh, R. D. (2016). Assessing the impact of climate change on the Ganga river system in India using an ensemble of regional climate models. This study evaluates probable effects of climate change on the Ganga river system in India, including changes in temperature, precipitation, and river flow, using a collection of regional climate models. In order to increase the precision of climate change estimates, the study analyses the shortcomings of current climate models and emphasises the need for better data and modelling methods.

III. IMPLEMENTATION

The implementation process consists of five phases - Data collection, Data Preprocessing, Data Transformation and Visualization, Model Testing, Development-

Data Collection - The data collection phase was a very crucial part of the project because it helped define a proper approach towards flood prediction. The data we collected was the river datasets of five rivers namely Cauveri, Godavari, Krishna, Mahanadi, and Son, and Sub Division IMD 2017 dataset. The river dataset helped give us a clarity that we can approach creating this project wherein we find the probability of floods by predicting the overflowing of a river due to the amount of rain it receives during the monsoon. The machine learning model was created using the Godavari river dataset.



	A	B	C	D	E	F
1	Date	Discharge	flood runo	daily runof	weekly rur	Flood
2	1-Jan-98	3244	0	0.91		0
3	2-Jan-98	1591	0	0.45		0
4	3-Jan-98	1973	0	0.55		0
5	4-Jan-98	1973	0	0.55		0
6	5-Jan-98	2011	0	0.56		0
7	6-Jan-98	1642	0	0.46		0
8	7-Jan-98	2631	0	0.74	4.22	0
9	8-Jan-98	2572	0	0.72	4.03	0
10	9-Jan-98	2378	0	0.67	4.25	0
11	10-Jan-98	1815	0	0.51	4.2	0
12	11-Jan-98	1742	0	0.49	4.14	0
13	12-Jan-98	782	0	0.22	3.79	0
14	13-Jan-98	1127	0	0.32	3.65	0
15	14-Jan-98	1154	0	0.32	3.24	0
16	15-Jan-98	1412	0	0.4	2.91	0
17	16-Jan-98	1990	0	0.56	2.8	0
18	17-Jan-98	3375	0	0.94	3.24	0
19	18-Jan-98	4513	0	1.26	4.02	0
20	19-Jan-98	6735	0	1.88	5.68	0
21	20-Jan-98	5830	0	1.63	7	0
22	21-Jan-98	5880	0	1.65	8.32	0
23	22-Jan-98	5818	0	1.63	9.55	0
24	23-Jan-98	4920	0	1.38	10.37	0
25	24-Jan-98	4302	0	1.2	10.63	0
26	25-Jan-98	4205	0	1.18	10.55	0
27	26-Jan-98	4203	0	1.18	9.84	0
28	27-Jan-98	3839	0	1.07	9.28	0
29	28-Jan-98	4013	0	1.12	8.76	0
30	29-Jan-98	3421	0	0.96	8.09	0

Sheet1

Fig. 1. Godavari River Dataset

The river dataset contains information from 1998. The attributes of the dataset include 'Discharge', 'Flood runoff', 'Daily runoff', 'weekly runoff' and a target variable 'Flood'. The IMD dataset contains information about the geographical subdivisions of India and the amount of rainfall received by the subdivision(in mm) on a monthly basis. Here is an image of the IMD dataset –

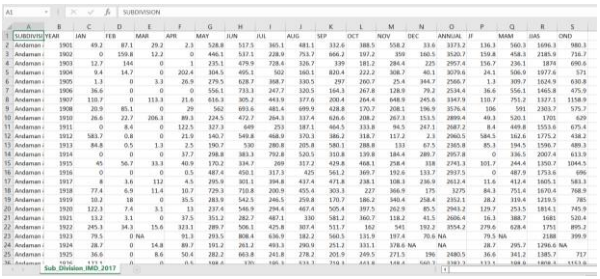


Fig. 2. IMD Dataset

Data pre-processing - Once the data was gathered it required cleaning. The raw dataset was first updated to create a binary classification problem.

Fig. 3. Binary Classification

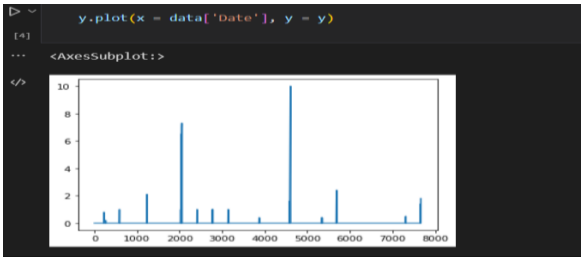


Fig. 4. Merged River Dataframe

In the third image above a value is being tried to be set on a copy of a slice from a Data Frame. We then pre-process by segregating the timeframe from the river dataset to merge it with the time frame of the IMD dataset.

```
data = data.fillna(data.mean())
data.info()
data.drop(columns='Date',axis=1,inplace=True)
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7670 entries, 0 to 7669
Data columns (total 7 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Date            7670 non-null   datetime64[ns]
 1   Discharge       7670 non-null   float64
 2   flood runoff    7670 non-null   float64
 3   daily runoff    7670 non-null   float64
 4   weekly runoff   7670 non-null   float64
 5   Unnamed: 6      0 non-null      float64
 6   Unnamed: 7      0 non-null      float64
```

Fig. 5. Data Preprocessing

We clean the data of all the null values which leaves us with a total of 7460 non null values. We then concatenate the new processed data with the appropriate time frame and we get a more detailed view of the discharge and the flood runoff values from 1998 to 2018.

Data Transformation and Visualization – For data transformation, we used the min-max scalar. We transformed the range of different discharge and runoff values by calculating their mean over a single year and concatenating the mean values with the individual runoff values for each year for each of the river datasets.

```
data=pd.concat([d1,data],axis=1)
data.head()
```

	Day	Months	Year	Discharge	flood runoff	daily runoff	weekly runoff	Unnamed: 6	Unnamed: 7
0	1	1	1998	3244.0	0.0	0.91	7.464144	NaN	NaN
1	2	1	1998	1591.0	0.0	0.45	7.464144	NaN	NaN
2	3	1	1998	1973.0	0.0	0.55	7.464144	NaN	NaN
3	4	1	1998	1973.0	0.0	0.55	7.464144	NaN	NaN
4	5	1	1998	2011.0	0.0	0.56	7.464144	NaN	NaN

Fig. 6. Mean Discharge Values

We created a set of nine histograms -Total amount of rainfall on a daily basis, Total amount of rainfall on monthly basis, Total amount of rainfall on yearly basis, Discharge level, Flood runoff level, daily and weekly runoff level. The histogram give us the pattern of discharge levels from 1998 to 2018. The histogram shows that the discharge for Godavari river are gradually decreasing from 1998 to 2018.

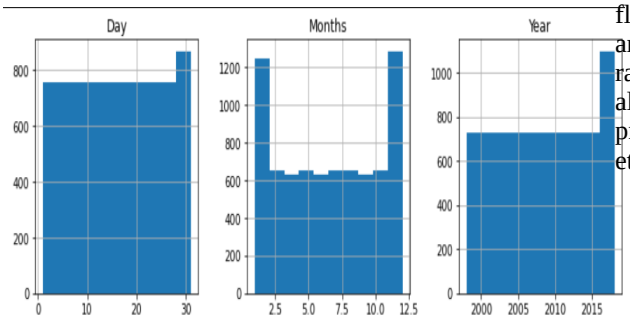


Fig. 7. Histogram for Godavari Discharge Values

We also created a line plot to show the trend of flood, daily and weekly runoff from 1998 to 2018. The line plot indicates that Godavari had the highest flood, daily and weekly runoff in the year 2010.

Model Testing- In Flood Prediction Using Machine Learning Models Mosavi, A et. al the author makes use of Linear Discriminant Analysis. The paper is based on historical rainfall datasets spanning 33 years, the goal of this project was to develop a machine learning model that can forecast floods in Kebbi state so that it may be applied to other Nigerian states with high flood risk. In [2] Jeerana Noymanee et al. uses a Gaussian Naive Bayes model for the model creation to analyse flood patterns in the Pattain Basin. There are a total of 6 Machine learning models - Logistic Regression, Linear Discriminant Analysis, KNN, Decision Tree Classifier, Gaussian Naive Bayes, Support Vector Machine. Initially we implemented a linear regression to test the sample data the output for the following was - image. The sample dataset was subjected to SMOTE oversampling - image. The dataset was then shuffled and segregated into train and test samples. The machine learning models were then implemented on the training dataset.

Development – The development process involved using streamlit to create a web application that would display the probability of flood and rainfall in a region. The segregation of tasks – i) involving flood prediction and ii) involving rainfall prediction was done by making use of separate sets of data.[11] The flood prediction incorporated the use of river datasets, namely - Godavari, Cauveri, Krishna, Mahanadi and Son. The rainfall prediction made use of city datasets of the four prominent metropolitan cities, namely – Bombay, Delhi, Kolkata and Chennai. The web application created consisted of a time-input widget which had dates from January 2019 to December 2033. The web application enables the user to select from one of the five rivers mentioned, enter the date of prediction and the system would use the LSTM algorithm to predict the probability of flood. A similar approach is done for rainfall prediction wherein the user selects one of the four cities, a date and the system predicts the probability of rainfall for the city at that particular date. The probability predictions are not displayed numerically but on a "High" and "Low" basis which is decided upon the yhat values predicted by the algorithm. The yhat value for the flood prediction are indicative mainly of the cumulative flood runoff values from daily runoff, weekly, runoff and monthly runoff values in the dataset. In the case of rainfall values the yhat values are calculated by the algorithm using the temperature, humidity, historical precipitation values etc.

pages > 1_Flood.py > ...

```python
import datetime
import streamlit as st
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
import pickle

st.title('Flood Prediction')
st.write(pd.read_csv('Godavari_forecast.csv'))

option = st.selectbox(
    'Select The River For Prediction',
    ('Godavari', 'Cauvery', 'Krishna','Mahanadi','Son'))
#st.write('You selected:', option)


d = st.date_input(
    "Select Prediction Date")
st.write('Prediction Date is:', d)
a=d.strftime('%Y-%m-%d')
#st.write(a)

if(option=='Godavari'):
    df = pd.read_csv('Godavari_forecast.csv')
    #st.write("Godavari")
elif(option=='Cauvery'):
    df = pd.read_csv('Cauvery_forecast.csv')
    #st.write("c")
elif(option=='Krishna'):
    df = pd.read_csv('Krishna_forecast.csv')
    #st.write("k")
elif(option=='Mahanadi'):
    df = pd.read_csv('Mahanadi_forecast.csv')
    #st.write("m")
elif(option=='Son'):
    df = pd.read_csv('Son_forecast.csv')
    #st.write("s")

#st.write(df)
prediction = df[df["ds"]==a]
#st.write(prediction)


#prediction[prediction["yhat1"]<=0]
prediction1 = prediction.loc[:,"yhat1"]
if((prediction1>=0).any()):
    st.warning("High Probability of Flood")
elif((prediction1<=0).any()):
    st.info("Low Probability of Flood")

```

Fig. 8. Flood Prediction code

```python
option = st.selectbox(
    'Select The City For Prediction',
    ('Bombay', 'Calcutta', 'Chennai','Delhi'))
#st.write('You selected:', option)


d = st.date_input(
    "Select Prediction Date")
st.write('Prediction Date is:', d)
a=d.strftime('%Y-%m-%d')
#st.write(a)

if(option=='Bombay'):
    df = pd.read_csv('Bombay_forecast.csv')

elif(option=='Calcutta'):
    df = pd.read_csv('Calcut_forecast.csv')

elif(option=='Chennaia'):
    df = pd.read_csv('Chennai_forecast.csv')

elif(option=='Delhi'):
    df = pd.read_csv('Delhi_forecast.csv')

#st.write(df)
prediction = df[df["ds"]==a]
#st.write(prediction)


#prediction[prediction["yhat1"]<=0]
prediction1 = prediction.loc[:,"yhat1"]
#st.write(prediction1)
if((prediction1<=73).bool()):
    st.warning("Very High Probability of Rainfall")
elif((prediction1<=76).any() & (prediction1>73).any()):
    st.warning("High Probability of Rainfall")
elif((prediction1<=80).any() &  (prediction1>76).any()):
    st.info("Low Probability of Rainfall")
elif((prediction1>80).any()):
    st.info("Very Low Probability of Rainfall")
```

Fig. 9. Rainfall Prediction Code

IV. Result and Discussion

Our study's findings indicate that machine learning has great potential as a method for predicting floods and rainfall. The model we developed exhibited a high level of accuracy in anticipating both flood events' incidence and severity, as well as the quantity of rainfall. These discoveries are significant for disaster management and risk reduction, as precise and prompt predictions can assist authorities and communities in getting ready and reacting to probable flood events.[12] Moreover, our model has the potential to improve by employing additional data and more sophisticated algorithms, as well as incorporating real-time sensor information from remote sensing and IoT devices. Nonetheless, it is essential to note that machine learning models are not perfect and may have drawbacks such as partiality, over fitting, and data incompleteness. Consequently, to offer a more complete flood and rainfall prediction system, our model should be employed in conjunction with other approaches and expert knowledge.

```python
# Spot Check Algorithms
models = []
models.append(('LR', LogisticRegression(solver='liblinear', multi_class='ovr')))
models.append(('LDA', LinearDiscriminantAnalysis()))
models.append(('KNN', KNeighborsClassifier()))
models.append(('CART', DecisionTreeClassifier()))
models.append(('NB', GaussianNB()))
models.append(('SVM', SVC(gamma='auto')))
# evaluate each model in turn
results = []
names = []
for name, model in models:
    kfold = model_selection.KFold(n_splits=10, random_state=None)
    cv_results = model_selection.cross_val_score(model, X_train_res_shuf, Y_train_res_shuf, cv=kfold, scoring=scoring)
    results.append(cv_results)
    names.append(name)
    msg = "%s: %f (%f)" % (name, cv_results.mean(), cv_results.std())
    print(msg)
```

```
LR: 0.996336 (0.001542)
LDA: 0.986474 (0.001841)
KNN: 0.997746 (0.001275)
CART: 1.000000 (0.000000)
NB: 0.991077 (0.002025)
SVM: 0.832426 (0.016546)
```

Fig. 10. Algorithm Accuracy Scores

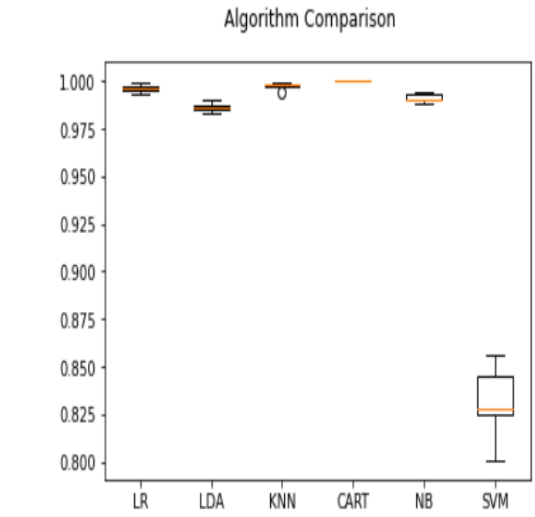


Fig. 11. Barplot Dectecting Accuracy

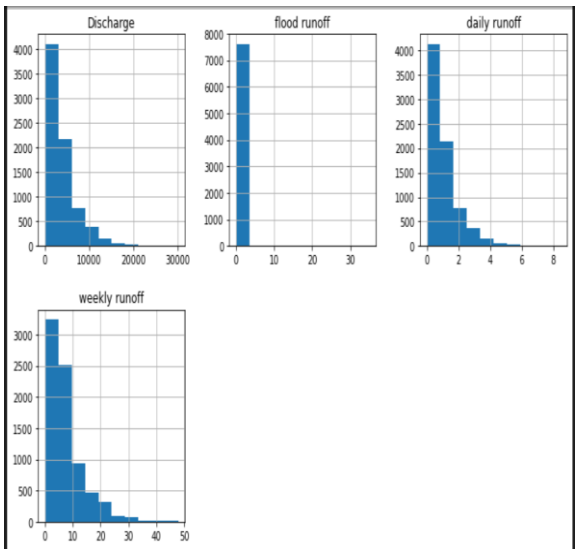


Fig. 12. Histogram Flood Runoff

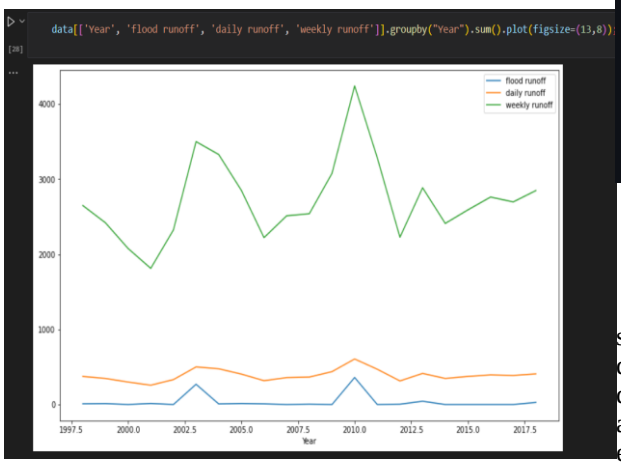


Fig. 13. Prediction Trend

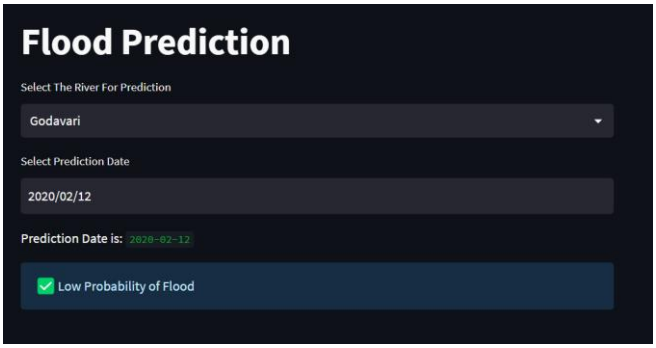


Fig. 14. Godavari River – Low Flood Probability

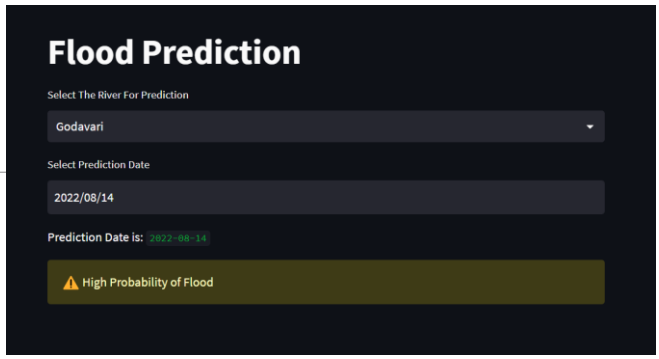


Fig. 15. Godavari River – High Flood Probability

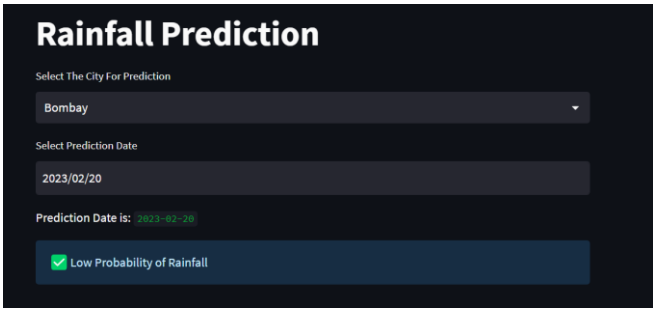


Fig. 16. Bombay – Low Rainfall Probability

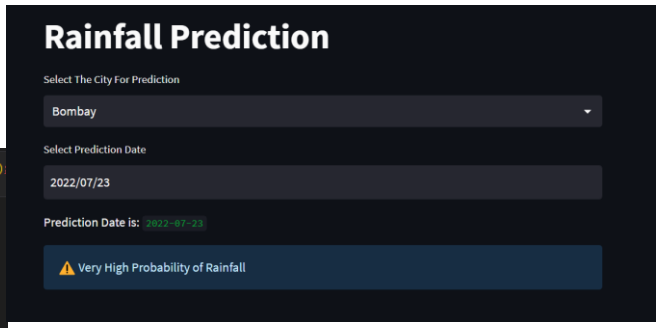


Fig. 17. Bombay – High Rainfall Probability

V. CONCLUSION

The proposed Flood and Rainfall Prediction has been successfully implemented and tested with the available data. The systematic process initiated by the process of data cleaning, processing the missing values, exploratory analysis and in the end building the model for evaluation. The performance and accuracy on test data is taken into consideration and the model with highest performance and accuracy is implemented in the machine learning model. This application can help to predict future floods due to rainfall. Multiple algorithm has been implemented in the project website which was created using streamlit and the algorithm used was

LSTM as it has the best accuracy and performance out of all the algorithms tested.

In conclusion, reliable rainfall and flood forecasting near river basins in India is essential for reducing the effects of natural catastrophes on infrastructure and human lives. Although while methods and instruments for prediction have considerably improved recently, there are still several problems, such as inadequate data and shifting climatic trends. Researchers, governmental organisations, and local communities will all need to put up consistent effort in order to address these issues. By improved data collecting, model calibration, and more coordination amongst various organisations involved in disaster management, future research should concentrate on increasing the accuracy of rainfall and flood prediction. However, some of the shortcomings of present approaches can be addressed with the use of machine learning techniques, higher-resolution models, and increased ground-based observation coverage.

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Liveliness Detection in Video Using Machine Learning

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Abstract- The human face is a valuable biometric measure that can be utilized to get access to a user-based system. Face recognition technology has developed rapidly in recent years and it is more direct, user friendly and convenient compared to other methods. But face recognition systems are vulnerable to spoof attacks made by non-real faces. It is an easy way to spoof face recognition systems by facial pictures such as portrait photographs. A secure system needs Liveness detection in order to guard against such spoofing. Due to the ease with which human face photos may be collected via smartphone cameras and social media, user- based access systems must be resistant to spoof face attacks. In other words, a trustworthy face-based access system can determine the input face's identity as well as its liveness. Various feature-based spoof face detection algorithms have been proposed to this purpose. In order to detect the liveness of the face, these algorithms often apply a sequence of operations to the input image(s). A deep-learning-based spoof face detection is proposed in this study.

Keywords: Facial Recognition technology, Liveness detection, deep-learning.

I. INTRODUCTION

Authentication and authorization via biometrics is becoming more common. It is based on the different identifying human physiological traits that are used to identify a human being, such as fingerprints, retina scans, iris scans, voice, and face.

Biometric systems in general are designed to identify individual humans, but they do not distinguish between live and non-live biometrics. In our project, we're concerned about the facial recognition system. Attacks on facial recognition systems can be carried out in a variety of ways. In our project, we plan to create a system that uses video to detect a spoofing attack on a face recognition system.

Liveness detection is a major area of interest within the field of biometric that encompasses a process of verifying whether the biometric being captured by the recognition system is Face anti-spoofing techniques requires a genuine photograph, recorded video or dummy evidence etc. to be present at the sensor (i.e. camera)

Photographs generally lack the 3D information and provides less physiological evidence than videos can provide this can be exploited in liveness detection as a limitation of static images. However, videos captured by high quality cameras can be also a challenging spoofing attack as they provide a strong sign for vitality through motion.

Dummy models on the other hand can be a threat to facial biometric system containing 3D information that static images and videos do not provide. Recent developments in the field of facial biometric have led to a renewed interest in liveness detection as a solution for spoofing attack problems.

II. RELATED RESEARCH

Sr No	Paper Title	Publication	Methodology Used	Key Findings
1.	Face Liveness Detection using Machine Learning and Neural Network - Literature Survey	CEUR Workshop Proceedings (CEUR-WS.org)	Deep Learning based Bi-LSTM model	Shearlet was used to develop an image quality-based liveness feature. Using feature fusion when extracting features and opting for a deep learning model which consists of CNN and SoftMax classifier proved to be most useful.
2.	Face Liveness Detection Using Machine Learning	IEEE Transactions on Affective Computing	Attention based multi-modal classification model	Image is converted into gray scale, because the input to haar cascade is gray scale image. should be capture on different
				light conditions for better accuracy The SVM, KNN

				algorithm shows 77.41% and 97.69% accuracy.
3.	Enhanced Deep Learning Architectures for Face Liveness Detection for Static and Video Sequences	ISCA Interspeech 2021	CNN-TDNN, Architecture and Recurrent Neural Network-based Language Model (RNNLM)	Linear diffusion smoothens the input image at a constant rate in all directions to remove noise. Initialize the pre-trained CNN with batch normalization in the integrated diffusion architecture and retrain it again to obtain higher accuracy.

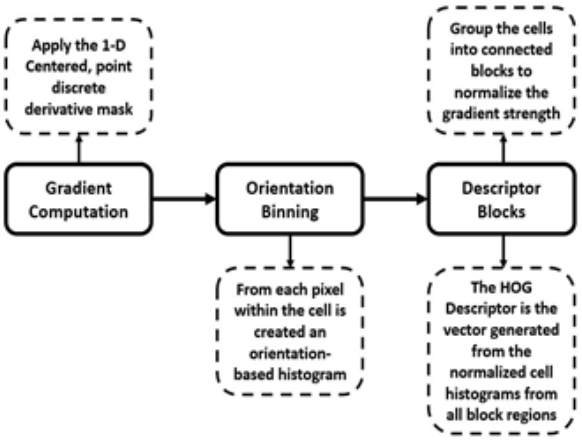
2.1 Computer vision and facial recognition

The term Computer Vision (CV) refers as a field of research that aim to develop proper techniques to enable computer to see and process the content of images and videos. The computer vision is a part of Artificial Intelligent (AI). The objects detection in an image is the main task of the CV algorithm as what and where the objects are seen. Additionally, the CV algorithms must identify the properties of identified objects, for example whether it is a face, building, or a door. In most cases these identified images are stored and compared against new objects. Furthermore, the CV enables us to have multiple metrics on the selected objects. Therefore, the CV has been utilized in various sectors, such as in safety, health, security, entertainment, cars, robotics, and in sports

2.2 Defining facial recognition:

Facial Recognitions (FR) are often done in two ways: Verification and identification. In verification, the system compares a given object with the existing stored objects. In identification, the system identifies the object and gives a rank of the matches. In both cases, the biggest challenge is teaching the machine to recognize faces. The FR technology implementation consist of several stages such as image acquisition, image processing, characteristic identifications, eye sockets, nose shape, template creation, and template matching. Facial recognition algorithm often measures the distance between the eyes, width of the nose, depth of the eye socket, cheekbones, and chin. Traditional FR algorithms use statistical approach or search for patterns, while the more recent ones use deep neural networks. In the following these two approaches are discussed in more detail.

Dlib HoG Face Detection:



Histogram of Oriented Gradients, also known as HOG, is a feature descriptor like the Canny Edge Detector, SIFT (Scale Invariant and Feature Transform) . It is used in computer vision and image processing for the purpose of object detection. The technique counts occurrences of gradient orientation in the localized portion of an image. This method is quite similar to Edge Orientation Histograms and Scale Invariant a Feature Transformation (SIFT). The HOG descriptor focuses on the structure or the shape of an object. It is better than any edge descriptor as it uses magnitude as well as angle of the gradient to compute the features. For the regions of the image it generates histograms using the magnitude and orientations of the gradient.

III. RESULT AND ANALYSIS

3.1 GUI SCREENSHOT

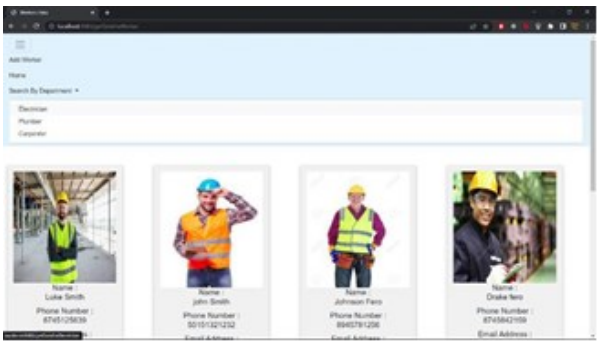


Fig 3.1.1 Implementation-1(Worker Data UI)

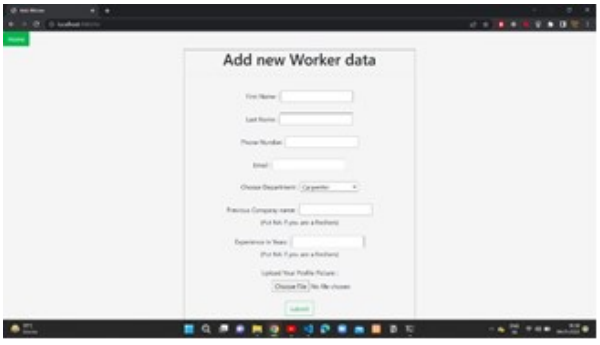


Fig 3.1.2 Implementation-2(Add new Worker Form)

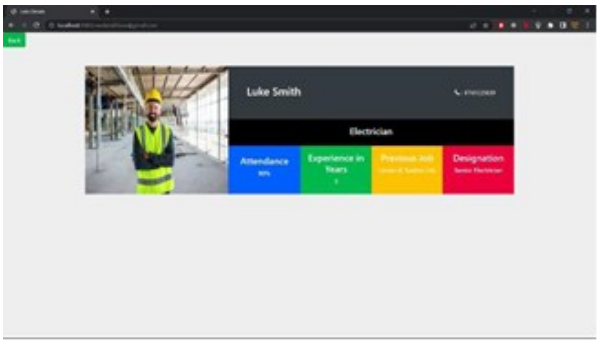


Fig 3.1.3 Implementation-3(Worker Detail Data UI)

3.2 DATASET SCREENSHOT

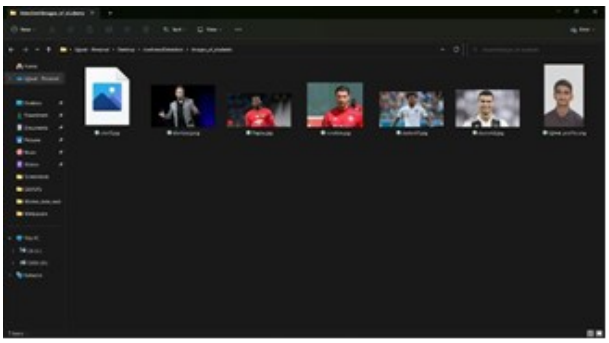


Fig 3.2.1 Image Dataset Used for Face Recognition

3.3 ACTUAL RESULTS

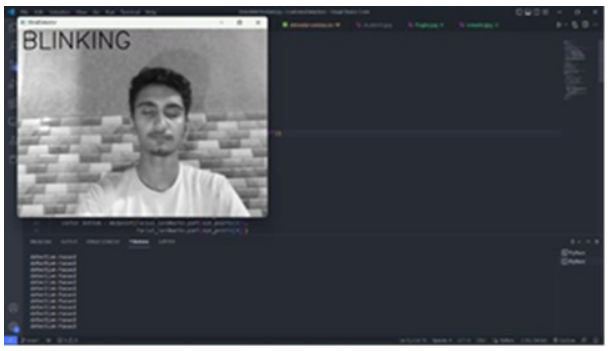


Fig 3.3.1 Blink Detection Output

3.4 DISCUSSION

For face detection we have used HOG and SVM. Histogram of oriented gradients (HOG) is used for feature extraction in the human detection process, whilst linear support vector machines (SVM) are used for human classification. We have used a popular library for face detection that have inbuild function that one can use to easily detect face inside an image with high accuracy. Those inbuild function uses HOG and SVM concepts for face detection.

For blink detection we have used dlib library. It's a landmark's facial detector with pre-trained models, the dlib is used to estimate the location of 68 coordinates (x, y) that map the facial points on a person's face like image below. These points are identified from the pre-trained model where the iBUG300-W dataset was used.

We have maintained the data of all the workers in our database working on a specific site. A worker can view his/her details and attendance using the GUI and Admin can remove, update and add a new worker to the site

IV. CONCLUSION AND FUTURE SCOPE

The increase in number of people using social media to express their views, tasks like opinion mining and sentiment analysis have gained a lot of importance. And using sarcasm in these social media texts make these tasks much more challenging.

In our project, we have presented an English- Hindi code-mixed dataset for sarcasm detection. We also presented a baseline supervised classification that is developed using the same dataset which uses three different machine learning techniques.

With increasing identity fraud each day, service providers need to ensure that their applications cannot be compromised. Thus, liveness detection in biometrics is required to prevent fraud during unsupervised attendance system. In future the techniques will be improved with new technologies and training the model. With further advancement the 2d camera can also be replaced with a 3d depth sensor for better accuracy. Improvement in accuracy of the machine learning models will be implemented. This software is the needed for current corporations and its demand will increase in future. A variety of possible advantages come with the usage of facial recognition. There is no need to directly touch an authentication system relative to other touch-based biometric identification methods such as fingerprint scanners, which could not function well if a person's hand is soil.

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Smart Healthcare Recommendation System

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Abstract — ***According to the World Economic Forum, nearly 6 million people die each year in developing countries due to a lack of access to quality healthcare. A large amount of clinical data representing patients' health status has been collected over the last few decades. This has significantly increased the amount of digital information available for patient-centered decision-making. Such digital information is frequently dispersed across multiple sites, making it difficult for users to find useful information for improving their well-being. Recently, health recommender systems (HRS) have been widely applied to the healthcare domain to better support medical recommendations. Here we propose an intelligent HRS based on machine learning algorithms using the support vector classifier, the Gaussian naive Bayes classifier, and the random forest classifier. For robust modeling, the mode of all three models' predictions is considered. This method will allow us to make much more accurate forecasts based on previously unseen data. Unlike predecessors in the same domain, HRS provides better personalization, increasing the details of provided recommendations and improving users' understanding of health.***

Keywords: Healthcare, Prediction, Recommendation, Machine Learning.

I. INTRODUCTION

With the vast amount of clinical data currently scattered across various websites on the Internet, users are unable to find useful information to improve their health. Additionally, the sheer volume of medical information (medications, medical tests, treatment recommendations, etc.) poses many challenges for health professionals in making patient-centered decisions. These issues require the adoption of medical recommendation systems so that both end-users and healthcare professionals can make more efficient and accurate health-related decisions.

This project proposes an intelligent healthcare recommendation system that benefits both patients and doctors or healthcare professionals. This is done by accurately predicting and recommending a nutrition-based diet that includes recommendations and prohibitions for maintaining good health during this period. Recommendations from nearby hospitals for each prognosis, and common medication. The user's medical history also helps medical professionals to further treatment, allowing patients to view medical records and upload prescriptions themselves.

Smart health recommender systems are becoming more important every day for better timely predictions. Minimizing the risk of life-threatening human illness requires efficient systems and effective recommendations for diagnosis.

HRS provides users with different types of recommendations to help improve their health. These systems also help healthcare professionals make more accurate and patient-centric decisions. The main purpose of the health recommendation system is to obtain reliable health information from the Internet, analyze the ones that are suitable for the user's profile, select the best ones that can be recommended, and adapt the selection method to the field of knowledge. Learn from the best recommendations.

Several studies have been conducted on HRS, but they target specific diseases or referral situations. This requires a comprehensive overview that provides a "complete landscape" of the recommended scenarios supported by HRS. The challenges of HRS are multifaceted and can be summarized in the following: Complexity and specifications, end-user diversity, usage scenario variations, data availability including user profiles, user factor assessment, and health. Recommended elements, feedback, and the most difficult evaluation issues.

The proposed mechanism targets continuous data and builds a prediction model based on the regression analysis method, which is not limited to the analysis and prediction of guidance data in the smart medical industry. New features can be added in the future to improve the prediction model's accuracy. New disease data, for example, have an impact on the number of systems seeking medical treatment and the hospital. Furthermore, when confronted with a larger amount of data, we can use the cloud architecture described in this paper to perform distributed computing.

II. LITERATURE SURVEY

We scrutinized a variety of research articles while developing our project, and they helped us acknowledge our alternatives and potential solutions. They also helped us understand the technical and mathematical knowledge that would be useful.

Wenbin Yue et al [1] performed a study on popular recommendation techniques and their applications in healthcare. An overview of three well-known recommendation techniques, namely content-based, CF-based, and hybrid methods, is provided. It states several challenging issues of health RS are highlighted, which should be handled efficiently for future health RS design. In a content-based RS, new items will be recommended to a user based on content features that are similar to the items on which this user has acted. The user's explicit feedback (rating) and implicit feedback (browsing/purchasing history) are usually used to determine whether he likes the item. Model-based CF recommendation algorithms construct a model and then predict the unknown information by training it on the user-item rating matrix. Because this is similar to traditional classification methods in machine learning, many classification models, such as decision trees and Bayesian classifiers, can be generalized to CF scenarios. To improve prediction accuracy, hybrid filtering methods

combine the benefits of content-based filtering and CF methods to process different data sources.

S.Vijiyarani et al [2] examined how data mining techniques are used to predict various types of diseases. This paper reviewed research papers that focused on predicting heart disease, diabetes, and breast cancer. The prediction of heart disease was discussed using machine learning algorithms such as Naive Bayes, K-NN, and Decision List. When compared to other algorithms, the Naive Bayes algorithm has the highest classification accuracy. The author concluded that Naive Bayes correctly classifies 74% of the input instances. Following that, we will talk about breast cancer prediction. It is carried out using a variety of data mining techniques, including C4.5, ANN, and fuzzy decision trees. Using C4.5, the author discussed and resolved the problem's issues and algorithms. Using ANN, the author concluded that the network is trained to have consistent accuracy over time and good performance. Finally, we discuss diabetes prediction, where the author discovers overfitting and overgeneralization behavior of classification using a homogeneity-based algorithm. The author predicts class accuracy using a genetic algorithm.

Sanjeev Kumar et al [3] Sharma proposed a hybrid framework for ranking drugs. Practitioners conduct research and order laboratory tests. During the process, information about this patient is entered into the system as a new case. The system will process the new information and extract patient characteristics. The patient's problem is used to make a diagnosis. To determine which symptom-drug classifier to use, the diagnosis is matched to a specific disease category in the system. The new case's patient features are fed into the classifier to predict which drug cluster/clusters to use for this patient. The ranking module will rank the drugs in each cluster to create the final recommendation list.

Sun et al. [4] proposed analyzing EMR records to detect typical treatment regiments and measuring (quantitatively) the effectiveness of those regimens for specific patient cohorts. The authors compare the similarity of treatment records in the EMR, use Map Reduce Enhanced Density Peaks based Clustering to group similar ones to treatment regimens, extract semantically meaningful information for the doctor, and estimate the treatment outcome for a patient cohort for a typical treatment regimen. The results of an empirical study using this approach show that the patient's effective rate and cure rate both increase.

Naveenkumar S. et al [5] suggested a model that predicts the disease of patients/users based on the symptoms that the user provides the system. The Nave Bayes Classifier is used to make intelligent health predictions. Because medical data is increasing at an exponential rate, they used Nave Bayes algorithms to identify patient data. This required the processing of existing data in order to predict the exact disease based on symptoms. In the proposed methodology, required clinical symptoms-related information can be obtained from historical knowledge by planning datasets using the Nave Bayes algorithm. However, they were unable to achieve a higher level of accuracy by using only one machine-learning algorithm.

Divya Gopu [6] analyzed the use of Data mining in the field of Medical health care. These data mining techniques can also be applied in research and education. Data mining is a branch of computer science that uses existing data in the medical field to predict disease occurrence. The paper conducts a survey on how data mining techniques, in conjunction with machine learning, are used to predict diseases based on user symptoms. According to the findings, the most important algorithms are support vector machines, neural networks, logistic regression, random forest, and so on. The accuracy of neural networks is high if proper training is provided by the datasets.

Shratik J. Mishra et al [7] explored how data mining techniques can be used for the prediction of different kinds of diseases based on the symptoms selected by users. The system is divided into two parts in this case: the admin module and the user module. The administrator is in charge of data preprocessing and training the system to generate disease prediction models. For training the datasets, a special algorithm known as the ID3 algorithm is used. ID3 is an abbreviation for Iterator Dichotomiser 3. The ID3 algorithm is primarily concerned with the entropy of each attribute, the information gained, and the entropy of the entire dataset. The attributes with the lowest entropy value are chosen as the root node. With the subsets, new attributes are discovered, and a decision tree is formed.

Jionglin Wu et al [8] measured 3 different approaches to predict heart failure diagnosis. The direct application of Boosting performed similarly to the logistic regression model traditionally used in biomedical research, and both were superior to the direct application of SVM based on AUCs determined for model validation purposes. If the goal is to build a simple yet effective model, this suggests that boosting and logistic regression may be better options. They demonstrated that applying machine learning techniques to longitudinal EHR data predicts future diagnoses of a disease that is normally difficult to detect.

K.Vembandasamy et al [9] implemented heart disease prediction using machine learning algorithms such as the Naive Bayes classifier. This paper examines the various data mining techniques that can be applied to healthcare services. The author has discussed the various dataset types that can be used in various fields of medical and healthcare services. The methodologies for data preprocessing and probabilities used in the algorithm are clearly explained. The parameters of heart disease are specified, and dataset visualization is demonstrated. The disadvantage is that maximum accuracy in prediction is not achieved.

M. Thiyagaraj et al [10] discussed data mining technique for kidney-related diseases. Kidney disease is a significant problem in low-income countries such as India. Kidney disease accounts for 60% of all deaths worldwide. Other chronic diseases that can be caused by kidney disease include high blood pressure, diabetes, anemia, weak bones, and nerve damage. Healthcare fraud and abuse can be detected with the help of data

mining. It assists physicians in determining the best treatment for a specific disease. It can generate quick analysis reports, improve operational efficiency, and lower operational costs. There are also some drawbacks, such as data ownership issues, privacy and security concerns for human data administration, and so on. Various algorithms are used at various stages of disease analysis and prediction.

III. PROPOSED WORK

There are several approaches to disease prediction. Therefore, the smart healthcare system helps with the prediction of common diseases. In some situations, you or a family member may require immediate medical treatment, but doctors may not be accessible due to unanticipated events, or we may not be able to find the right doctor for the care. We will try to include a smart online healthcare system in our project to address this issue. Patients may access quick assistance regarding their medical issues through this web-based application.

A. Objective

1. To predict various diseases through symptoms

2. To recommend solutions for the disease predicted

3. To learn different Machine learning algorithms

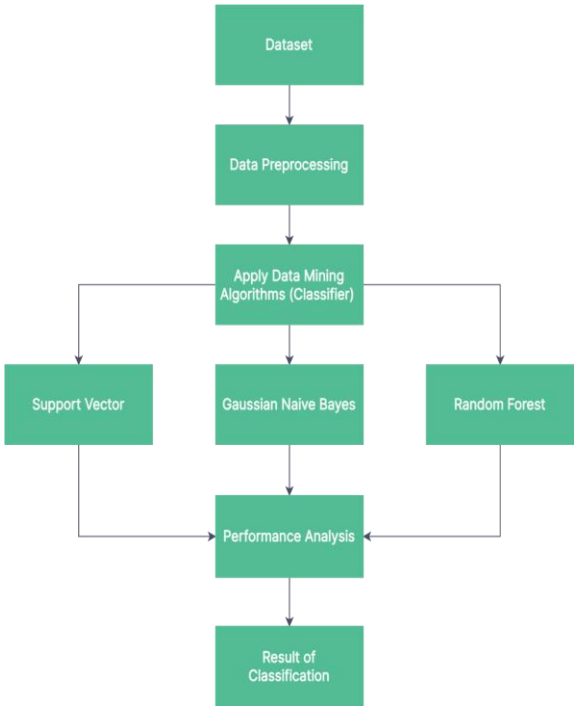

Fig 1. Block diagram for the proposed method

The first step in addressing any machine learning challenge is to prepare the data. For this issue, we'll be using a dataset from Kaggle. Two CSV files—one for training and one for testing—make up this dataset. The dataset has 133 total columns, of which 132 reflect the symptoms and the final column provides the prognosis.

The most crucial phase of a machine learning project is cleaning. The quality of our machine learning model is determined by the quality of our data. Therefore, cleaning the data is always required before feeding it to the model for training. The target column, prognosis, is a string type and is converted to numerical form using a label encoder. All the columns in our dataset are numerical.

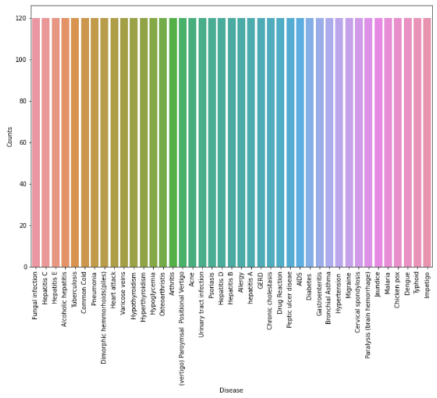

Fig 2. Diseases

The data may be used to train a machine-learning model once it has been collected and cleaned. The Support Vector Classifier, Naive Bayes Classifier, and Random Forest Classifier will all be trained using this cleaned data. To assess the models' quality, a confusion matrix will be used.

Once the three models have been trained, we will combine their predictions to forecast the illness from the input symptoms. This strengthens and improves the accuracy of our total forecast.

Fig 3. Data Flow Diagram

The next step in the process would be the recommendations that the users will get once the disease is detected. The recommendations will be provided for the diet one should follow in order to prevent the disease from becoming more serious. Do's and Don't will be recommended to spread awareness among the public. The users can also book an appointment from the Hospital recommended if needed in case of any emergency. The users' data will be stored in cloud storage so that they can access and keep a note of their Appointments and Prescriptions.

B. Methodology

The data is divided into an 80:20 structure, meaning that 80% of the dataset will be used to train the model and 20% of the data will be used to assess the model's performance. Under Machine learning, three algorithms were used for classifying and predicting the diseases i.e., SVM, Naïve Bayes, and Random Forest.

The Support Vector Classifier is a discriminative classifier, which means that it searches for the best hyperplane to divide the samples into distinct categories in hyperspace when it is given labeled training data. This algorithm is used in the initial stage for classifying the symptoms to predict the disease.

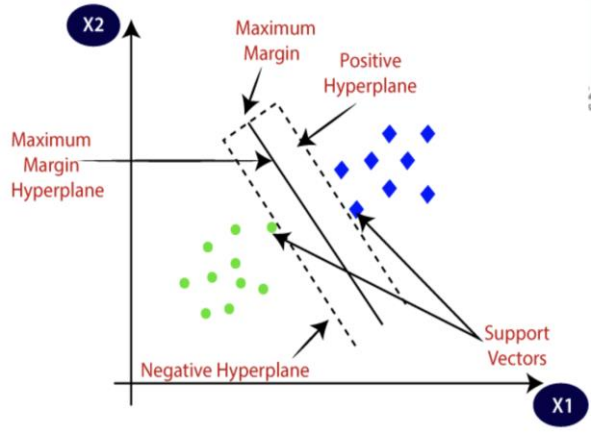

Fig 4. Diagram for Support Vector Classifier

The Naive Bayes algorithm is a classification method that is based on the Bayes theorem in predictive modeling and applies Bayesian techniques. The suggested smart healthcare recommendation system framework uses the "Naive Bayes classifier" data mining method to improve the prediction model. In order to pinpoint the precise symptom expectation, this system includes a bigger number of data indexes and features that are genuinely gathered from expert data.

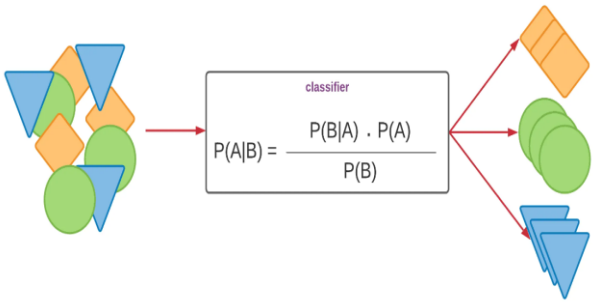

Fig 5. Diagram for Naïve Bayes Classifier

Random forest (RF) is a hierarchical grouping of base classifiers with a tree structure. Textual information often has several different aspects. There are many irrelevant characteristics in the dataset. For the classifier model, just a few significant features are informative. The RF algorithm selects the most essential relevant attribute based on a simple predetermined probability. It will be easier to classify the dataset because the accuracy of this algorithm is the highest.

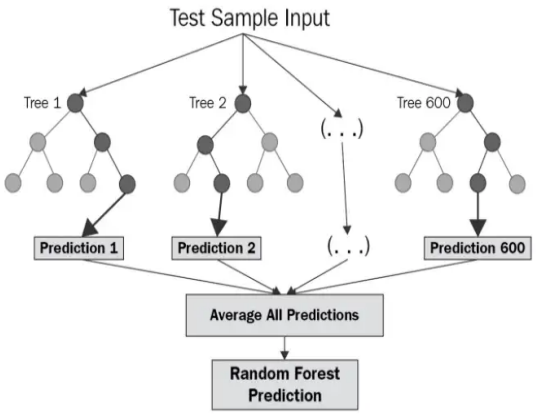

Fig 6. Diagram for Random Forest Classifier

IV. RESULTS AND DISCUSSION

The Random Forest classifier was used to create a confusion matrix on the test data, resulting in very high prediction accuracy. This classifier is known for its ability to handle complex relationships between features and avoid overfitting. It works by creating multiple decision trees and making a final prediction based on the average of the predictions made by all trees. This algorithm is simple to implement and has a good reputation for accuracy, as evidenced by the high prediction accuracy in this case. The Random Forest classifier is a valuable tool for solving problems in areas such as pattern recognition, classification, and regression.

A Support Vector Classifier (SVC) was used to create a confusion matrix on the test data. A confusion matrix is a tool used to evaluate the performance of the classifier, and in this case, the prediction accuracy was found to be very high. SVC is a popular machine learning algorithm that uses a boundary, called a hyperplane, to separate data points into different classes. The algorithm tries to find the hyperplane that maximizes the margin between the classes, meaning that it finds the line that is as far away from the closest data points in each class as possible. The SVC algorithm is particularly useful in problems with high-dimensional data, as it can effectively handle large numbers of features. The high prediction accuracy, in this case, indicates that the SVC algorithm is well-suited for this type of problem and can be trusted to make accurate predictions.

The Gaussian Naive Bayes classifier was used to create a confusion matrix on test data, resulting in high prediction accuracy. This algorithm uses Bayes' theorem and assumes that the features in the data are independent and follow a Gaussian distribution. It makes predictions based on the probabilities of each class given the data's features. The Gaussian Naive Bayes classifier is commonly used for text classification, sentiment analysis, and spam filtering, and has proven to be an effective tool in these applications. The high prediction accuracy, in this case, highlights the capability of this algorithm to make accurate predictions.

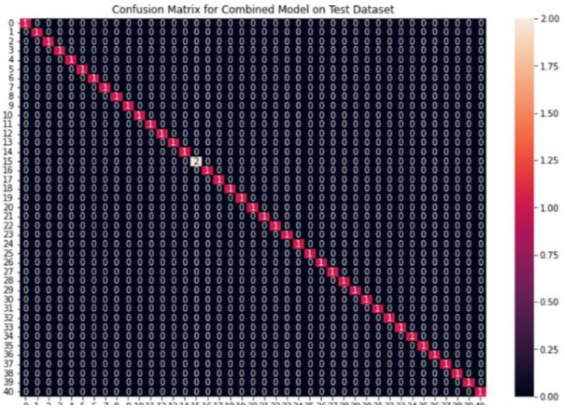

Fig 7. Confusion Matrix for the combined model

The output indicates that all machine learning algorithms demonstrate good performance with high mean scores after k-fold cross-validation. To improve the model's robustness, the predictions of the three models can be combined by taking the mode. This approach increases the accuracy of predictions on new, unseen data even if one of the models is incorrect. To accomplish this, the three models should be trained on the train data, assessed using a confusion matrix, and then combined. The combined model accurately classifies all data points. To complete the implementation, a function can be created that takes symptom inputs separated by commas and outputs the predicted disease using the combined model based on the symptoms provided.

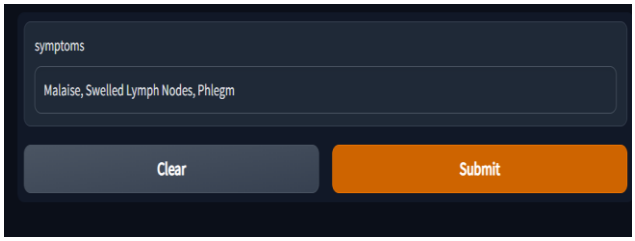

Fig 8. Symptoms input screen

On the input screen, the user must enter the symptoms that are bothering them; they can enter as many as they want before clicking the submit button to receive the prediction.

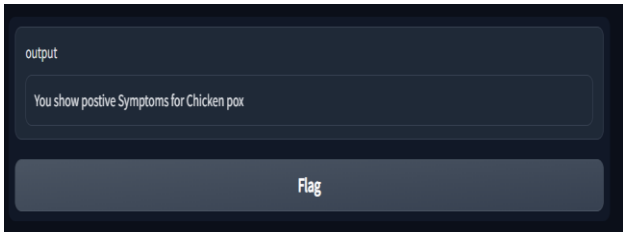

Fig 9. Result Screen

The screen above depicts the outcome of the prediction based on the symptoms entered, as well as the combined efficiency of all three algorithms for maximum accuracy.

V. CONCLUSION

The World Economic Forum reports that poor access to quality healthcare results in 6 million deaths annually in developing countries. A substantial amount of clinical data has been gathered over the years, resulting in a large pool of digital information for patient-centered decision-making. However, this information is often dispersed across various sites, making it challenging for users to find relevant information. To address this, health recommender systems (HRS) have been introduced to provide better medical recommendations. Our proposed HRS is intelligent, utilizing machine learning algorithms like the support vector classifier, Gaussian naive Bayes classifier, and random forest

classifier. By considering the mode of prediction from all three models, we aim to make more precise predictions based on new data. Unlike existing solutions, our HRS offers better personalization, with more detailed recommendations and enhanced user understanding of health.

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Digital Signature Analysis using Siamese and various Deep Learning Networks

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Abstract—**This paper focuses on the application of deep learn- ing models, specifically Siamese networks and popular architec- tures in the field of signature analysis. The aim of this research is to explore the effectiveness of these models in extracting relevant features from signature images and perform classification tasks with high accuracy. The results are analyzed and compared to establish the best-performing model for signature analysis. Signatures serve as unique identifiers for individuals and are widely used as a professional element in various industries, banks, and secret organizations. Accurately identifying signatures is crucial, as forging them can cause significant inconvenience or trouble. This paper explores the latest advancements in digital signature identification. The main focus of this research is on the application of Siamese Neural Networks (SNNs) in signature analysis. SNNs consist of two identical networks for two input vectors, which are joined at a single output vector. This weight- shared twin network can be trained to learn a feature space by placing similar observations close to each other. In this study, an SNN model is created and trained on a selected dataset containing original and forged signatures. Additionally, other deep learning models, such as Convolutional Neural Networks (CNNs), VGG16, and ResNet50, were also created and tested to increase the accuracy of the output and understand their behavior. The results showed that the SNN model outperformed the other models in terms of accuracy. The paper concludes by analyzing the quantitative and qualitative aspects of the models used, providing valuable insights into their performance and behavior. This study advances the field of deep learning techniques for handwriting-based biometrics and has numerous potential applications in fields such as forensics, security, and authentication.**

Index Terms*—*Signature analysis, Siamese Neural Networks (SNNs), Convolutional Neural Networks (CNNs), VGG16, ResNet50, Quantitative and qualitative analysis, Performance and behavior

I. INTRODUCTION

In today's world, the advancement of deep learning has opened up new opportunities for research and development in various fields. The Convolutional Siamese Network, being a subset of machine learning that is based on Artificial Neural Networks, is a complex model that can be used to analyze and compare signatures in a systematic and methodical manner. In this research, we aimed to compare the performance of four different Convolutional Neural Network (CNN) models in identifying handwritten signatures. The models we used were VGG-16, ResNet50, Inception-v3 and a Siamese NN model. Our goal was to determine which model was most effective at recognizing similarities in text data within images. After comparing the results, we found that the ResNet50 model performed the best with an accuracy of 82.3% when tested on a dataset of 300 images and 86% when tested on a dataset of 140 images.

A. Siamese Network

The Siamese network operates by having two identical sig- nature networks, which are actually twin Convolutional Neural Networks (for two separate signatures) with the Rectified Linear Units (ReLU) activation function as the input layer. The twin CNNs have the same weights and configuration, and the ReLU activation function introduces non-linearity for faster computation.

During the pooling of the layers, the dimensions of the

layer are reduced step by step, grouping common entities into one single entity, reducing the dimensions of the layer and eliminating unnecessary duplicates. The rest of the paper will cover related work, methodology, results, and conclusion

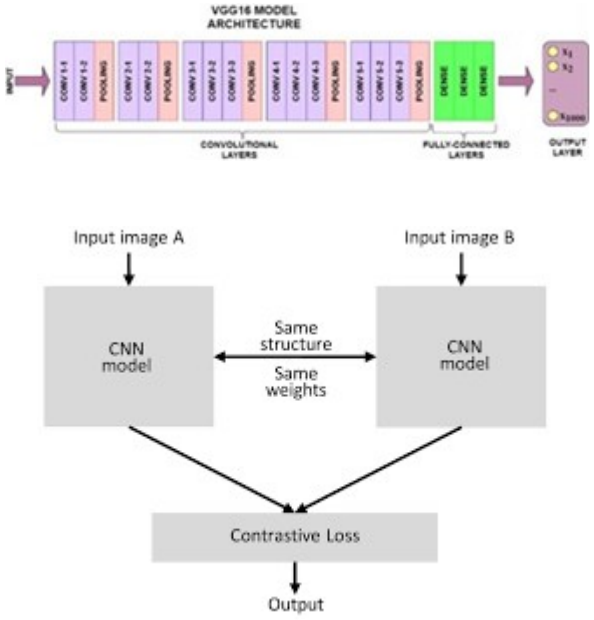

Fig. 1. Siamese Network

B. ResNet50

ResNet50 is a deep convolutional neural network architec- ture that is trained to recognize images. It was introduced in

2015 by Microsoft and won the ImageNet Large Scale Visual Recognition Challenge (ILSVRC) that year. ResNet50 is a residual network, meaning it uses residual blocks to allow for deeper network architectures that are still able to be optimized effectively. ResNet50 has 50 weight layers, hence its name, and is commonly used for a variety of computer vision tasks such as image classification, object detection, and semantic segmentation. The model has been pre-trained on a large image dataset, so it can be easily fine-tuned for specific

tasks or fine- tuned further for even better results.

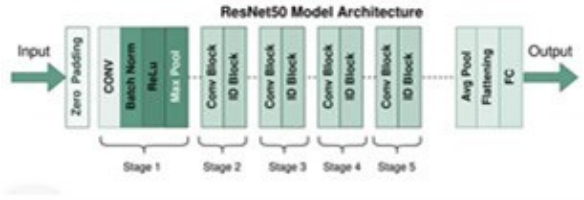

Fig. 2. ResNet50

C. VGG16

VGG16 is a popular deep learning model architecture that was developed by the Visual Geometry Group at the University of Oxford. The model was introduced in 2014 and it was used for the ImageNet Large Scale Visual Recognition Challenge (ILSVRC) that same year. VGG16 is named after its structure of having 16 layers, which includes 13 convolutional layers and 3 fully connected layers. The model uses a series of small convolutional filters to detect and extract features from images, which are then passed through multiple layers to learn and identify patterns in the data. This architecture is characterized by its use of simple, yet deep and wide, convolutional layers, which makes it well-suited for image classification tasks. The VGG16 model has been widely used in computer vision and has been pre-trained on a large dataset, making it easy to fine- tune for other tasks.

D. InceptionV3

Inception-v3 is a convolutional neural network (CNN) architecture developed by Google for the ImageNet Large Scale Visual Recognition Challenge in 2015. It is a deep learning model designed to perform image classification and recognition tasks. The network was designed with an empha- sis on scalability and modularity, making it well suited for deployment on large-scale image recognition problems.

Inception-v3 is a deep network that consists of many layers, including convolutional layers, pooling layers, and fully connected layers. It utilizes the concept of inception modules, which are multi-branch CNN blocks that extract information from an image at multiple scales and resolutions. This allows the network to learn more diverse and robust features, resulting in improved performance on image recognition tasks.

Inception-v3 has been trained on a large dataset of images, and its pre-trained weights are publicly available for transfer learning. This allows researchers and practitioners to fine-tune the model for their own image recognition tasks, making it a popular choice for many computer vision applications.

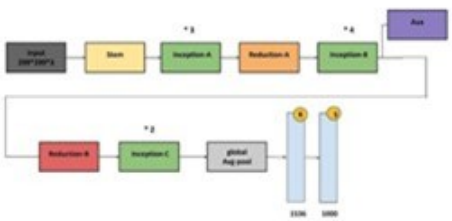

Fig. 4. InceptionV3

II. RELATED WORKS

A deep learning model for signature verification was created with two classes (real and forgery) for each user, resulting in 60 classes to predict. The model [1] uses CNNs to learn signatures and achieved an accuracy of 99.7%. It can be used in government offices for approval or authentication but the fully connected layer structure needs improvement.

The study [2] used deep convolutional neural network and SVM classifier to extract features and achieved high accuracy in recognizing Japanese, Italian, Dutch, and Chinese signatures from three datasets (SigComp2011, SigWiComp2013, and Sig- WIcomp2015). The results showed 100% accuracy for some Japanese users, and 9 out of 10 Chinese users were recognized

The Dutch signatures had an average accuracy of 96.4% for five users. The study suggests exploring other language datasets and feature techniques for future improvement.

In the proposed method [3], a neural network was constructed by optimizing some existing neural networks. The method used a data structure tree along with nodes similar to the human eye's neurons for pattern recognition. The steps involved were preprocessing, feature extraction, and neural network training.

The paper [4] proposed a CNN-Siamese based model for online signature verification. The model addresses the chal- lenges of one-shot learning and accurately learning intra- personal variations of signatures. Experiments were conducted on MCYT-330 and SVC datasets. The proposed model showed high accuracy on SVC dataset, making it suitable for real- time applications. The model was tested with varying number of samples and demonstrated better performance than recent baseline models. The results show the capability of the model to achieve excellent performance in online signature verifica- tion.

The authors of this paper [5] re-trained the classification layer of a pre-trained GoogleNet model using transfer learning with a collected signature dataset to successfully improve its accuracy. The experimental results showed a precision of

95.2% on primary signature image data.

A signature verification system [6] has been proposed and demonstrated significant results on Persian signature dataset. The accuracy of the system improved by 9.6% when 22 genuine images were used instead of 9. The False Acceptance Ratio decreased by 7.78% and the False Rejection Ratio by

14.66% with increased number of genuine images during training. The proposed system is based on Rezai et al.'s architecture and includes image processing and Autoencoder to generate forged images. The optimized features lead to a slight improvement in accuracy and reduction in FAR and FRR ratios.The input size limitations caused overfitting on smaller datasets leading to FAR issues.

In this paper [7], the authors proposed a system for identifying forged handwritten signatures using deep learning and CNNs. Five different classification models were compared including VGG-16, ResNet50, Inception-v3, Xception, and a custom CNN model. After testing on datasets of 300 and 140 images, the authors concluded that ResNet50 had the highest accuracy of 82.3% and 86%. Future work will focus on further analysis and classification of the characteristics of handwritten signatures using the best performing model, ResNet50.

III. FUNDAMENTAL OF DEEP LEARNING

Deep learning is a subfield of machine learning that uses algorithms inspired by the structure and function of the brain, called artificial neural networks, to process and analyze large amounts of complex data. It enables computers to learn and make decisions on their own, without being explicitly programmed. The fundamental idea behind deep learning is to use multiple layers of artificial neurons, each layer building upon the previous one, to perform hierarchical representations of the input data. The layers in a deep learning model are trained using large amounts of labeled data, allowing the model to learn patterns and relationships in the data, and make predictions based on those patterns. Deep learning algorithms have been successfully applied to a variety of tasks such as image and speech recognition, natural language processing, and autonomous decision-making systems.

A. Convolutional Neural Network (CNN)

Convolutional Neural Networks (CNNs) are a type of deep learning technique used for computer vision tasks such as image classification, object detection, semantic segmentation, and image generation. They are designed to process grid- like data such as images and are inspired by the structure of the visual cortex. The main building block of a CNN is a convolutional layer, which performs a convolution operation on the input image to create a feature map that contains activations for different features. CNNs also incorporate pool- ing layers for down-sampling and fully connected layers for final classification or regression. The weights of the CNN are learned through the backpropagation algorithm, updating weights based on errors between predictions and ground truth labels. CNNs have proven successful in image classification tasks and their architecture can be optimized using techniques such as transfer learning and data augmentation. Siamese Network and various Deep Learning model used in this paper is primarily based on CNN.

B. Dataset- Handwritten Signatures (kaggle)

The dataset consists of 60 signatures, 30 of which are genuine signatures created by the respective signatory and the other 30 are forged signatures made by someone else. Each person has 5 genuine and 5 forged signatures. The naming of the images follows a specific convention: ”NFI” indicates that it is a signature image, followed by the signatory number (two digits), the forger number (two digits), and the date of the signature (four digits). For example, ”NFI-00602023” represents a forged signature of person 023 created by forger 006 on 2023. ”NFI-02103021” represents a genuine signature of person 021 made by the same person on 021.

Fig. 5. Arrangement of signatures via id

Fig. 6. Genuine and Forged Signatures

IV. RESULT AND DISCUSSION

The signature verification system trains the dataset in batches and calculates the distance metric during the process. During signature verification, the calculated distance metric is compared to a constant threshold value to determine the authenticity of the signature. The used distance metric is the Euclidean distance, which is incorporated into the loss function. It was discovered that using an adaptive threshold during the final stage of preprocessing significantly improved the signature verification process. The results obtained from the verification process, based on the distance value, improved the accuracy of classifying the signatures as authentic or forged. The system’s accuracy was found to be 76% when tested on the cedar dataset.

Fig. 7. Predict the Genuity of a Signature

A. FUTURE SCOPE

In the future, our aim is to transform this project into a tool that can be integrated with various software for authentication purposes or perhaps as a browser extension. Before making it accessible to a wider customer base, we will explore all possible options. The future of our website lies in utilizing social media content effectively, as it attracts more followers. Thus, bloggers need to be mindful of how they can use their

Fig. 8. Sample Output

```
# pprint(accuracy_list)

[[68.55555555555554, 0.010436208734754473],
 [72.44444444444444, 0.08142854067962617],
 [73.77777777777777, 0.06229071732610464],
 [72.77777777777777, 0.060908406509555215],
 [76.55555555555556, 0.15184751071035865],
 [69.77777777777779, 0.13817599799484018],
 [73.33333333333334, 0.2994436828792096],
 [70.33333333333334, 0.19811320543289188],
 [69.11111111111111, 0.24311239972710613],
 [74.11111111111111, 0.43224880241209269 4],
 [72.77777777777777, 0.4720932865142823],
 [64.33333333333333, 0.19396199315786367],
 [72.44444444444444, 0.4809536105394364],
 [71.33333333333334, 0.30941104955971244],
 [67.88888888888889, 0.3910220739245415],
 [68.44444444444444, 0.38352143615484247],
 [68.22222222222223, 0.41022167623043065],
 [72.11111111111111, 0.813147156238556],
 [70.22222222222223, 0.6930586102604868],
 [70.55555555555556, 0.9204366180300714],
 [70.33333333333334, 0.7697121573239566],
 [69.88888888888889, 0.8593933169543745],
 [69.55555555555554, 0.39814770512282854],
 [69.0, 0.38125730667263275],
 [69.11111111111111, 0.41896832998842 01]]
```

Fig. 9. accuracy list of models

content to maximize their social media presence and achieve their desired goals.

Recently, many large media companies have entered the

blogging arena, seeking to increase their sales. Furthermore, search engines like Google favor established brands and websites with high domain authority, making it challenging for small businesses to compete. To overcome this, small and medium companies should position themselves as experts in their field through high-quality content, attracting more customers. As a result, they may choose to hire professional blog writers to produce content for well-established platforms.

V. CONCLUSION

In this paper, we utilized the DL models along with Convo- lutional Siamese Network, a type of Artificial Neural Network, for signature verification. The model trains on the dataset to identify the unique patterns in signatures and determine if they are authentic or not. There is significant potential for using such models in future applications for prediction and verifi- cation purposes. This project will inspire more competition and research in the field to improve the accuracy of neural network models, making them more suitable for solving real- world problems.

We have created a highly effective signature verification

system that incorporates Image Processing, a popular and widely used domain for applications such as image detection and fingerprint verification. This system reduces human error in signature verification and improves accuracy, efficiency, and speed. The system is user-friendly, requiring no prior knowledge of Image Processing. If adopted by banks or companies, this system will provide customers with a greater sense of security and trust. Thus, we propose that this system brings about a change in the way banks, companies, and others handle signature verification.

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Livestream video liveliness detection for Attendance Tracking

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Abstract— Automatic Face Recognition (AFR) has created a revolution in this changing world. It has ensured us with more safety of our data. Smart attendance using Face Recognition comes handy in day to day activities. The purpose of this project is to build attendance management system based on face recognition, Face recognition is an important application of Image processing owing to its use in many fields. Identification of candidate in an organization for the purpose of attendance is an application of face recognition. Managing attendance can be a tedious job when implemented by traditional methods like calling out roll calls or taking a student's signature. To solve this issue, a smart and authenticated attendance system needs to be implemented. Various algorithms and techniques has been used for improving the performance of face recognition. The concept we are using here is Open CV. We are also using Raspberry Pi and camera module to take image and storing them in database. This way the attendance will be automated.

Keywords—component, formatting, style, styling, insert (key words)

I. INTRODUCTION

Liveness detection is the ability of a system to detect whether the obtained biometrics is real or fake. Liveness check uses algorithms that analyse data after they are collected from biometric scanners and readers to verify if the source is coming from a fake representation. A facial recognition system is computer app which takes multiple photos of the person and it stores the data of face of that person and when the person again comes in front camera, it is able to verify that person. We give the basic information of student like, roll no., name. The method we are using is Open CV. It takes around 100 images of that person and stores the data. Now a days attendance is a very important part for student as well as teacher of an organization. The person in photos and in real time videos can be identified using facial recognition systems. It is a tier of biometric security. Other types of biometric security are voice, fingerprint and eye recognition. In real time we can use it to unlock phones, find missing persons, aid forensic investigations, help the blind, etc. The main aim of this project is to build an attendance system based on face recognition. The Attendance System using Face – Recognition is a replacement way method for the traditional way of marking attendance. Attendance systems using face recognition provide authenticated data also proxy data entering chances are much less as compared to other systems. In the proposed system, at the time of enrolment, video is captured and images of students are stored through facial detection, recognition and recorded in a database. In real time, video of a student entering a classroom will be captured, face will be detected and matched with the dataset images, name & roll number of the present student will be displayed along with updating the attendance.

II. RELATED WORK

Face is a unique identity of any person. It is used in many domains and is the fastest growing research area. Many systems are being proposed for attendance management. One of the systems [1], generates a smart attendance system which uses Quick Response (QR) code to track & record the attendance. Students and professors are given a unique QR code, at the beginning of the course, they are required to scan their QR code using a QR reading device. Attendance of students whose QR code is scanned will be recorded. This system is responsive to mobile phones and different computer systems.

A reliable attendance monitoring system based on biometric is developed, which is used to monitor the presence of students in a more effective way. It reduces the chances of marking proxy attendance and also reduces the problems like missing papers of attendance, which occur during marking attendance manually. Teachers have a small fingerprint scanner with them and students will press their finger on it to mark their attendance. Attendance management systems using Iris recognition [3], are more reliable and accurate because of the inner characteristics of iris like uniqueness, time invariance, immovability etc. The Iris pattern of each student is used for attendance. By using the camera live images of student iris are captured and stored in a database. Gray coding algorithm is used for measuring radius of iris and then that radius is matched with the radius of each student in the database and attendance of that student will be marked.

In one of the proposed models, two databases (face database & attendance database) are used. During enrolment, facial images of students are stored into the face database. The camera captures the images of the classroom, the images get enhanced and the attendance is marked in the attendance database after face detection & recognition. AdaBoost algorithm and Principal Component Analysis (PCA) are used for face detection and face recognition respectively. The LBPH algorithm [5], can recognize the front face as well as side face with approximate accuracy of 90%. The flow of this algorithm starts with dividing the image into blocks and calculating the histogram of each block, then combining the histogram of all the blocks into a single histogram. This histogram has some value which is used for comparing later with the real time image histogram for identification. Multiple faces can be detected in a single detection hybrid process of Haar cascade and Eigenfaces method are used [6]. This process is able to detect multiple faces with an

accuracy of

91.67%. By using this method, we can recognize faces during day and night time and are also able to detect 15 degrees side facing faces. By using a webcam this process can successfully perform at more than 200 cm.

One of the methodologies [7], considers accuracy rate, stability of system in actual time video processing, truancy of system and interface setting of the face recognition system. Face detection and recognition are two main parts of face recognition. Feature extraction is done by the LDA (Linear Discriminant Analysis) method. This model takes help of methods such as geometric Feature method, Subspace analysis method, Neural Network methods, Support Vector Machine (SVM) method to develop their face recognition algorithm. Experimentally this model of video face recognition system gives an accuracy rate up to 82%

Face Recognition-based Lecture Attendance System proposed a system that takes the attendance of students for classroom lecture. The system takes attendance automatically using face recognition. However, it is difficult to estimate the attendance precisely using each result of face recognition independently because the face detection rate is not sufficiently high. In this paper, we propose a method for estimating the attendance precisely using all the results of face recognition obtained by continuous observation . The Attendance management is the significant process that were carry out in every institute to monitor the performance of the student. Every institute does this is its own way. Some of there institute use the old paper or file-based system and some have adopted strategies of automated attendance system using some biometric technique. A facial recognition system is a computerized software which is suited for determining or validating a person by performing comparisons on patterns based on their facial appearances. In this system OpenCV & Face Recognition libraries were used which are one of the popular libraries for face detection by using these libraries system first capturing the student photos and storing them into the database which were further used for the training purpose after that at the time of attendance when system camera get on system will detect the faces that were present in the frame the faces were detected by using HOG i.e. (Histogram of Oriented Gradients) which were carrier out in the system. after that if image that were present in the frame is tilted then Face Landmark Estimation algorithm will be carried out and face will be transformed to be as close as possible to perfectly cantered.

III. IMPLEMENTATION

Image acquisition:

Image is acquire using a high definition camera which is placed in the classroom or lab. This image is given as an input to the system.

Dataset Creation:

Dataset of student is created before the recognition process. Dataset was created only to train this system we are going to create a dataset of the whole class which involve their name, roll number department and images of the student in different variations. Whenever we register student's data and image in our system to create dataset, deep learning applies to each face to compute 128-d facial features and store in student face data file to recall that face in recognition process. This process is applying to each image taken during registration.

Face Detection and Extraction:

Face detection is important as the image taken through the camera given to the system, face detection algorithm applies to identify the human faces in that image, the number of image processing algorithms are introduced to detect faces in an image and also the location of that detected faces. We have used HOG method to detect human faces in given image.

Face Positioning:

There are 68 specific points in a human face. In other words, we can say 68 face landmarks. The main function of this step is to detect landmarks of faces and to position the image. A python script is used to automatically detect the face landmarks and to position the face as much as possible without distorting the image.

Face Encoding:

Once the faces are detected in the given image, the next step is to extract the unique identifying facial feature for each image. Basically, whenever we get localization of face, the 128 key facial point are extracted for each image given input which are highly accurate and these 128- d facial points are stored in data file for face recognition.

Fig 1. Activity Diagram of the

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systems [1], generates a smart attendance system which uses Quick Response (QR) code to track & record the attendance. Students and professors are given a unique QR code, at the beginning of the course, they are required to scan their QR code using a QR reading device. Attendance of students whose QR code is scanned will be recorded. This system is responsive to mobile phones and different computer systems. A reliable attendance monitoring system based on biometric is developed [2], which is used to monitor the presence of students in a more effective way. It reduces the chances of marking proxy attendance and also reduces the problems like missing papers of attendance, which occur during marking attendance manually. Teachers have a small fingerprint scanner with them and students will press their finger on it to mark their attendance. Attendance management systems using Iris recognition [3], are more reliable and accurate because of the inner characteristics of iris like uniqueness, time invariance, immovability etc. The Iris pattern of each student is used for attendance. By using the camera live images of student iris are captured and stored in a database. Gray coding algorithm is used for measuring radius of iris and then that radius is matched with the radius of each student in the database and attendance of that student will be marked. In one of the

proposed models [4], two databases (face database & attendance database) are used. During enrolment, facial images of students are stored into the face database. The camera captures the images of the classroom, the images get enhanced and the attendance is marked in the attendance database after face detection & recognition. AdaBoost algorithm and Principal Component Analysis (PCA) are used for face detection and face recognition respectively. The LBPH algorithm [5], can recognize the front face as well as side face with approximate accuracy of 90%. The flow of this algorithm starts with dividing the image into blocks and calculating the histogram of each block, then combining the histogram of all the blocks into a single histogram. This histogram has some value which is used for comparing later with the real time image histogram for identification. Multiple faces can be detected in a single detection hybrid process of Haar cascade and Eigenfaces method are used [6]. This process is able to detect multiple faces with accuracy.

A facial recognition system is a computerized software which is suited for determining or validating a person by performing comparisons on patterns based on their facial appearances. In this system OpenCV & Face Recognition libraries were used which are one of the popular libraries for face detection by using these libraries system first capturing the student photos and storing them into the database which were further used for the training purpose after that at the time of attendance when system camera get on system will detect the faces that were present in the frame the faces were detected by using HOG i.e. (Histogram of Oriented Gradients) which were carrier out in the system. after that if image that were present in the frame is tilted then Face Landmark Estimation algorithm will be carried out and face will be transformed to be as close as possible to perfectly centered. After that system will encode all the images that were present in the database as well as the face which were detected in the frame. For performing encoding Deep Conversional Neural Network algorithm will get carried out & for each face 128 measurements were generated then the measurements of the face that were detected in frame it get compared with the measurements of the faces that were present in the image which is earlier stored in the database. So at last by using simple liner SVM algorithm system will find the person in database of know peoples (i.e. capture at the starting of the project) who has closest measurements to the image that were detected by camera. After finding perfect match system will generate the name and date & time & present mark and store the entry in CSV file. Which were further uploaded on the database.

IV. RESULT

The main working principle of the project is that, the video captured data is converted into image to detect and recognize it. Further the recognized image of the student is provided with attendance, else the system marks the database as absent. The model will identify the face of the person in front of the camera and check with the database of images and mark the student accordingly. This will help in automating the entire process of taking attendance manually.

V. FUTURE SCOPE

The future scope of the project can be integrated with the hardware components for example GSM through which a monthly list of the defaulter students can be sent to the mentor. Additionally, an application can be developed to help students to maintain a track of their attendance. It can also be used in offices where a large group of employees sit in a hall and their attendance will be marked automatically by capturing a video but for this the accuracy of the recognition needs to be improved.

VI. CONCLUSION

In order to obtain the attendance of individuals and to record the entry and exit, the proposed system can be used. The system can widely be used in the institutions/organizations. The proposed system takes attendance of each student by continuous observation at the entry and exit points.The proposed system has a much simpler and efficient algorithm. The system is simpler because of use easy and user- friendly Framework. It has a more efficient algorithm along with much less complex database configurations. The system is more efficient because of being platform independent. Attendance management system using face recognition is designed to solve the issues of existing manual systems. To avoid proxy attendance, security of Dataset and Database is important.by this system manual attendance can be eliminated and time is saved. As this system does not require touching anything so risk of germs transmission is also eliminated.

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A Study on Deep Learning Model Quantization Techniques for Edge Devices Research Scholar

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Abstract—**Deep learning (DL) models have attained significant recognition in several domains such as speech recognition, object detection, amongst others. However, deployment of such models on edge devices, such as smartphones and embedded systems, faces challenges such as limited computational resources, memory constraints, and power consumption. In order to overcome these challenges, DL model quantization techniques have been proposed to condense model size and computational complexity, while preserving its accuracy. This study presented a thorough analysis of the most recent developments in DL model quantization approaches for edge devices, and it also categorized quantization techniques into two types, i.e., post training quantization and quantization-aware training. Moreover, a comprehensive examination of various quantization techniques are reviewed, thereby highlighting their pros and cons. It also compared the accuracy of different quantization methods across different DL models. In addition, this study discussed research challenges and future directions for DL model quantization for edge devices. The purpose of this study was to offer researchers and practitioners a comprehensive understanding of DL model quantization techniques.**

Keywords—Deep Learning, Deep neural networks, TensorFlow, Quantization.

I. INTRODUCTION

Deep learning (DL) is a field within machine learning (ML) that specializes in designing artificial neural networks composed of multiple layers for identifying patterns in big data sets. This concept is based on the structure and operations of the human brain that can be used to solve challenging tasks, namely image classification, natural language processing, and decision-making. DL algorithms are trained through massive amounts of data and iterative tuning of parameters, allowing them to learn and make decisions on their own without explicit programming. Artificial neural networks (ANNs) with several hidden layers, often known as deep neural networks (DNNs), are utilized in DL. The goal of DL is to allow artificial systems to learn from vast amounts of data and make decisions without explicit programming, by mimicking the structure and function of the human brain [1].

Due to the extensive layer and neuron count in deep neural networks, the storage requirements and computational demands are significant. Following Table I displays some of the well-known deep convolutional neural networks (DCNNs) and their specifications for storage and computation (with multiply-accumulate (MAC) being the dominant operation in DNNs) [2].

TABLE I. SPECIFICATIONS OF DCNNS [2]

DCNN	Input Size	No. of convolutional layers	No. of FC layers	Total weights	Total MACs
AlexNet	227 × 227	5	3	61M	724M
OverFeat	231 × 231	5	3	146 M	2.8G
VGGNet-16	224 × 224	13	3	138 M	15.5G
GoogleNet (Inception-V1)	224 × 224	57	1	7 M	1.43G
ResNet-50	224 × 224	49	1	25.5 M	3.9G
SqueezeNet	224 × 224	26	0	1.2 M	1.7G
MobileNetV1	224 × 224	27	1	4.2 M	569M
ShuffleNet	224 × 224	49	1	1.4 M	140M

The vast number of parameters and calculations involved in DNNs pose challenges and result in slow processing using traditional hardware, particularly during inference when hardware resources are limited. To fully utilize the potential of DNNs, optimization of their processing is crucial.

Many real-world applications demand quick decision-making abilities similar to those of humans, such as detecting various objects on the road in real-time for a self-driving car [3]. In such scenarios, it is crucial to perform these computations locally in real-time. It is difficult to reduce the number of parameters while also developing a model that can work within the constraints of edge devices. Large models with a high number of parameters take longer to process inputs during inference, consume more energy, and require more storage compared to smaller networks with fewer parameters [4]. Lowering the complexity of the parameters and removing unnecessary connections can improve the ML/DL model's performance, reducing computation time and energy consumption. Before deploying the trained model to resource-constrained devices, it is therefore necessary to reduce its size.

II. REVIEW OF EXISTING LITERATURE

Gong *et al.* [5] and Wu *et al.* [6] employed K-means clustering on the weight values in the parameter space for quantization, which compressed the network weights after training and reduced storage and computational complexity8-bit quantization of the parameters has been shown to significantly increase speed with minimal loss of accuracy [7].

Suyog *et al.* [8] showed that limiting all parameters to 16-bit values can significantly reduce memory consumption and the number of floating-point operations while preserving precision.

In order to make deep neural networks smaller, S. Han *et al.* [9] devised a weight quantization approach that minimizes the number of bits required to encode the weight matrix. This approach reduces the amount of memory required by eliminating duplicate weights and consolidating multiple connections into a single weight. For instance, the weights are quantized into four bins in a DL model with four neurons in both the input and output layers, with each bin having the

same value. This results in smaller indices for each weight that must be stored during deployment on an embedded device.

It is possible to compress deep networks using network quantization by using binary, low precision, or quantization to lessen the number of bits desired to represent each weight. Traditional deep networks frequently employ floating-point precision for both inference and training, such as 32-bit precision, which results in significant computational costs, memory requirements, and storage needs. However, multiple research [10–12] have developed reduced bit-width models that, by quantizing both activations and weights, retain good accuracy.

Jacob *et al.* [13] introduced a quantization method that employs integer arithmetic for inference, which is more efficient than floating-point operations and requires fewer bits for representation. The authors designed a training step to preserve accuracy while substituting floating-point operations with integer operations. The trade-off between accuracy loss and on-device delay associated with employing integer operations is balanced by this method. In this method, integer arithmetic is used for inference and floating-point operations are used for training.

III. Deep Neural Networks

Deep neural networks (DNNs) are a type of artificial neural network that consists of several layers of interconnected nodes, or artificial neurons [14]. They are called "deep" because they have multiple hidden layers, which are responsible for learning complex representations of data. Each artificial neuron receives inputs, performs a computation on those inputs, and produces an output. The outputs of one layer of neurons are fed as inputs to the next layer, and so on, until the final layer produces the network's output.

The computations performed by each neuron are based on a set of learned weights, which are updated during training to diminish the error between the network's predictions and the actual target outputs. These weights are often updated using an optimization procedure like gradient descent, which moves the weights in the direction of the error reduction. The training process for DNNs typically involves large amounts of labeled training data and can be computationally intensive. However, the end result is a network that is capable of making accurate predictions on new, unseen data.

DNNs have proved effective in a variety of applications, including speech recognition, recommender systems, computer vision, natural language processing, robotics, and healthcare, among others. This is due to the fact that they can handle high-dimensional and noisy input data as well as automatically develop complicated representations of data. DNNs are a powerful tool in the field of ML, but they also have limitations, including the risk of overfitting and the need for large amounts of training data. In spite of this, study on them is still ongoing and are likely to play an increasingly vital role in many fields in the future [14].

A Deep Neural Network (DNN) architecture typically consists of the following components [15]:

- **Input Layer:** This layer receives the input data and passes it to the next layer.
- **Hidden Layers:** These are multiple layers in between the input and output layers. The hidden layers are where the computation happens, and the layers learn to extract features from the input data.
- **Output Layer:** This layer provides the final prediction based on the computation of the hidden layers.
- **Activation Functions:** To add non-linearity to the network, activation functions are added to each neuron's output. Common activation functions include ReLU, sigmoid, and tanh.
- **Weights and Biases:** Weights are used to multiply the input data, and biases are added to the result to shift the activation function. These weights and biases are learned during the training process.
- **Loss Function:** The difference between the output that really occurs and the output that was expected is calculated using a loss function. This loss is used to guide the learning process and update the weights and biases.

A DNN architecture diagram shown in Fig. 1 consists of nodes, representing neurons, connected by arrows, representing the flow of data.

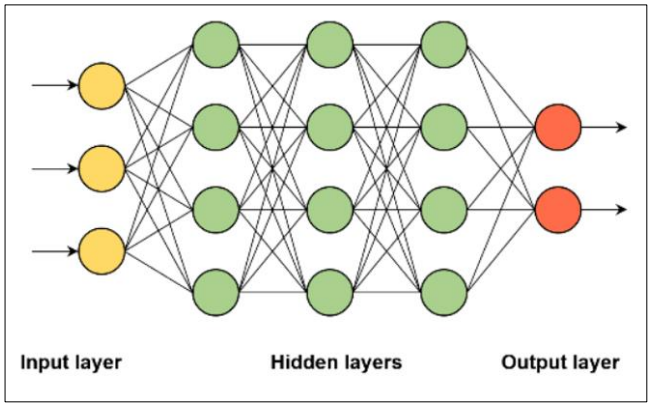

Fig. 1. Deep Neural Network (DNN) Architecture [15]

In Fig. 1, the left side of the figure represents the input layer as a collection of nodes, while the right side of the diagram represents the output layer as a set of nodes. The hidden layers are represented as sets of nodes in between the input and output layers. The arrows represent the flow of data, with each arrow representing the connection between two neurons and the weight of the connection represented by the thickness of the arrow.

There are several types of Deep Neural Networks (DNNs), including [16]:

- **Feedforward Neural Networks:** These are the simplest type of DNNs. The data flows only in one direction, from input to output, through a series of interconnected layers of artificial neurons. These networks are trained via supervised learning, in which the weights and biases of the neurons in each layer are updated using the input and intended output data until the network's predictions match the desired outputs.
- **Convolutional Neural Networks (CNNs):** These are DNNs designed specifically for image recognition and classification tasks. The use of convolutional layers, where each neuron in the layer

is coupled to a tiny, local part of the input data, is the main novelty of CNNs. As a result, the network may learn input data properties that are resistant to translation, scaling, and rotation. The final prediction is then produced by processing the outputs of the convolutional layers by a number of fully connected layers.

- **Recurrent Neural Networks (RNNs):** These are DNNs that allow data to flow in loops, allowing the network to maintain a memory of past inputs and use it to inform future predictions. This makes them well-suited to sequential data such as speech, text, or video. RNNs use a hidden state vector to store information about the past inputs, which is updated at each time step as new data is processed. Based on the network's final hidden state, the final prediction is created.
- **Autoencoders:** These are unsupervised DNNs used for dimensionality reduction and feature learning. Autoencoders have an encoder section that compresses the input data into a lower-dimensional representation, and a decoder section that takes the lower-dimensional representation and reconstructs the original data. During training, the autoencoder learns to minimize the reconstruction error, effectively learning a compact representation of the input data that retains its most important features.
- **Generative Adversarial Networks (GANs):** These are DNNs used for generative tasks, such as creating realistic images, videos, or text. GANs are made up of a discriminator network and a generator network, which work together to separate actual data from fake data. The generator competes with the discriminator during training by attempting to make data that the discriminator is unable to differentiate from actual data. The generator eventually has the ability to produce extremely realistic data that the discriminator is unable to differentiate from actual data.
- **Transformers:** These DNNs are employed in natural language processing tasks including text production and machine translation. Transformers use self-attention mechanisms to allow each word in a sequence to attend to all other words in the sequence when making predictions. This allows them to capture long-range dependencies in the data, making them well-suited to tasks such as machine translation, where the meaning of a word depends on the context of the entire sentence.

IV. Quantization in Deep Learning

Quantization is the process of reducing the accuracy of the numbers used to represent a neural network's parameters in DL [17]. Precision can be decreased with just a slight loss in accuracy, allowing for a reduction in the memory and computation needs when deployment on hardware devices. The most prevalent type of quantization in DL is utilizing less data to signify weights and activations, such as 8-bit values instead of 32-bit ones. The quantization process involves training the network with quantization-aware techniques and fine-tuning it to the quantized representation. A 32-bit floating point integer is used to hold weights in DNNs.

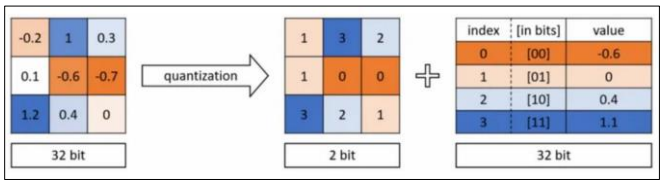

Fig. 2. Quantization [17]

In order to make a neural network smaller, a method called quantization reduces the accuracy of the weights and activations. To do this, the number of bits used to represent each weight is decreased, for example, from 32 bits to 16 bits, 8 bits, 4 bits, or 1 bit. This reduction results in a smaller size of the deep neural network (DNN). It's vital to consider that quantization may also result in a decline in accuracy, and finding the right balance between model size and accuracy is essential [17].

An open-source platform called TensorFlow Lite makes it possible to use ML models on edge devices. Quantization is one of the methods used by TensorFlow Lite to lower the memory and computational expenses of DL models during deployment. In order to save memory and speed up inference, this method includes lowering the precision of the network's weights and activations, often from 32-bit to 8-bit integers. In order to reduce the impact on accuracy, the quantization method entails quantizing the weights and activations during training and adjusting the quantized model. TensorFlow Lite also provides tools for quantization-aware training, where the model is trained with quantization-related operations to improve its accuracy after quantization.

In comparison to utilizing the conventional complicated DNN model, we may get a number of benefits by quantizing the DNN model [18]. Here are a few of these advantages:

• *Storage capacity:* The DNN model has a high degree of accuracy because of its many parameters, which need a lot of storage [19, 20]. The DNN model may be deployed more easily on devices with constrained resources by compressing it to conserve storage space.

• *Computation requirements:* Resource Constraint Devices (RCDs) may not be able to handle the huge volume of FLoating point OPerations (FLOPs) needed for DNN operations [21]. Therefore, it may be advantageous to use DNN compression to lessen the need for computation.

• *Earliness:* The DNN model's inability to provide real-time predictions is hampered by the length of time required for both training and prediction [22, 23]. DNN compression approaches have been created to quicken both the training and prediction stages in an effort to increase efficiency.

• *Privacy:* When sending data from the source to a high-performance computer, security flaws and privacy losses may occur [24]. Using compressed DNN models on RCDs with in-situ processing to secure sensitive data is advantageous since it guarantees data security and upholds privacy.

• *Energy consumption:* DNN compression is a preferable option for Internet of Things (IoT) devices that use batteries since it consumes less energy when processing data [25].

V. TensorFlow Lite (TFLite)

TensorFlow Lite is an open-source platform created by Google that enables deployment of ML models on devices with limited resources like smartphones, microcontrollers, and embedded systems [26]. TensorFlow Lite provides an easy-to-use API for developing and training ML models, as well as tools for converting these models to a compact binary format for deployment on edge devices. The binary format is optimized for efficient execution on these devices and can run without the need for a full-fledged ML framework. TensorFlow Lite also supports hardware-accelerated inference on certain devices, further increasing the performance and efficiency of deployment. In conclusion, TensorFlow Lite offers a compact and effective framework for implementing ML models on edge hardware.

The internal architecture of TensorFlow Lite consists of several key components [27]:

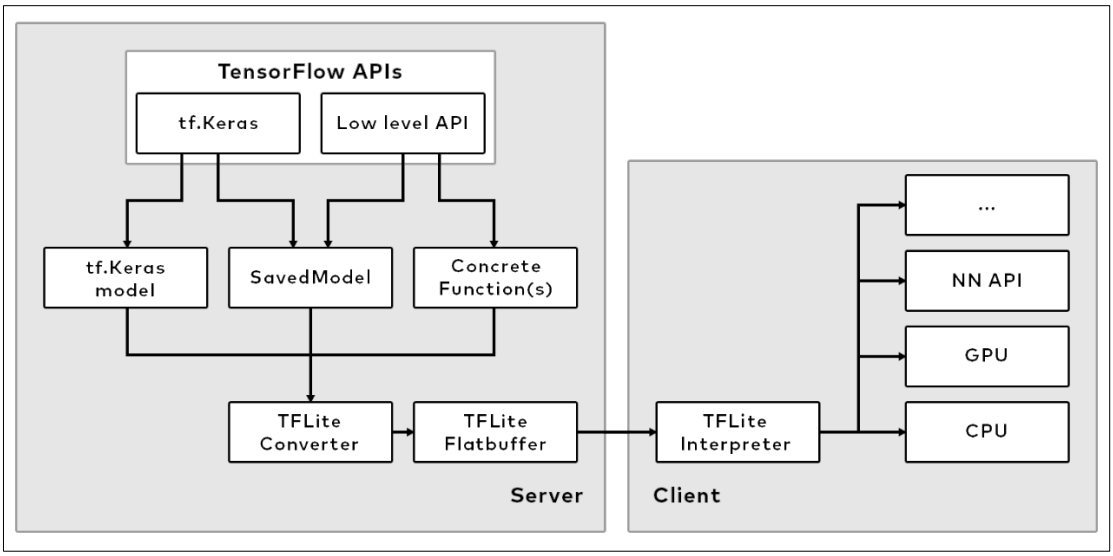

Fig. 3. TensorFlow Lite Internal Architecture

A. Model Interpreter: This is the core component that executes the model on the target device. It takes the input tensors, runs the operations defined in the model, and returns the output tensors.

B. Model Converter: This component converts a TensorFlow model into the TensorFlow Lite binary format, which can be executed by the Model Interpreter. The conversion process involves optimizing the model for deployment on edge devices, such as quantizing the weights and activations and reducing the model size.

C. Hardware-Specific Acceleration: TensorFlow Lite supports hardware acceleration on certain devices, such as GPUs and DSPs. The Model Interpreter takes advantage of these accelerators to improve the performance of inference.

D. Memory Management: TensorFlow Lite provides efficient memory management for deployment on resource-constrained devices. It uses a memory-mapped file to share tensors between the model and the application, reducing memory overhead and improving performance.

E. Operator Kernel Library: This is a collection of optimized low-level implementations of operations that can be executed by the Model Interpreter. TensorFlow Lite provides a default set of kernels, but also allows custom kernels to be implemented for specialized operations.

VI. Quantization techniques

Quantization can take place during model training or after model training. Post-training quantization and quantization-aware training are the two types of quantization.

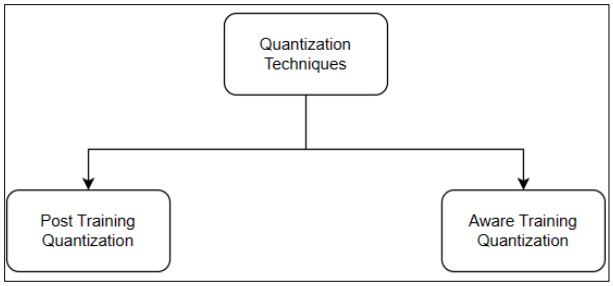

Fig. 4. Types of Quantization Techniques

A. Post Training Quantization: The model's weights and activations are quantized after the training procedure is complete in a technique known as post-training quantization [28]. This approach is typically used to reduce the memory and computational requirements for deploying the trained model on hardware devices with limited resources. In post-training quantization, the model is trained on floating-point data initially, and then the weights and activations are quantized to use lower-precision representations, such 8-bit integers or 16-bit floating-point data. The quantization process can be performed using various methods, including simple rounding, k-means clustering, and Min-Max scaling. Post-training quantization can result in a small degradation in model accuracy, which is often acceptable for many practical applications. In some cases, fine-tuning the quantized model can further improve accuracy. In conclusion, post-training quantization offers a quick and effective method for deploying deep neural networks on low-power and resource-constrained devices while maintaining high accuracy.

The process of post-training quantization usually involves the following steps [28]:

- Freeze the model: The first step is to freeze the model, which means to stop training and preserve its weights and biases.
- Evaluate the model: The next step is to evaluate the frozen model on a validation dataset to measure its accuracy.
- Quantize the model: The quantization process involves converting the floating-point weights and activations to lower precision fixed-point representations. The most common quantization methods are dynamic quantization and static quantization.
- Fine-tune the quantized model: After quantization, the model's accuracy may drop slightly, so the model is fine-tuned on the validation dataset to recover its accuracy.
- Deploy the quantized model: Finally, the quantized model is deployed for inference on devices such as smartphones, edge devices, or embedded systems.

B. Aware Training Quantization: Quantization-Aware Training (QAT) is a type of quantization in deep neural networks where the model is trained with quantization in mind. In other words, during the training process, the model is exposed to the quantization process and its effects on the gradients and forward computations. With QAT, the gradients are more precise and the model's accuracy is better preserved during quantization since the weights and activations are quantized during training and the quantization error is taken into consideration during backpropagation [28]. Compared to post-training quantization, QAT can result in better accuracy for quantized models and can avoid the fine-tuning step required in post-training quantization. However, it can be computationally more expensive, as the quantization process must be performed during training. In conclusion, compared to post-training quantization, quantization-aware training is a more sophisticated quantization strategy that can improve model accuracy but has a larger computational cost.

The process of quantization aware training usually involves the following steps [28]:

- Design a quantization-aware training process: In this step, the training process is designed to take quantization into account. This may involve adding quantization-aware layers or operations to the model, or modifying the loss function to penalize quantization-related inaccuracies.
- Train the quantization-aware model: The quantization-aware model is trained on the training dataset, and its accuracy is monitored during training.
- Evaluate the quantized model: After quantization, the accuracy of the learned model is assessed using a validation dataset.
- Fine-tune the quantized model: The quantized model can be adjusted if necessary to regain accuracy following quantization.
- Deploy the quantized model: The quantized model is then used for inference on systems like embedded systems, cellphones, and edge devices.

In this study, the accuracy of three widely used models were compared when they utilized either floating-point values, quantization aware training, or post-training integer quantization.

TABLE II. COMPARISION OF DIFFERENT QUANTIZATION TECHNIQUES WITH THEIR ACCURACY

Model	**Floating - point baseline model**	**QAT Model**	**Post-training full integer quantized model**
Mobilenet v1 1.0 224	71.03%	71.06%	69.57%
Mobilenet v2 1.0 224	70.77%	70.01%	70.2%
ResNet v1 50	76.3%	76.1%	75.95%

The observations from the above table are as follows:

1. When comparing accuracy, post-training integer quantization is frequently outperformed by Quantization Aware Training.
2. The floating-point baseline model is even more accurate than quantization aware training.
3. Post-training integer quantization often has lower accuracy.

VII. CHALLENGES AND FUTURE SCOPE

Deep neural network quantization is a method for lowering the memory and processing needs of neural network models, enabling their use on hardware with constrained resources, such as embedded systems and mobile devices. Quantization, however, also brings with it some challenges and restrictions. One challenge is the loss of accuracy that can occur during quantization, especially with high-precision models. This is because quantization reduces the number of bits used to represent each weight and activation, leading to a loss of information. The trade-off between quantization error and model accuracy can be addressed by finding an appropriate quantization scheme and using techniques such as fine-tuning and retraining. The difficulty of selecting the appropriate quantization scheme, such as deciding the number of bits to represent weights and activations, is another problem. The choice of quantization scheme depends on the specific application and the desired trade-off between accuracy and computation speed. The development of more sophisticated quantization methods that can better retain the accuracy of the original model is a potential topic for quantization research. This includes the development of hybrid quantization methods that use both low- and high-precision representations, and the use of adaptive quantization that can adjust the quantization scheme during the forward pass. Additionally, research is being done to develop quantization-aware training methods that can explicitly account for quantization errors during the training process.

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Utilizing Machine Learning to Improve Conversion Rates from Leads to Sales

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Abstract— **We get leads from a variety of platforms. While some of these leads might be potential buyers, the majority of them are not. You may also need to deal with a significant number of leads depending on the type of consumers you have and their LTV (lifetime value). Having your sales representatives speak to each and every lead is a waste of resources. Additionally, certain leads would require to be developed before they are ready. A lead is more likely to advance in the sales pipeline as they are nurtured. They will have their doubts allayed, and nurturing can also assist in educating leads so they can better comprehend how the product would benefit them. Businesses choose a lead qualification approach to make sure that only leads who are likely to buy are engaged with resources. Our model will automatically estimate the likelihood that a lead will be converted into a sale.**

Keyword– Data Science, Machine Learning, Logistic Regression, Prediction.

I. INTRODUCTION

A technique known as predictive lead scoring uses algorithms rather than arbitrary frameworks to rate leads. Which of your leads are sales qualified is determined by the algorithms using the data available. The algorithms frequently compare this data to historical lead performance using the same data that traditional lead scoring does. Predictive lead scoring h1as the advantage of eliminating the requirement for manual scoring system development, which is one of its main benefits. Predictive lead scoring can dig deeper into historical data to uncover trends that humans are likely to miss, helping to better qualify the leads. More clearly qualified leads translate into more sales.

You acquire leads from several various platforms. While some of these leads might be potential buyers, the majority of them are not. You may also need to deal with a significant number of leads depending on the type of consumers you have and their LTV (lifetime value).[3]

Having your sales representatives speak to every lead is a waste of resources. Furthermore, certain leads would need to be developed before they are ready. A lead is more likely to move up in the sales funnel as they are nurtured. They will have their doubts allayed, and nurturing can also assist

in educating leads so they can better comprehend how the product might benefit them.

To ensure only leads who are likely to buy are engaged with resources, businesses opt for a lead qualification strategy.

II. IMPORTANCE

The Marketing Automation Business has seen substantial growth in the adoption of predictive lead scoring. The following are some advantages of employing predictive lead scoring:

• Data-Driven strategy: In the case of the conventional lead scoring system, all of the criteria used to determine the lead rating were determined solely by the Sales Executive's discretion. Therefore, a few suppositions and educated estimates had to be taken into account when doing lead scoring. However, with predictive lead scoring, this is not the case.

• Less Error-Prone: Because predictive lead scoring is data-driven, it is less error-prone. Additionally, it employs Machine Learning and Artificial Intelligence Algorithms to assess the Lead Score, which lowers inaccuracies

• Quicker and more comprehensive: Because predictive lead scoring methods completely rely on machine learning algorithms to evaluate the lead scores, they are typically quicker than traditional lead scoring approaches. Additionally, it offers a thorough and extensive profile of the Lead, increasing the reliability of the results.

III. OBJECTIVE

This paper's goal is to investigate how machine learning techniques can be used to increase lead-to-sale conversion rates in commercial settings. In particular, the paper looks at how machine learning algorithms can be used to spot trends in consumer behavior and preferences, forecast how likely they are to convert, and deliver personalized recommendations to enhance the conversion process. Giving businesses useful insights to improve their sales strategies and boost revenue is the ultimate objective.

IV. PROBLEM STATEMENT

The conversion of leads into sales is one of the biggest problems that businesses face. The conventional method of solving this issue entails relying on sales representatives to manually sort through customer information and spot conversion opportunities. However, this method takes a lot of time, is prone to mistakes, and frequently misses the subtleties of customer behaviour. Businesses can improve their understanding of their customers, forecast their propensity to convert, and streamline the conversion process by utilizing machine learning techniques. Despite the potential advantages of this strategy, many businesses find it difficult to integrate machine learning techniques into their sales strategies, underscoring the demand for additional study and research.

Tech Stack:

1. Language

a) Python

2. Software

a) Jupyter Notebook

3. Libraries:

a) SMOTE b) Pandas c) Numpy
d) Matplotlib e) seaborn
f) sklearn

V. WORKING

It uses information from a banking institution's direct marketing campaigns in Portugal. Phone calls were the main component of the campaigns. It was frequently essential to get in touch with a client numerous times to find out whether they would subscribe to the product (bank term deposit) or not (i.e., "yes" or "no").

We are creating a logistic regression model to assign each lead a lead score between 0 and 100 that the company may use to target potential leads. A higher score would mean that
the lead is hot and most likely to convert, whilst a lower number would mean that the lead is cool and unlikely to convert.[7]

To provide each of the leads a lead score between 0 and 100 that the business may use to target potential leads, we are developing a logistic regression model. In contrast, a lower number would indicate that the lead is cold and unlikely to convert, while a higher score would indicate that the lead is hot and most likely to convert.

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 41188 entries, 0 to 41187
Data columns (total 21 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   age             41188 non-null  int64
 1   job             41188 non-null  object
 2   marital         41188 non-null  object
 3   education       41188 non-null  object
 4   default         41188 non-null  object
 5   housing         41188 non-null  object
 6   loan            41188 non-null  object
 7   contact         41188 non-null  object
 8   month           41188 non-null  object
 9   day_of_week     41188 non-null  object
 10  duration        41188 non-null  int64
 11  campaign        41188 non-null  int64
 12  pdays           41188 non-null  int64
 13  previous        41188 non-null  int64
 14  poutcome        41188 non-null  object
 15  emp.var.rate    41188 non-null  float64
 16  cons.price.idx  41188 non-null  float64
 17  cons.conf.idx   41188 non-null  float64
 18  euribor3m       41188 non-null  float64
 19  nr.employed     41188 non-null  float64
 20  y               41188 non-null  object
dtypes: float64(5), int64(5), object(11)
memory usage: 6.6+ MB
```

Fig 1

A. We can classify leads as follows

Cold Lead: Customers who haven't expressed any interest in your "term deposit" offering are known as cold leads. of the hardest leads to convert.

Warm Lead: Potential customers who are familiar with your products or the way your business operates. These clients converse with one another, making them easier
to approach as prospects than cold leads.

Hot leads: are clients that have expressed interest in your business or goods. These leads need your immediate attention since if you wait too long to answer, they can lose interest.

B. How can machine learning assist the sales cycle?

Using verified consumer data, machine learning enables you
to "train" computers to generate precise predictions about brand-new or existing but unknown customers. In order to generate a prediction model, a machine- learning algorithm analyses a database of customer data, identifies trends and patterns, and builds a model from the data.

B2B sales teams will gain from automatic warnings about a customer's tendency to buy a specific product by using the prediction model on new data sets. They might now choose to offer the customer something special in order to boost sales.

Knowing when to provide incentives or discounts is only one aspect of it. The B2B sales process is frequently very consultative and entails customising the solution to each client, especially for businesses whose product is low volume and high margin. It always takes a lot of effort to follow up on leads effectively, and if these leads aren't likely to convert, a lot of time and money could be lost. You may concentrate the efforts of your sales staff on the leads that are most likely to become customers by using reliable propensity models to identify those leads.[

Logistic regression:

Logistic regression is one of the Machine Learning algorithms that is most frequently employed in the Supervised Learning category. It is used to forecast the categorical dependent variable using a specified set of independent variables

Logistic regression is used to predict the output for a dependent variable that is categorical. The outcome must therefore be a discrete or categorical value. It offers the probabilistic values that lie between 0 and 1 rather than the precise values between 0 and 1. It can be either True or False, 0 or 1, or Yes or No.[5] Logistic regression and linear regression are fairly similar, with the exception of how they are used. While logistic regression is used to address classification issues, regression issues are addressed by linear regression.

Instead of fitting a regression line in logistic regression, we fit a "S" shaped logistic function that predicts two maximum values (0 or 1).

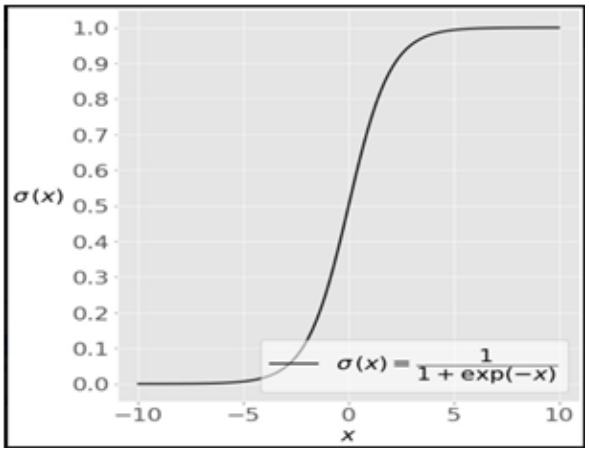
The logistic function's curve demonstrates numerous possibilities, such as whether or not the cells are cancerous, whether or not a mouse is obese dependent on

its weight, etc.

Using both continuous and discrete datasets to classify fresh data, logistic regression is a crucial machine learning technique.

Logistic regression can be used to quickly pinpoint the variables that will be effective when classifying observations using multiple sources of data.

To translate predicted values into probabilities, one uses the sigmoid function. Any real value between 0 and 1 can be transformed into another value with this function. We use machine learning's sigmoid function to translate predictions into probabilities.



VI. CONCLUSION

Traditional methods do not help much business organization in revenue growth, use of Machine Learning approaches prove to be an important aspect for shaping business strategies keeping into consideration the purchase patterns of the consumers. It turns out that educational approaches are an important aspect forming business strategies with regard to consumer buying patterns. Sales predictions taking into account various factors, including previous sales years helping businesses adopt appropriate strategies for increase in sales and unflinchingly stepped into competitive world.

VII. RESULT

The High conversion rate factors

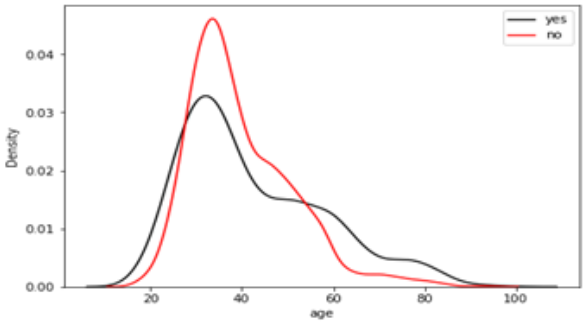


Fig 4 Age vs converted people

We can notice that people around the range of 23 to 35 years of age are more likely to buy the product. This can be because usually during this age, an individual becomes financially independent and can take wise decisions accordingly.

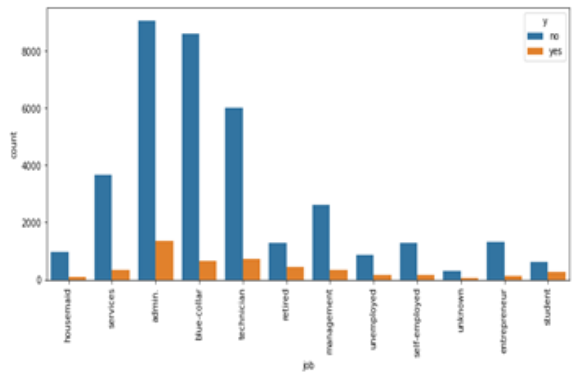


Fig 5: job vs conversion count

Analysing the bar plot we can understand that, people with job titles like admin jobs, blue collar jobs, and technician are more likely to get converted into sales.Reason for this can be since these job titles are more high paying jobs as compared to other jobs.

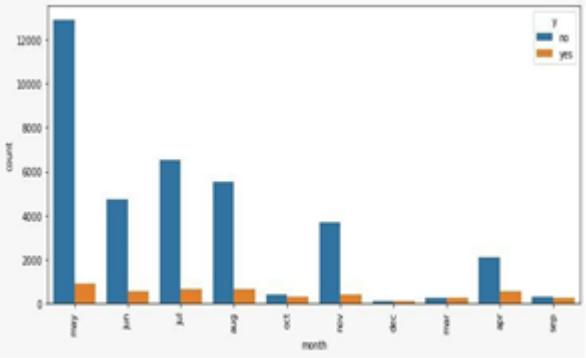


Fig 6: Month vs conversion count People contacted

- If contacted in Month march/securing the p/dec
- If called on Weekday Tuesday/Wednesday /Thursday

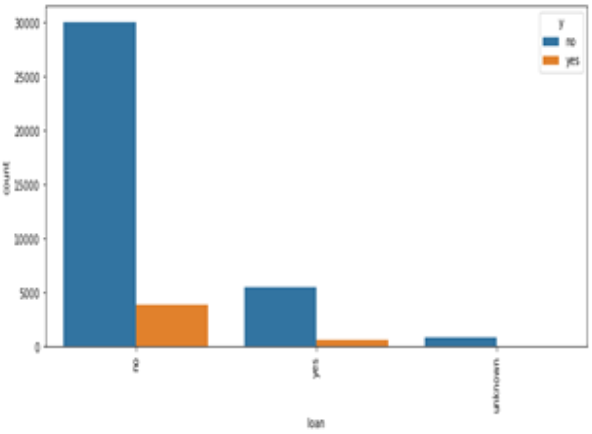


Fig 7: Loan vs converyed count

If there is no previous loan, there are more chances that the bank trusts the individual and assumes that the particular individual has the finanacial capacity to buy the product or service.

SMOTE

Unbalanced classification is the process of developing prediction models for classification datasets with a large class imbalance.

It can be challenging to work with unbalanced datasets since most machine learning techniques ignore the minority class, which leads to subpar performance even though it is frequently the most important.

One strategy for handling unbalanced datasets is to

oversample the minority class. The simplest approach is to replicate examples from the minority class, however these examples don't add any new understanding to the model. Instead, by synthesizing the previous instances, new ones can be produced. For the minority class, data augmentation techniques like the Synthetic Minority Oversampling Technique, or SMOTE, are used.

In order for MOTE to work, samples in the feature space that are close to one another are picked, a line is created between the examples, and a new sample is then drawn at a point along the line.[2]

In particular, a first sample is chosen at random from the minority class. In that case, the location of k of the closest neighbors is given (k is normally equal to 5).

In feature space, a synthetic example is created at a position randomly selected between two instances, and a neighboring example is chosen at random.

```
this is the pre- over sampling distribution:
[(0.0, 25579), (1.0, 3252)]
this is the post- over sampling distribution:
[(0.0, 25579), (1.0, 25579)]
```

Fig 8: Pre over sampling and post over sampling results

SMOTE selects samples from the feature that are close together. This method allows for the production of as many synthetic examples of the minority class as necessary. According to the study, in order to balance the distribution of the classes, it is advised to first use random under sampling to reduce the number of samples in the majority class before utilizing SMOTE to oversample the minority class.

```
logreg SMOTETomek:  0.780610180464514
logreg F1 Score:  0.780610180464514
logreg recall Score:  0.780610180464514
logreg RMSE for prediction: 0.4684
Accuracy for train data
              precision    recall  f1-score   support

         0.0       0.71      0.80      0.75     25579
         1.0       0.77      0.68      0.72     25579

    accuracy                           0.74     51158
   macro avg       0.74      0.74      0.74     51158
weighted avg       0.74      0.74      0.74     51158

Accuracy for test data
              precision    recall  f1-score   support

         0.0       0.95      0.80      0.87     10969
         1.0       0.29      0.66      0.40      1388

    accuracy                           0.78     12357
   macro avg       0.62      0.73      0.63     12357
weighted avg       0.87      0.78      0.81     12357
```

Fig 9: Logistic regression score

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Biomedical Keywords Recommendation for Clinical Trial Records Using Machine Learning

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Abstract — **Analyzing unstructured biomedical research papers and clinical trial studies is very critical for better understanding of the theories related to the domain. The data is available but there is no usage of visualizations and big data analytics on these textual pieces of information. Also, the therapeutic product creators should be able to retrieve similar research work at a faster rate. In this paper, we focus on presenting a high- fidelity prototype, developed for the application, incorporating an advanced search engine, which recommends relevant keywords for much better document matches. To improve the final search results, the model is constructed with the naïve bayes classifier following the basic collaborative filtering approach. Sentiment analysis and other natural language processing techniques are used to detect citation bias towards scientific claims.**

Index Terms - Biomedical, analytics, therapeutic, recommends, keywords, model, sentiment, bias.

I. INTRODUCTION

Clinical trials are the experimental and research studies, usually performed on humans to compare the performance of the new treatment with the standard treatments. They are carried out to evaluate the medical and behavioral effects of the new drug or chemical. Clinical trials are being considered the primary way by researchers to find out if the new treatment is safe and effective in people. They are conducted to assess the safety and effectiveness of a new medicine. There are several stages in the process of approving clinical trials. Generally, the Food and Drug Administrator is the sole approver of all the clinical trial studies being initiated in the United States. Each phase of a clinical trial consists of different number of people on which the tests are performed. In the USA, after the completion of each phase, the investigators are required to submit the results to the FDA for approval before moving on to the next phase. Clinical trials are also be used to compare two separate treatments, to see if they have equal effect. The clinical trials can also be used to determine the natural history of a disease.

Only about one in one thousand investigational drugs make it to human trials, which means most of the clinical trials being initiated phase out in the pre- clinical trial stages. Safety is the most important priority in every phase of a clinical trial. The clinical trials mainly revolve around drugs, which are the substances intended to treat or prevent a disease. The pre-clinical studies are performed on animals, mainly to evaluate if the new treatment will work or not. If the pre-clinical results are promising, the researcher then designs the study for humans. At the start of any clinical trial, one group of people receive the standard treatment along with the new treatment. The other group of people receive the standard treatment only. A computer is used to randomly categorize people into these two groups, in order to prevent any sort of bias. The people who receive only the standard treatment also receive a placebo (chemical substance identical to the new drug but with no active ingredients), in order to assure complete randomness, even in the thoughts of those people. The most reliable results come from the double-blinded treatments, which involves both the clinical researchers and the patients not knowing what sort of treatments they are undergoing.

II. LITERATURE SURVEY

In comparison with the existing research work done on keywords recommendation, this paper aims at improving the efficiency and accuracy of the model, along with the incorporation of technologies like big data analytics and sentiment analysis of the clinical trial records for better user learning and experience. More work needs to be done on knowing the users, for better predictions and recommendations.

1. Xiao Zhou (June 2020). Collaborative Filtering on Keywords Recommendation for Clinical Trial Records. Semantic Scholar, CS229 Stanford.

This paper describes the concepts regarding the development of a known keyword-recommending algorithm using the basic technique of collaborative filtering. The publisher has emphasized on the importance of retrieving similar clinical trial records and documents using locality sensitive hashing. The implementation of the study has three modules. The first module is known as data engineering module, which extracts keywords from text, transforms keywords to indices, and loads the indices into a utility matrix which will be used by the second machine learning module [1]. The second module is the machine learning module which implements the algorithm developed in this study, performs train, validation, test, and prediction tasks. Last module is the data visualization module which provides a web user interface for user's query and result display.

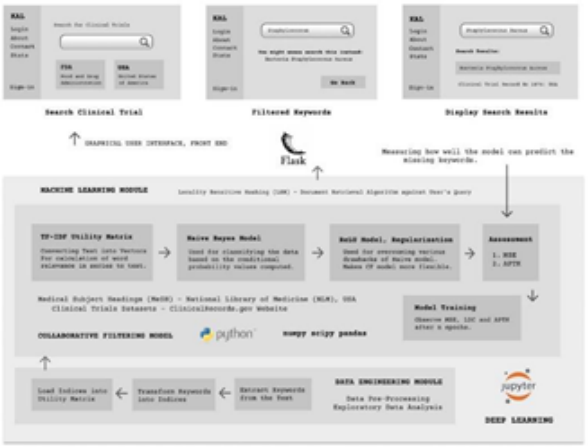
2. Vinaya B. Savadekar, Pramod B. Gosavi (2014). Towards Keyword Based Recommendation System. Archived in International Journal of Science and Research (IJSR), November Volume 3 Issue 11. This research paper proposes a basic keyword-based recommendation method, to address scalability and inefficiency problems when processing or analyzing large-scale data [2]. The author aims at presenting a personalized recommendation list containing the most appropriate items for the users. Specifically, keywords are used to indicate users' preferences or behavior, and a user-based collaborative filtering algorithm is being created to generate appropriate recommendations. The proposed system is much more efficient in terms of complexity, which has been developed for the products on Amazon data.

3. Dan Frankowski, J. Ben Schafer, Jon Herlocker, Shilad

Sen (January 2007). Collaborative Filtering Recommender Systems. In Springer-Verlag Berlin Heidelberg, Part of the Lecture Notes in Computer Science Book Series, Vol 4321. Adaptive Web.

This research paper introduced the core concepts of the collaborative filtering technique along with its primary uses for the adaptive web users. The paper also discussed about the theories and practices of CF algorithms, and various design decisions regarding the rating systems and acquisition of ratings. The author has tried to emphasize on the basic process involved in evaluating the CF system models, and the evolution of rich user interaction interfaces. The author finishes with points regarding the challenges of privacy in the CF recommendation service case.

III. FLOWCHART DESIGN



IV. RELATED THEORY

Thinking of creating an efficient document retrieval search engine powered by keyword-recommending algorithms, without the application of deep learning techniques is quite difficult. More layers of neural networks make way for improved performance in terms of parameters like accuracy and depth. Deep Learning is being incorporated to help the system learn from large amounts of data, on its own. Neural networks simulate the behavior of a human brain. Human Brain is, by far, the most powerful computer that has existed so far. Deep learning algorithms can process unstructured data, since it performs similar to a human brain in terms of recognizing the data inputs, bias and the value of inputs. Deep Learning is chosen because of its capacity to model non-linear relationships within data. Classification improves drastically with every addition of a hidden layer inside the neural network. These algorithms are high in proficiency while processing non-linear features and associations. It is a subset of machine learning.

A. TF-IDF Utility Matrix

Data Preprocessing is the hectic task every model has to go through during the initial stages. Term Frequency Inverse Document Frequency or TF-IDF is an approach to do the data preprocessing task in a highly flexible manner. Every important feature can be extracted using the TF-IDF utility matrix, which determines the importance of a word, present in the text, by finding its frequency of occurrence in the document and computing how often that same word occurs in other documents. If a word occurs many times in a particular document, but not in others, then that word might be relevant to that particular document only, and is therefore more important.

In the biomedical literature domain, there are many synonyms and abbreviations available for medical terms, which makes the keyword extraction difficult for the model. To tackle this issue, the Medical Subject Headings (MeSH) produced and maintained by the National Library of Medicine were used [1]. The MeSH terms inside the clinical trial records, in the form of documents, were transformed into a Trie Data Structure, which is mainly used for the prefix- based searching facility. The MeSH terms in each of the clinical trial records are being fed into the TF- IDF utility matrix. After the matrix is constructed, it is divided randomly into three matrices: the training matrix, validation matrix, and the test matrix. Then, the bayesian classifier takes all these matrices.

B. Naïve Bayes Model

Naïve Bayes is the most popular machine learning algorithm to solve classification problems. Naïve Bayes Model is based on the Bayes Theorem. This model is used for classifying the data based on the

computation of conditional probability values. The model assumes that all the features are independent. In other words, the classifier simply assumes that the presence of a particular feature in a class doesn't affect the presence of other features. Naïve Bayes Classifier is famous for Text Classification, which is a basic application of natural language processing.

The similarity between the biomedical keywords is being calculated based on how close two of the MeSH items are in the utility matrix. The closer they are, the higher value of similarity they possess. The Naïve Bayes classifier model can be found under the scikit-learn library of python. The training matrix which was passed onto the Naïve Bayes Classifier consists of the TF-IDF scores of the MeSH terms. The goal is to estimate the matrix element score, and prove the hypothesis correct, by linearly combining the TF-IDF scores of the neighboring MeSH terms, present in the Utility Matrix. The loss function is calculated and is then optimized using the mini- batch gradient descent or m-BGD algorithm.

C. ReLU Activation Function

The Rectified Linear Unit is an Activation Function, used to overcome various drawbacks of the Naïve Bayes Model. It makes the model more flexible. An activation function is mathematical function that transforms the given input to the required output that has a certain range. The ReLU activation function outputs either 0 or the positive values. The negative values are not possible. The activation function is used to increase the learning capacity of the model. Without an activation function, the model behaves like a linear regression model, which does not have the capacity to perform classification tasks.

After the model training, some TF-IDF values were observed negative, which makes the Naïve Bayes model

too rigid [1]. To eliminate the negative values of the training matrix, the ReLU activation function is used. Since the model is trained with very large amounts of training data, there are high chances of overfitting. To tackle this issue, Regularization was used along with the m-BGD optimization algorithm. The batch gradient descent algorithm was not used since its computation is expensive. Regularization also helps in tuning all the main hyperparameters. The type of Recommendation used in this paper is known as Collaborative Filtering, which is basically a method which tends to find similar users and likely recommend what similar users behave in viewing or liking. Collaborative Filtering focuses on the basic relationship between the users and the items.

D. Mean Squared Error

To validate, assess and measure the performance of the whole collaborative filtering model, MSE or the mean squared error is used. The mean squared error metric is being applied to define the loss functions being calculated in the previous models. Another evaluation metric, APTK is being used to measure how well the model can predict missing keywords. In the model training phase, the MSE, Loss Descent Curve and APTK are being observed after training the model on a certain number of epochs.

To integrate the Google Colab or Jupyter iPython notebook's deep learning code into a website, the Flask API is used. The machine learning models can be successfully integrated with the web using Flask. It is a simple web application framework to build the back-end of web apps. Pycharm IDE makes its way into this scenario. The flask library can be installed with the help of pip command. Before integrating the machine learning model with the Flask API, the pickling of the model is necessary. The end process is being followed by the application deployment.

V. RESULTS

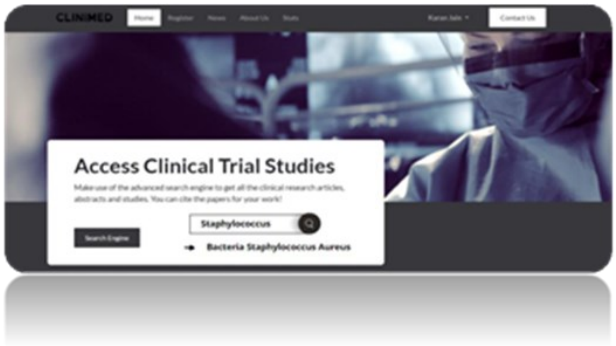


Figure: Clickable Recommended Keywords

VI. DISCUSSIONS

On the homepage of the site, there is an advanced search bar, which has been powered by a keyword recommending algorithm developed using the term frequency inverse document frequency matrices and the Naïve Bayes classifier, optimized with the mini- batch gradient descent algorithm. The user cannot enter all the medical keywords associated with the desired document to be retrieved from the database. To improve the final search results, all the relevant keywords are being recommended using the basic collaborative filtering approach or methodology.

On viewing the clinical trial record research papers and abstracts, the user will find analytics alongside each article. Sentiment analysis is also performed on the clinical trial study abstracts for better learning. The data visualization module takes care of the word clouds for faster information retrieval while surfing the website. The website will generally be used by medical students, PhD scholars, clinical researchers, scientists, pharmacists from the anglospheres and other parts of the world. The main feature of the site will be that of the citation facility, which indirectly encourages to avoid plagiarism and follow some of the standard practices for referencing the established work of other professionals. The clinical trial papers are maintained by the National Library of Medicine.

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Online Portal for Type of Anemia Disease Identification

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Abstract - **Anemia is a microcytic, normocytic and macrocytic caused due to inadequate supply of oxygen to tissues or insufficient hemoglobin leading to lethal abnormalities in the human body. The global public health toll almost 42% of children below age of 5 and almost 40% women under pregnancy suffer anemia worldwide. In the proposed paper, it presents an online platform using machine learning algorithms Random Forest, KNN, and Naive bayes. The proposed system intends to detect the type of anemia the patient is suffering from on the basis of the various parameters of the blood test report and help detect type of anemia along with the remedial diets that can help reduce the effects and accordingly tell the patient to visit the doctor. We intend on using this platform with medical personnel helping in early identification of anemia along with the additional information of the type of anemia the patient is suffering from for prompt treatment.**

Keywords - Anemia, Machine Learning, Random Forest, KNN, Naive Bayes.

I. INTRODUCTION

In the health industry during the recent years remarkable advancement in technology took place, which resulted in exponential increase in data. All the useful information can be extracted using the data, used for prediction, recommendation and decision

making. For prevention and effective treatment of diseases, diagnosis and prediction at the right time is required. Deficiency of healthy red blood cells causes Anemia disease. Because of the lack of healthy red blood cells, the oxygen is not able to be delivered throughout the body as expected. Anemia is highly prevalent in India. The third National Family Health Study (NFHS-3) conducted during 2005–6 found that amongst children aged 6 to 59 months, the prevalence of anemia is 69.5%; in rural India, the prevalence is

71.5%. The prevalence of anemia is maximum among younger children between the age of 12-17 months and 18-23 months. The prevalence of anemia in rural areas appeared to have risen since the previous NFHS (in 1998–9). [1][2]

Some measures need to be taken to prevent the spread of anemia using the new learning and advancements of the tech industry. We found out during our study that with the help of machine learning we could solve the problem and find out the type of anemia a user/patient is suffering from. Using machine learning algorithms like Random Forest, Decision Tree and Naive Bayes [3], We plan on finding out the type of anemia the patient is suffering from which can help in timely and prompt treatment [4]. This early diagnosis can help in reducing the symptoms and nullify any harmful effects of the disease. In our country, we have witnessed a lot of improvement in health care facilities, but still there is a lack of expertised doctors in rural areas and some people are still not able to afford expert healthcare facilities. We have a large population living in the rural areas where there is a lack of advancement and expert medical staff resulting in late diagnosis of the anemia disease due to which the disease becomes deadly. Machine Learning can help us overcome many different problems faced by our country in the field of medicine. Using this project, we will be able to detect whether a person or patient is suffering from anemia and get to know the type of anemia the patient is suffering from in a matter of seconds. [3]

II. PROBLEMS FACED

Anemia is a growing problem amongst young children living in rural India. In Rural areas, there is a lack of proper medical treatment and experienced doctors. This leads to patients traveling long distances to visit experienced doctors for treatment. This delay ultimately leads to the disease becoming more fatal.

Also, many people avoid going to the doctor because they are scared or they can't afford it. Also, due to the lack of trained or experienced doctors in rural areas, they misdiagnose the symptoms resulting in Anemia becoming more fatal.

Anemia, also goes quite unnoticed in many people especially children, which can go unnoticed at first but suddenly become fatal in nature. To identify this, a doctor needs to go through the CBC blood test report thoroughly to identify the early stages of Anemia. Once identified, it is quite easy to cure the disease.

But one thing to also look at is the type of anemia the patient is suffering from. Knowing which type of anemia the patient is suffering from is a very important part of the diagnosis as based upon the type of anemia, the treatment plan is made. To find the type of anemia is a difficult task as multiple parameters of the blood test report has to be taken into consideration which can only be done and diagnosed by an experienced doctor.

To tackle this problem, we are planning to use machine learning algorithms which would feed the input data of some blood test parameters using which the machine learning model will be able to tell the type of anemia the patient is suffering from. We would create an online portal where the user/patient or medical professionals can simply enter some blood test parameters required and will get the required type of anemia the patient is suffering from.

Our online portal would warn and alert the user if the user is suffering from anemia and notify them to seek medical attention so that they can be treated on time. The online portal would also notify the type of anemia the

user is suffering from and would help in the diagnosis of the doctor.

We would also through the website provide information to the user about anemia, symptoms and diets which could help in the recovery from the disease. We plan on using the online portal in the future with NGOs, social bodies, social organizations or government bodies and rural areas for social good.

III. METHODOLOGY

To start our project, we have imported a dataset [8] which contains 5 parameters and tells us whether a person is suffering from anemia or not. But, what we want to know is what type of anemia the user/patient is suffering from. In order to find that out, we have used the following parameters below from the dataset [7] -

	Gender	Hemoglobin	MCH	MCHC	MCV	Result
0	Male	14.9	22.7	29.1	83.7	Not Anemia
1	Female	15.9	25.4	28.3	72.0	Not Anemia
2	Female	9.0	21.5	29.6	71.2	Anemia
3	Female	14.9	16.0	31.4	87.5	Not Anemia
4	Male	14.7	22.0	28.2	99.5	Not Anemia
5	Female	11.6	22.3	30.9	74.5	Anemia

Fig 1. Original Dataset [7]

1. Gender - Gender is a very important parameter as the blood parameters and limits for both Male and Female are different and vary, so it is important to also consider this factor.

2. MCV - MCV stands for mean corpuscular volume. Basically this blood test measures the average size of the red blood cells. Using this test we can get to know whether our red blood cells are too small or too large which can depict any blood disorder such as anemia. [8]
3. MCHC - MCHC is a similar measure to MCH, MCHC stands for "mean corpuscular hemoglobin concentration". MCHC checks the average amount of hemoglobin in a group of red blood cells. A doctor might use both MCHC and MCH in order to diagnose Anemia. [9] [10]

4. Hemoglobin - This parameter tells us about the amount of oxygen present in our blood. It is basically a protein which has the capacity to carry oxygen throughout the body from the lungs. It is also a very important parameter in prediction of anemia. For men, anemia is typically defined as a hemoglobin level of less than 13.2 g/dl and in women as hemoglobin of less than 11.6 g/dl. [11]

We in total have used these 5 parameters to find out the type of anemia the user/patient is suffering from. There are mainly 3 types in which anemia can be divided into - Microcytosis (low MCV), Macrocytosis (high MCV) and Normocytic (normal MCV) [5][12][13]. Under these 3 types, we can zoom in into the cause of anemia as mentioned in Fig. 2.

Using the below mentioned Fig. 2, we have classified almost all types and causes of anemia. The normal range of MCV in humans should be between 80 g/dL - 100 g/dL, the normal range of MCHC in humans should be 32 g/dL - 36 g/dL and the normal range of Hemoglobin in Males should be between 13.2 g/dL - 16.6 g/dL and in Females between 11.6 g/dL - 15 g/dL.[6][12][13][14]

Now in Anemia, all patients suffer from low hemoglobin in the RBCs, but to exactly know which type of anemia the patient suffers from, we have to go more into depth and look at the MCV and MCHC values in order to pinpoint towards the exact type of anemia for further treatment of patient. The type of anemia can be confirmed on the basis of multiple parameters of the blood test report, but we are mainly focusing on using two parameters, the MCV values and MCHC values to find out the type of anemia and classify it into Normocytic, Microcytic and Macrocytic Anemia according to Fig.2 [6][13].

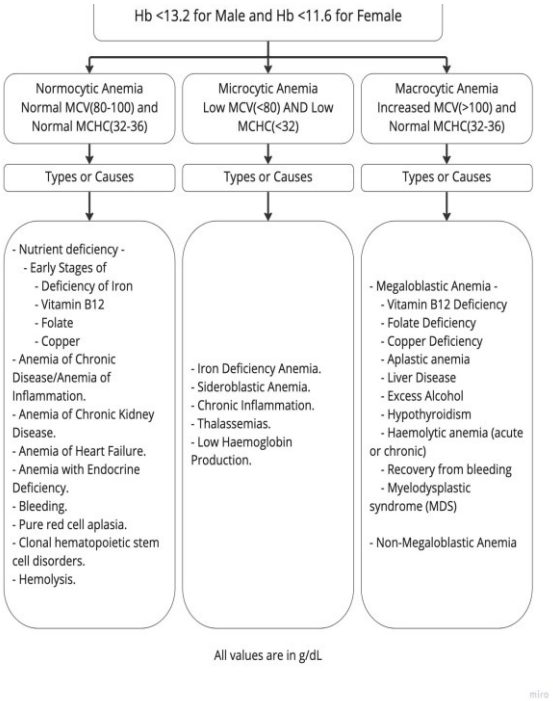

Fig 2. Types of Anemia [4][5][6][13][14][15]

Hemoglobin is a blood parameter which tells us initially whether a person is suffering from anemia or not as low hemoglobin essentially indicates towards anemia disease. If the hemoglobin value is less than <13.2 g/dL in Male or <11.6 g/dL in Females then we can say that the patient is suffering from anemia [15].

To know the type of anemia the patient is suffering from, we need to further investigate the other parameters.

Using MCV and MCHC values, we get to know exactly whether the patient is suffering from Normocytic, Microcytic or Macrocytic anemia.

- If MCV is low (<80 g/dL) and MCHC is low (<32 g/dL) then we can classify it as Microcytic Anemia [6][14][15].
- If MCV is normal (>80 g/dL and <100 g/dL)

and MCHC is normal (>32 g/dL and <36g/dL) then we can classify it as Normocytic

Anemia [6][13][14].

- If MCV is Increased (>100 g/dL) and MCHC is normal (>32 g/dL and <36 g/dL) then we can classify it as Macrocytic Anemia [6][13][14].
- If for instance the hemoglobin of the patient is in the normal range that is for Male (13.2 g/dL - 16.6 g/dL) and for Females (11.6 g/dL - 15 g/dL) then the patient is not suffering from anemia [6][15].
- If any other condition is possible, it could be because of chronic anemia but doctors or medical experts diagnosis is important for real diagnosis.
- Though using these all conditions we can get the type of anemia, it is important to be reviewed and consult a doctor before coming to the exact cause causing anemia disease and only a medical expert or doctor could find the exact reason causing the disease or root cause.

Using the above condition, we make changes in our dataset [8] and our dataset now looks like this -

	Gender	Hemoglobin	MCHC	MCV	Type
0	1	14.9	29.1	83.7	Not Anemic
1	0	15.9	28.3	72.0	Not Anemic
2	0	9.0	29.6	71.2	Microcytic
3	0	14.9	31.4	87.5	Not Anemic
4	1	14.7	28.2	99.5	Not Anemic

Fig 3. Newly made dataset

In the above database, 1 represents Males and 0 represents Females. In the Type columns, we have specified the exact type the patient is suffering from , which ranges from Not Anemic, Microcytic, Chronic Disease Anemia, Normocytic and Macrocytic.

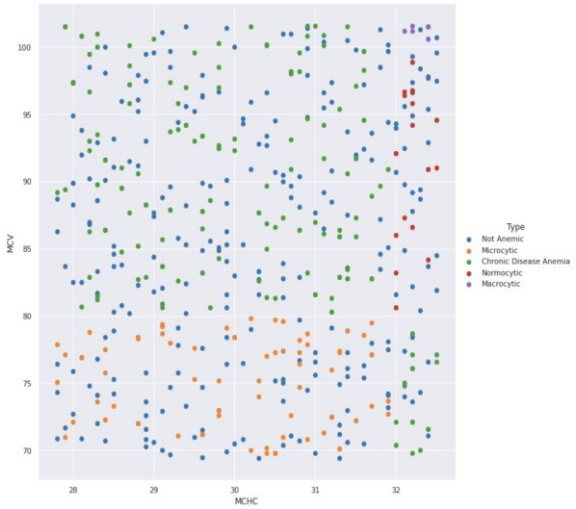

Fig 4. Visualizing Dataset (MCHC vs MCV)

The dataset consists of a total of 534 unique data entries after cleaning and removing duplicate values from the dataset. In the dataset, 319 values are of type Not Anemic, 127 are of type Chronic Disease Anemia, 65 are of Microcytic, 18 are of Normocytic and 5 are of Macrocytic anemia.

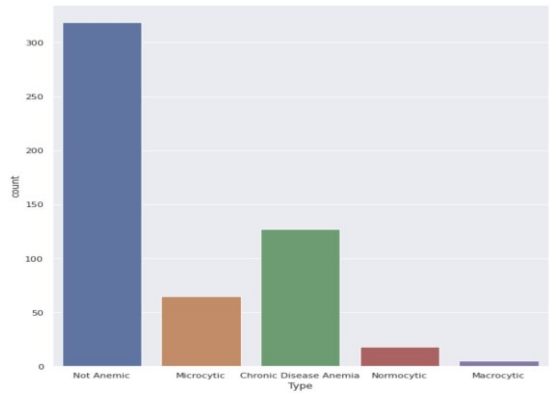

Fig 5. Countplot of the types of anemia in datasetNow, to visualize some of the parameters according to the different types of anemia we have plotted multiple boxplots for each parameters vs each type of anemia -

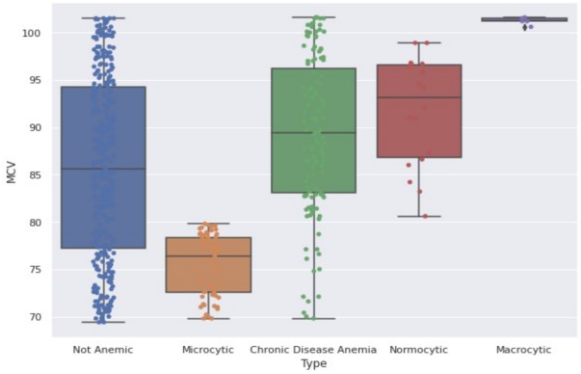

Fig 6. Boxplot of MCV vs Types

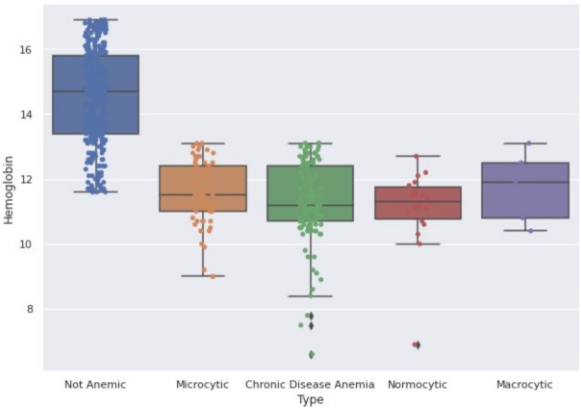

Fig 7. Boxplot of Hb vs Types

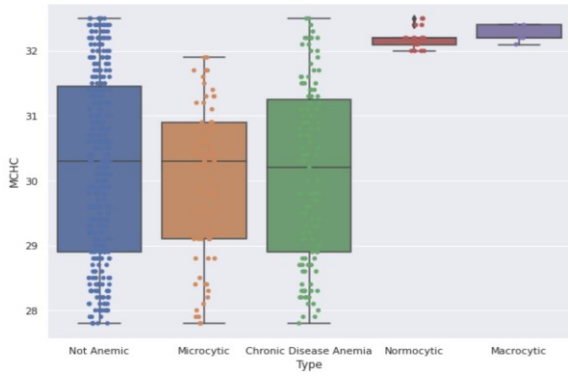

Fig 8. Boxplot of MCHC vs Types

As written before, we are using the parameters Gender, Hemoglobin, MCV and MCHC to classify which type of anemia the patient is suffering from.

Now, to give you an overview of how we are going to do it, we have below created a flowchart depicting how we will achieve the required results -

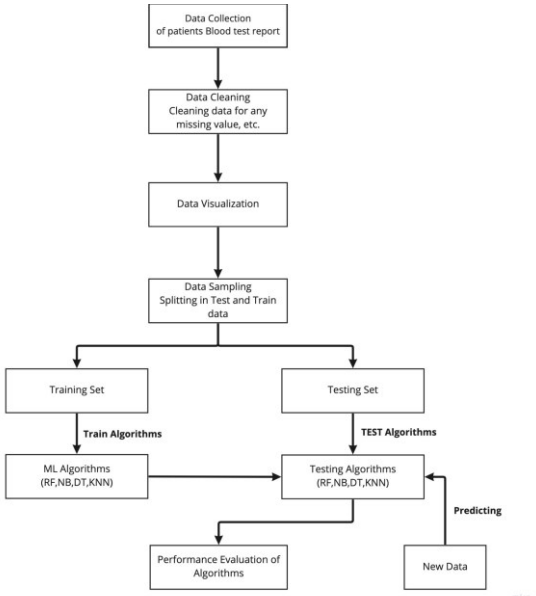

Fig 9. Flowchart of working [5]

Applying Classification Algorithms

- After feature extraction now comes to model training.
- First of all we have divided the dataset into training and testing using a method called train_test_split(). We have divided our dataset into a 75-25% train-test split.
- Now select the classification algorithm and import it from respective libraries.
- Algorithms that we are going to use are Random Forest, Naïve Bayes and KNN [3][4][5].
- Below are the detailed study of our algorithms-

1. Naive Bayes Algorithm - Naive Bayes Algorithm is a supervised machine learning algorithm which is based on the famous bayes theorem and is used mostly to solve classification problems. It is one of the easiest and effective classification algorithms. It basically predicts the output based on the basis of the probability of the object. [16] Now, defining the formula as per our project - P(A|B) is Posterior probability: Probability of hypothesis A on the observed event B. P(B|A) is Likelihood probability: Probability of the evidence given that the probability of a hypothesis is true. P(A) is Prior Probability: Probability of hypothesis before observing the evidence. P(B) is Marginal Probability: Probability of Evidence. [16]

If P(NO|Anemia) is greater than P(YES|Anemia), then the person is not suffering from Anemia, else vice-versa. Random Forest - Random forest is a simple to use machine learning algorithm that delivers a good result much of the time, it also does not require us to use hyper parameter tuning. It is also one of the most commonly used algorithms due to its simplicity and versatility which can be used as both regression and classification algorithms. [17] Why use Random Forest? Random Forest is one of the most popular machine learning algorithms used for both classification and Regression problems. It is used because of its speed, that is it works very fast even for very big datasets. It also provides a very high accuracy in comparison with the other machine learning algorithms. [17]

As per our problem, We define the formula:

P(YES|Anemia) is Probability of having

Anemia Disease in a person.

P(Anemia|YES) is the value of patients having parameters outside the normal range having anemia.

P(Anemia) is the value of people having

Anemia.

P(YES) is the value of total people having blood parameters out of range.

So, we can rewrite the Naive Bayes algorithm as -

P(YES|Anemia) = P(Anemia|YES) * P(Anemia) / P(YES)

We will then compare this value with the normal or parameter of people not having Anemia -

P(NO|Anemia) = P(Anemia|NO) * P(Anemia) / P(NO)

After this calculation, we will in the end compare both these, and the one grater will be the final answer -

How does the Random Forest algorithm work?

Random Forest as the name suggests, is an algorithm created by the use of multiple decision trees. In this, Random Forest algorithm creates multiple decision trees, and then as per the input, the decision tree shows the output. In random forest, the algorithm for a classification problem takes all the majority classes predicted by all decision trees and average of all predicted outputs for a Regression Problem. [17]

Now, lets see the working of Random Forest

Algorithm -

Step-1: Firstly, we select random data points from the training data set.

Step-2: Next, we build a decision tree for each of the respective data points.

Step-3: Next, we decide the number of decision trees we want.

Step-4: Repeat Step 1 & 2.

Step-5: Now, for predicting, compile all the outputs of all decision trees and take the majority of all outputs for the final output.

3. KNN - KNN is one of the simplest machine learning algorithms in Supervised learning technique. KNNbasically uses the techniquewhere it classifies data based upon the similarity of other data points. So if we put in a new data, it will classify it based upon the other data points which is closest to the new data and accordingly classify it. This algorithm does not learn anything from the training data set immediately, but stores it and uses it at the time of classification, that is why it is also known as lazy learner algorithm.[18]

Now, lets see the working of the KNN

algorithm [18] -

Step-1: Firstly we have to select the K

number of neighbors to use.

Step-2: We calculate the Euclidean distance of all k numbers of neighbors.

Step-3: We take the K number of nearest neighbors.

Step-4: We count the number of categories of each nearest data point.

Step-5: Assign the new data point to the majority category of the K nearest neighbors.

Step-6: Our model is ready to use. Real Time Implementation Of Project

● Here comes the main part where we

have to map our project with the real world problems.

● We are going to create an online portal where we would display all types of information regarding anemia, types of anemia, causes, and provide a service where the users can input there blood parameters of Hb, MCV, MCHC and Gender and accordingly get notified of the type of anemia they might be suffering from and advice them to visit a doctor for further diagnosis and treatment.

● We have decided to provide our service to NGOs or Social work bodies or organizations or medical bodies or rural clinics or hospitals where there is a lack of experienced medical staff.

● We would also provide diet plans which patients can use which can benefit them and reduce the effects of the anemia disease.

IV. TECHNOLOGY USED

We are using one of the most useful and powerful language ie. python. Python also has robust library support for Machine learning.

1. Google Collab – This is a jupyter notebook IDE where we can easily run and also see the output of each cell simultaneously. We will use Google Colab as it already has many of the required libraries installed and is very user friendly to use.

2. Pandas - This is one of the most important libraries for data science applications. It is basically used from importing the dataset, to cleaning, to feature selection, etc. It is the go to library for any data science and machine learning project.

3. Scikit – It is a machine learning library containing many models like classification, regression and clustering algorithms. We are using this library to import all the important algorithms which we are using and to also use this library to get the important metrics like accuracy, precision, f1 score, recall, etc.

4. Matplotlib – It is a library used for data visualization. It is a library used to create various types of graphs and plots which help us better understand the data which we are using.

5. Seaborn – It is a library used for creating many types of advanced graphs and plots and is mostly used in our project to visualize the data.

6. Flask - It is a library which we will use to create our online portal. It is a very simple to use python framework which allows us to use python in the frontend as well.

V. RESULT AND DISCUSSION

After implementation of all the above steps, we have come up with the accuracy we have achieved using the Random Forest, Naive Bayes and KNN algorithms - Table 1 - Algorithm Accuracy

Algorithms	Precision	Recall	F1 Score
Random Forest	0.99	0.99	0.98
Naive Bayes	0.88	0.88	0.88
KNN	0.81	0.83	0.81

Table 2 - Weighted Average of Precision, Recall and F1 Score for each algorithm

Above is the accuracy we have achieved from our algorithms after training them and then testing them with the test data. From this result we plan on using the Random Forest algorithm in our online portal as it has provided us with the most accuracy out of all algorithms.

We have also shown the weighted average of precision, recall and F1 score -

From the table above, we can see that we have achieved very good scores of Precision, Recall and F1 Score. Ideally, the optimum result of these three metrics should be 1. As we can see, the Random Forest algorithm achieved the highest score in all their metrics out of all the algorithms followed by Naive Bayes and KNN.

As we see, our results are up to standards and the accuracy of each algorithm is very good, even exceeding our expectations [3][4].ACKNOWLEDGMENTS

My completion and success of the project could not have been accomplished without the support and guidance of my teachers. I sincerely want to thank our mentor Dr. Sangeeta Vhatkar. We are extremely fortunate and privileged to have HOD IT Dr. Sangeet Vhatkar ma'am as our mentor who enlightened us with her expertise and in depth knowledge and motivated and inspired us to use our full potential and to do our best.

I sincerely want to extend my thanks to our Principal Dr. B. K. Mishra and Vice Principal Dr. Kamal Shah for always encouraging us to do our best. We are thankful to and fortunate enough to get constant encouragement, support and guidance from all teaching staff of the IT Department who helped us in successfully completing our project work. Also, we would like to extend our sincere thanks to all staff in the laboratory for their timely support.

We would also like to express our gratitude towards our parents for their kind cooperation and encouragement which helped us in completion of this project.

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A Cost-Benifit Analysis and Fertilizer Prediction For Crop Yield Optimisation

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Abstract— **India is currently the world's second largest producer of several dry fruits, agriculture-based textile raw materials, roots and tuber crops, pulses, farmed fish, eggs, coconut, sugarcane and numerous vegetables. In order to produce more agricultural products adequate quantity of good fertilizers should be used. Majority farmers use fertilizers to increase production. But they should know which fertilizer is best suitable for their land and in which amount. They should calculate how much it will cost for total process of fertilization. This paper is to help them to solve this problem using Software technology and machine learning. This research paper present fertilizer prediction and cost benefit analysis for farming. The analysis evaluates the cost and benefit of using a fertilizer prediction system to optimize crop yield in the context of a large-scale farm. A survey was conducted with farmers to assess the cost and time required to implement a fertilizer prediction system. Additionally, a financial analysis was conducted to assess the economic benefits of using a fertilizer prediction system. Finally, the results were compared to the current fertilizer application methods to determine the potential benefit of using a fertilizer prediction system. The results of the analysis show that a fertilizer prediction system has the potential to reduce costs and increase yields significantly. The analysis also sheds light on the challenges and opportunities associated with implementing a fertilizer prediction system. The findings of this study provide valuable insights for farmers and agricultural professionals interested in optimizing crop yield through the use of fertilizer prediction systems.**

This paper is based on following key points.

1. The Impact of AI and ML on Fertilizer Use

2. Sustainable Agriculture

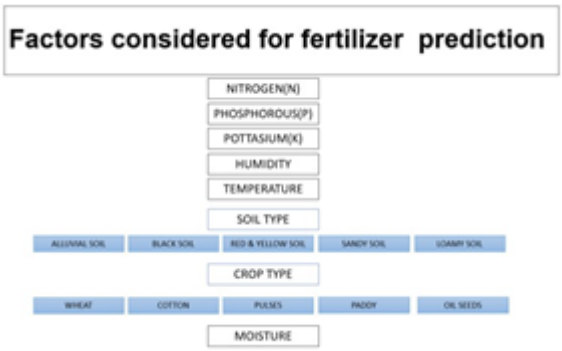
3. Cutting Costs and Improving Yields

4. Maximizing Profits and Minimizing Waste

Keywords— Fertilizer, Crop, Agriculture, soil quality

I. INTRODUCTION

Agriculture is the backbone of Indian Economy. Plants require nutrients in order to grow and give more yields. Nutrients to the plants are provided through soil, manure and the fertilizers. There are 16 essential nutrients that are required for the plant growth viz., carbon, hydrogen, oxygen, nitrogen, phosphorous, potassium, Sulphur, calcium, magnesium, boron, iron, manganese, molybdenum, zinc, chlorine and copper. These are either provided through soil or water in the form of micronutrients and macronutrients. The deficiency of these nutrients can be found out by using soil testing mechanism. There have been advancements in Science and Technology in India from past few decades. But the productivity of farming is declining and there are several reasons behind it: fragmented land holding illiteracy of farmer, lack of decision making in choosing good seed, manure and fertilizer. Several studies show that farmers have little knowledge over usage of optimum level of fertilizer for optimal crop yield. The plants require fertilizer when they are deficient of nutrients. Also the usage of fertilizer more than the requisite level produces crops with increased fertilizer content which upon consumption leads to several harmful diseases. When fertilizers are added to the soil it decreases the microbial activity of soil. The factors affecting the fertilizer consumption are: extent of available land, cultivated land, rainfall, cropping pattern, soil characteristics.



The use of artificial intelligence (AI) and machine learning (ML) in agriculture has been rapidly increasing in recent years. These technologies have shown great potential in improving crop yields and reducing the amount of fertilizer needed. One of the ways AI and ML are being used in agriculture is for fertilizer prediction.

Fertilizer prediction involves using algorithms to determine the amount of fertilizer required for crops. This is important because over-fertilization can be harmful to crops and the environment, while under-fertilization can result in lower yields. With the help of AI and ML, farmers can now make more informed decisions about fertilizer use, leading to more sustainable and efficient agriculture practices.

The first step in fertilizer prediction using AI and ML is to gather data. This data may include information on soil type, weather conditions, crop growth, and fertilizer usage. This data is used to train machine learning algorithms, which can then make predictions about the optimal amount of fertilizer required for specific crops and conditions.

There are a number of different AI and ML algorithms that can be used for fertilizer prediction, including decision trees, neural networks, and support vector machines. These algorithms use statistical methods to analyze the relationships between the data and make predictions about fertilizer requirements. The algorithms can also be fine- tuned and improved over time as more data is gathered, allowing for even more accurate predictions in the future.

One of the advantages of using AI and ML for fertilizer prediction is that the algorithms can learn from past data and make predictions about future conditions. This can help farmers make decisions about fertilizer use that are more in line with the specific needs of their crops, leading to improved yields and more sustainable agriculture practices. This proposed system takes soil data such as nitrogen level, phosphorous level, Potassium level, soil type, temperature, moisture, crop types as input and suggests you the best fertilizer which should use. It calculates price of fertilizer, water cost, amount of fertilizer required, and cost of other necessary instruments in the process and gives the total cost of fertilizing the land. If anyone was unware about using new fertilizer it will show them ways and appropriate condition and time to use it.

II. LITERATURE SURVEY

A literature survey on the topic of fertilizer prediction and cost analysis would involve reviewing research papers and articles that explore the methods used to predict fertilizer requirements for crops and the associated costs. Here are a few key findings from such a survey:

Fertilizer prediction methods: A number of methods have been proposed for predicting fertilizer requirements for crops. These methods range from simple nutrient balance models to complex machine learning algorithms. Some of the most widely used methods include crop simulation models, neural networks, and decision trees.

Cost analysis of fertilizers: The cost of fertilizers is determined by various factors, including the type of fertilizer, the cost of raw materials, and the production and transportation costs. Researchers have used cost-benefit analysis and linear programming techniques to analyze the costs associated with different fertilizer application strategies.

Integration of fertilizer prediction and cost analysis: Some studies have attempted to integrate fertilizer prediction and cost analysis into a single framework. For example, researchers have used multi-objective optimization algorithms to determine the optimal fertilizer application strategy that balances both the fertilizer requirements of crops and the associated costs.

Case studies: Many studies have been conducted on specific crops and regions to evaluate the effectiveness of fertilizer prediction and cost analysis methods. These studies have provided insights into the challenges and opportunities of applying these methods in different agro-climatic conditions.

Machine learning algorithms: A number of machine learning algorithms have been applied to the problem of fertilizer prediction, including decision trees, random forests, neural networks, and support vector machines. These algorithms have been trained on data collected from various sources, such as soil nutrient content, crop growth data, and weather conditions, to make predictions about the fertilizer requirements for crops.

Integration with other technologies: Some studies have integrated AI and ML-based fertilizer prediction with other technologies, such as remote sensing, to improve the accuracy of predictions. For example, researchers have used satellite images and unmanned aerial vehicles to gather information about crop growth and soil nutrient content, which is then fed into machine learning models to make predictions about fertilizer requirements.

Overall, the literature survey highlights the importance of considering both fertilizer prediction and cost analysis when making decisions about fertilizer application. The methods used to predict fertilizer requirements and analyze costs continue to evolve and improve, offering new opportunities to optimize fertilizer use and minimize costs.

III. RELATED WORK

The study proposes a novel crop yield prediction model that performs better than existing approaches when employing a beehive clustering strategy. At the 2013 International Conference on Pattern Recognition, Informatics, and Mobile Engineering, the model was displayed. [1]

The author describe an intelligent system for predicting agricultural production using kernel methods in their study titled "An intelligent system based on kernel approaches for crop yield prediction." The paper was released by Springer in Berlin, Heidelberg, and presented at the Pacific-Asia Conference on Knowledge Discovery and Data Mining. [2]

The paper titled "Fuzzy Logic based Crop Yield Prediction using Temperature and Rainfall parameters predicted through ARMA, SARIMA, and ARMAX models" by Bang, Bishnoi, Chauhan, Dixit, and Chawla (2019) presents a fuzzy logic approach for predicting crop yield using temperature and rainfall data. The authors use ARMA, SARIMA, and ARMAX models to predict the temperature and rainfall parameters and then use these predictions as inputs to their fuzzy logic model. The study was presented at the 2019 Twelfth International Conference on Contemporary Computing (IC3) and was published by IEEE.[3]

"Crop Yield Prediction Using Data Analytics and Hybrid Approach" has a hybrid approach for predicting crop yield using data analytics. The study was presented at the 2018

Fourth International conference on Computing, Communication, Control and Automation (ICCUBEA) and was published by IEEE. [4]

A study on various data mining strategies for crop yield prediction is presented in the publication "A study on various data mining techniques for crop yield prediction" by Gandge (2017). The research was presented at and afterwards published by IEEE's International Conference on Electrical, Electronics, Communication, Computer, and Optimization Techniques in 2017. [5]

The author in 2016 provide a study on predicting rice crop yield using artificial neural networks in their paper titled "Rice crop yield prediction using artificial neural networks." The research was published by IEEE and presented at the

2016 IEEE Technological Innovations in ICT for

Agriculture and Rural Development (TIAR). [6]

The study on the use of support vector machines for predicting rice crop yield in India in their paper titled "Rice crop yield prediction in India using support vector machines." The research was presented in the IEEE-published 13th International Joint Conference on Computer Science and Software Engineering in 2016. [7]

A study on the application of a decision support system for forecasting Indian rice crop production is presented in Author's work, "Proposed decision support system (DSS) for Indian rice crop yield prediction." IEEE published the research, which was presented at the 2016 Technological Innovations in ICT for Agriculture and Rural Development (TIAR) conference. [8]

A study on employing a deep neural network for crop selection and yield prediction in Bangladesh is presented in the paper "A Deep Neural Network Approach for Crop Selection and Yield Prediction in Bangladesh". The research was published by IEEE and presented at the 2018 IEEE Regio 10 Humanitarian Technology Conference (R10- HTC). [9]

In a 2008 study, Jaikla et al. investigated the use of the support vector regression approach for predicting rice yield. At the 5th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications, and Information Technology, the work was presented.. [10]

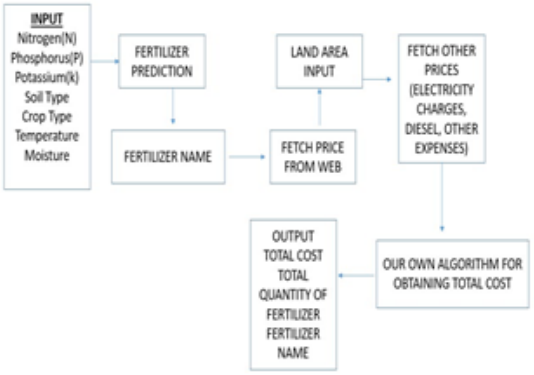
The study proposed a wheat yield prediction model using artificial neural networks in the 4th International Conference on Engineering Technology and Technopreneuship.[11]

A flexible framework, XCYPF, was proposed for agricultural crop yield prediction in 2015 by Manjula and Narsimha at the 9th IEEE ISCO conference. [12].

IV. PROPOSED METHODOLOGY

The works done till now only predict fertilizer based on soil quality like nitrogen deficiency, potassium deficiency, phosphorus deficiency or the crop farmer is going to yield. It doesn't show how much different fertilizers need to use and weather conditions such as Temperature, humidity are not considered. So, It is necessary to provide more accurate result considering all parameters and suggest amount need to be used. This program will calculate the cost it will take to fertilize full land and suggest effective and cost friendly fertilizer to be used.

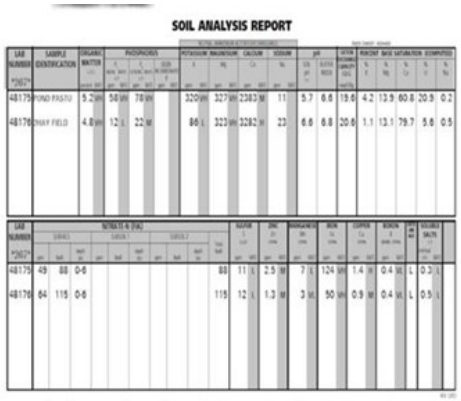
The Aim is to suggest farmer the best choice on fertilizer, amount he required and predict the cost He will needed to complete the fertilization process. So the process planned as follow to achieve optimum result.



A. Fertilizer Prediction:

To achieve the goal of suggesting best fertilizer for that take following parameters into consideration.

- Nitrogen
- Phosphorus
- Potassium
- Soil type
- Crop type• Moisture
- Temperature
- Humidity



An example soil test report from Midwest Labs. The report is complete, showing organic matter, pH, cation exchange capacity, base saturation and nutrient levels – including micronutrients.

Machine learning algorithms used to predict fertilizer.

1) Random Forest Algorithm:

➢ Random Forest is a powerful and versatile supervised machine learning algorithm that grows and combines multiple decision trees to create a "forest.

➢ Suppose there is a dataset that contains NPK, crop types, soil types. So, this dataset is given to the

Random Forest classifier. The dataset is divided into subsets and given to each decision tree. During

the training phase, each decision tree produces a prediction result, and when a new data point occurs, then based on the majority of results, the Random Forest classifier predicts the final decision.

2) k-Nearest Neighbors (k-NN):

➢ k-NN is a type of instance-based learning algorithm that makes predictions based on the similarity between new data points and existing data points.

➢ It is commonly used for classification and

regression tasks, including fertilizer prediction.

3) Gradient Boosting:

➢ Gradient Boosting is an ensemble learning algorithm that combines multiple weak learners to make predictions.

➢ It is commonly used for regression and classification tasks, including fertilizer prediction.

4) SVM (Support Vector Machine):

➢ SVM develops a hyperplane or set of hyper planes in a high-or boundless dimensional space, which can be utilized for characterization, relapse, or different errands.

➢ Naturally, a great partition is accomplished by the hyperplane that has the biggest separation to the closest preparing information purpose of any class, since by and large the bigger the edge the lower the

speculation blunder of the classifier.

➢ SVM calculation has a regularization parameter, which stays away from over-fitting.

➢ SVM calculation utilizes the portion trap, so you can construct master learning about the issue.

5) Decision Trees:

➢ Decision trees are a type of supervised machine learning algorithm that can be used

for fertilizer prediction. They are a tree-like structure that makes predictions based on a series of decisions and conditions.

6) Neural Networks:

➢ Neural networks are a type of machine learning algorithm that are modeled after the structure and function of the human brain. They are

commonly used for prediction tasks, including fertilizer prediction.

B. Amount of fertilizer required:

The amount of fertilizer required should be known by farmer before buying it. By predicting How much a mount of fertilizer a part of farm required formula can predict total amount of fertilizer required. As if 1 acre of land require

13kg of fertilizer. It can simply say how much fertilizer

require by specific area of farm. This amount changes with respect to land properties.

C. Cost analysis:

Cost analysis is an important aspect of fertilizer prediction as it helps to determine the economic feasibility of different fertilizer application strategies. Here are a few ideas for conducting cost analysis on fertilizer predictions:

Cost-Benefit Analysis: A cost-benefit analysis can be used to compare the costs of different fertilizer application strategies with the potential benefits, such as increased crop yield and improved soil fertility. This type of analysis takes into account the costs of fertilizer, labor, and equipment, as well as any potential income from increased crop production.

Linear Programming: Linear programming can be used to optimize the fertilizer application strategy to minimize costs while still meeting the fertilizer requirements of crops. This approach models the relationship between fertilizer requirements, costs, and constraints, and uses mathematical algorithms to determine the optimal solution.

Life Cycle Cost Analysis: Life cycle cost analysis can be used to analyze the long-term costs associated with different fertilizer application strategies, taking into account both the initial costs and the ongoing costs over the life of the fertilizer application.

Monte Carlo Simulation: Monte Carlo simulation can be used to evaluate the uncertainty associated with fertilizer prediction and cost analysis. This approach uses random sampling to model the variability in fertilizer requirements, costs, and other factors, and provides a probabilistic assessment of the costs associated with different fertilizer application strategies.

Multi-Objective Optimization: Multi-objective optimization can be used to optimize the fertilizer application strategy by considering multiple objectives, such as minimizing costs and maximizing crop yield. This approach uses mathematical algorithms to determine the trade-off between these objectives and find the optimal solution.

These are just a few examples of the many methods that can be used to conduct cost analysis on fertilizer predictions. The choice of method will depend on the specific context and objectives of the analysis, as well as the data and resources available.

The algorithm is going to be precise and effective in calculating total amount, the charge of fertilizer spraying machine, diesel for tractor, electricity charges and money to brought that fertilizer are also included.

At last result will display the overall results to the farmer:

V. CONCLUSION

The prediction of fertilizer is based on parameters as mineral level, soil quality, crop type, moisture, temperature, rainfall which increases accuracy of prediction. By suggesting them approximate amount of fertilizer required prevents excess use and wastage of fertilizer. This system considers all expenses for fertilization process and gives total cost of fertilization process. It will save farmer's money, as farmers do not have to rely on fertilizer brokers, they will directly get the current real price of the fertilizer. It is cost effective and avoid wastage of fertilizers, as farmers sometimes brings more fertilizer than they needed, so we will tell them

approx. quantity that is enough for their land, this will save their money as well avoids wastage of fertilizers.

It saves time and energy of farmers as they are getting everything calculated, so they don't have to input their time and energy on such estimations.

VI. FUTURE SCOPE

The future scope of fertilizer prediction using AI and ML is very promising. As these technologies continue to advance and become more widely adopted, we can expect to see even more accurate and sophisticated predictions about fertilizer use in agriculture. Some potential areas of growth for fertilizer prediction using AI and ML include:

Increased automation: As AI and ML algorithms become more advanced, we can expect to see increased automation of fertilizer prediction. This will allow farmers to make decisions about fertilizer use with less effort and greater speed.

Improved accuracy: As more data is gathered and algorithms continue to improve, we can expect to see even more accurate predictions about fertilizer use. This will help farmers make better decisions about fertilizer use, leading to more sustainable and efficient agriculture practices.

Integration with other technologies: As fertilizer prediction using AI and ML becomes more widespread, we can expect to see it integrated with other technologies in agriculture. For example, AI and ML could be integrated with sensors and other monitoring systems to provide real-time data on crop growth and fertilizer use.

Expansion to new crops and regions: As AI and ML algorithms become more sophisticated, we can expect to see them expanded to new crops and regions. This will allow farmers around the world to benefit from these technologies and make better decisions about fertilizer use.

ACKNOWLEDGMENT

We Would Like To Express My Special Thanks Of Gratitude To Our Guide Mr.Sudhir Dhekane, Who Gave Us The Opportunity To Do This Wonderful Research Work On The Topic Fertilizer Prediction And Cost

Analysis Using Machine Learning Algorithms Which

Also Helped Me In Doing Lots Of Research And We Came To Know Many Things We Are Really Thankful To Him And Even My Friends.

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Prediction of Multiple Diseases using Machine Learning

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Abstract— **The healthcare industry generates a massive amount of data every day, and machine learning has become a widely used tool to identify patterns and make predictions. With the help of machine learning, real-world problems in the healthcare industry can be solved more efficiently, and researchers are exploring more advanced technologies to improve the accuracy and effectiveness of their approaches. A recent study that describes the current state of disease prediction methods, particularly with respect to prediction algorithms, can provide a better understanding of the latest models developed in this field. Additionally, this paper compares the advantages and disadvantages of various approaches used to predict diseases such as Breast Cancer, Heart Disease, and Diabetes. Finally, the paper highlights some research directions that can be pursued in the future to improve disease prediction in the healthcare sector.**

Keywords- Heart Disease, Breast Cancer, Diabetes, Machine Learning, Classificatio

I. NTRODUCTION

As the world becomes more fast-paced, many healthcare organizations have emerged that offer continuous monitoring solutions, such as smartwatches that consistently track a patient's health and fitness. In the past, patients would visit a clinic and rely on the doctor's expertise and experience to diagnose and prescribe appropriate treatments. However, this outdated method of diagnosis often results in delayed treatment and a higher incidence of health problems, especially in countries like India that are experiencing rapid growth and development.

The healthcare industry has experienced a transformation due to the adoption of technology. This modern approach has led to the development of computer-aided support systems and tools, which have greatly improved patient care while reducing the cost of treatment by increasing efficiency in medical resources. However, designing a predictive system that can accurately predict diseases using available medical data is a significant challenge that requires careful consideration.

The healthcare industry is a significant generator of data, which is used by predictive models to extract relevant information about a patient's specific disease. This extracted information is then used to provide more effective and better-tailored treatments. Machine learning has been widely adopted in the healthcare industry to address various real-world problems that previously required the time and expertise of an individual. Large amounts of data, including patient records, medical images, and reports, are produced in the healthcare sector and serve as datasets that help identify patterns and make predictions.

Our proposed system incorporates multiple disease predictions within a single user interface, including heart-related diseases, breast cancer, and diabetes. We will use machine learning classification algorithms, such as Logistic Regression and Random Forest, to predict these multiple diseases.

II. Literature Review

A. Survey Existing System

Senthil Kumar Mohan et al. [1] presented a promising approach for predicting heart disease using a hybrid machine learning approach. The goal was to identify important features by applying machine learning techniques to improve the accuracy of predicting cardiovascular disease. The prediction model was created using a diverse set of features and various well-known classification methods such as k-Nearest Neighbors (kNN), Logistic Regression (LR), Support Vector Machines (SVM), Neural Networks (NN), and Voting. In recent times, different data mining techniques and prediction methods have been widely used to detect and predict heart disease. The system achieved an accuracy of 88.47%, indicating its effectiveness in predicting heart disease.

In their study, Lambodar Jena et al. [2] focused on predicting the risk of serious diseases using distributed machine learning classifiers, utilizing algorithms such as Naive Bayes and Multilayer Perceptron. The research aimed to predict Chronic Kidney Disease and achieved high accuracy rates of 95% and 99.7% for Naive Bayes and Multilayer Perceptron, respectively. This indicates the effectiveness of the proposed approach in accurately predicting the risk of chronic kidney disease.

Rashmi G Saboji et al. [3] aimed to develop a scalable solution for identifying heart disease using classification mining and implemented the Random Forest Algorithm. The proposed system was compared against the Naive-Bayes classifier and demonstrated higher accuracy in identifying heart disease, with an accuracy rate of 98%. This indicates the effectiveness of using the Random Forest Algorithm for accurately identifying heart disease.

Rati Shukla et al, [4] recommended prediction and detection for breast cancer by using machine learning algorithms like Decision Tree, Support Vector Machine, Random Forest, Naïve Bayes, Neural Network, and KNN The results of their study indicated that the Support Vector Machine algorithm outperformed all the other algorithms in terms of accuracy. This suggests that the Support Vector Machine algorithm is a promising tool for predicting and detecting breast cancer.

B. Limitation Existing system or research gap

One is based on specialized/clinical text source while another is based on unspecialized text source. In the older method, standard statistical methods and doctor’s intuition, knowledge and experience was used for prognosis and disease prediction. This practice often lead

to unwanted errors and biases, which increased the expenses and affected the quality of service provided to patients.

Existing online health care systems are not reliable and accurate.

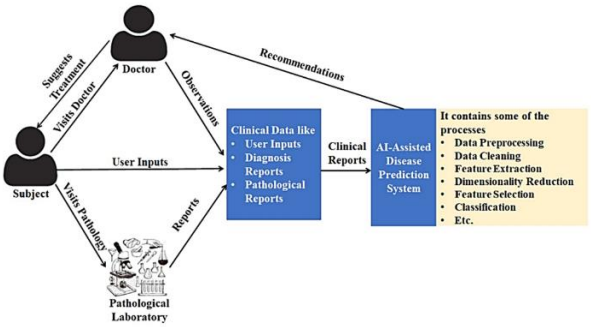


fig. 1: Steps in a general decision support system

C. Diagnosis Method

In many electronic analysis datasets, missing values, redundant information, and irrelevant attributes are common, which can reduce the efficiency of classifiers to gain insights from the data. As a result, researchers have utilized pre-processing methods, such as missing value imputation, data filtering, and data reduction, before providing the data to a classification model.

The pre-processed training samples are then used to create a machine learning module that includes the hyper-parameters of the classifier. In the testing phase, patient information is collected and pre-processed based on the available data from the training stage.

Finally, the pre-processed data is used by the saved learning model to determine whether the patient has the disease or not.

D. Problem Statement and Objectives

The traditional analysis method involves a patient visiting a doctor, witnessing numerous medical tests and then reaching a agreement. This method is highly time-consuming. The design presented in the paper suggests an automated disease prediction system to save time needed for the original manual process of disease prediction. The input to the system is given by the user and output obtained is the set of probable diseases the user might have.

- The main goal of this system is to predict diseases based on the symptoms presented by the patient. The system receives input from the user in the form of symptoms and information, and then generates an output which predicts the most likely disease based on this input.
- In addition to predicting diseases based on user input, this system also includes a database feature that allows the storage of patient data and corresponding diagnosed diseases. This data can be stored as a record and retrieved for future treatment purposes.
- With the advancement of technology, there is a growing demand for an automated prediction system that can accurately predict diseases based on symptoms without the need for physical visits to hospitals. Such a system would enable users to receive a quick diagnosis and seek appropriate treatment without delays.

III. Proposed System

Prior research has mainly focused on assessing the presence or absence of a disease. In this proposed system, we not only aim to accurately predict the disease, but also display the degree of the patient's susceptibility to the disease through a graphical representation. To achieve this, we will collect various parameters from the user and utilize machine learning algorithms such as Decision Tree, Random Forest, Naïve Bayes, and Logistic Regression to obtain the best possible results. The system will analyze and predict on diverse datasets, thereby improving the accuracy of the results. As the accuracy of the system increases, it will become more reliable and trustworthy for patients, instilling confidence and reducing concerns related to disease susceptibility.*Analysis/Framework/Algorithm*

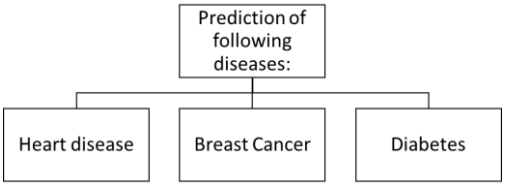
1. Random Forest

Random Forest is an ensemble learning method, widely used for classification and regression problems, providing greater accuracy compared to other models. It can easily handle large datasets and improves the performance of Decision Trees by reducing variance. During training, decision trees are constructed, and the output is the class mode of the individual trees' class predictions.

2. Logistic Regression

Logistic Regression is a classification algorithm used in machine learning. It's a powerful tool for binary classification that is used to predict the probability of an event occurring. The algorithm works by analyzing the relationship between a dependent variable and one or more independent variables. It uses a logistic function to convert the continuous output of the regression model to a binary output, such as yes or no, 1 or 0, true or false. Logistic Regression is widely used in healthcare for predicting the likelihood of various diseases based on the patient's characteristics and medical history.

A. Design Details



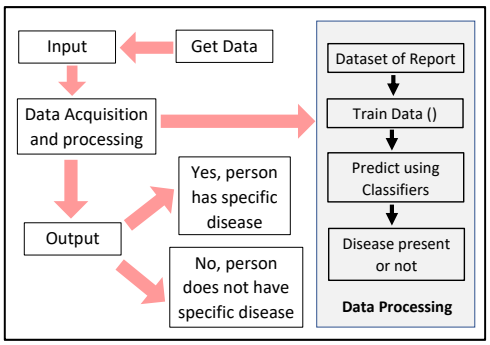


fig. 2 : The Proposed System /System Architecture

B. Methodology

This project aims to predict multiple diseases based on patient-entered data. The process starts by defining the problem statement and preparing the dataset for analysis. Data visualization techniques like scatter plots and graphs are used to identify anomalies and missing values, which are addressed during preprocessing to ensure high-quality data for accurate disease prediction. The prediction is made using machine learning algorithms like Logistic Regression, Naïve Bayes, and Random Forest, which provide early and accurate disease predictions. Python is used as the primary language to carry out the machine learning algorithms due to its widespread use in the field.

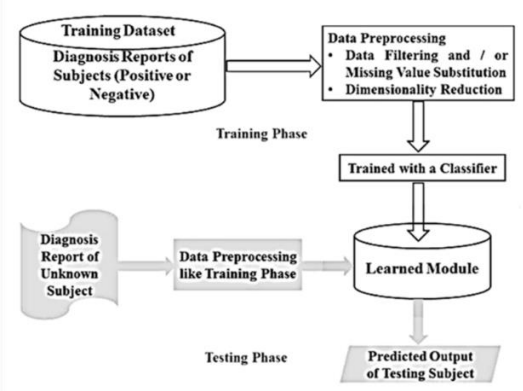


fig. 3: A block diagram illustrating steps for prediction of diseases from a given set of datasets

IV. Experimental set up

A.Details of Database or details about input to systems or selected

We have provided the testing dataset to this trained model for testing the accuracy of model.

B.Performance Evaluation Parameters (for Validation)

Accuracy of the diseases based on algorithm used

1. Breast cancer
   Logistic regression accuracy - 92.1 %

2. Heart disease
   Random forest - 95%

3. Diabetes
   Random forest- 98%

C.Evaluation Metrics

The paper describes multiple disease prediction systems that utilize machine learning models, which are evaluated based on predefined criteria such as accuracy, precision, recall, F1-score, specificity, and area under the receiver operator characteristic curve. These performance metrics can be measured using a confusion matrix or error rate, which provides information on the model's true positives, true negatives, false positives, and false negatives. The confusion matrix is an N x N dimensional matrix, where N is the number of classes, and it is used to evaluate the performance of a prediction model.

V. V. Implemenation

1. Decided the number of the diseases for the project
- Heart Disease
- Breast cancer
- Diabetes

2. Collection of datasets for diseases.
3. Implementation of different machine learning algorithms on diseases like Logistic Regression and Random Forest.

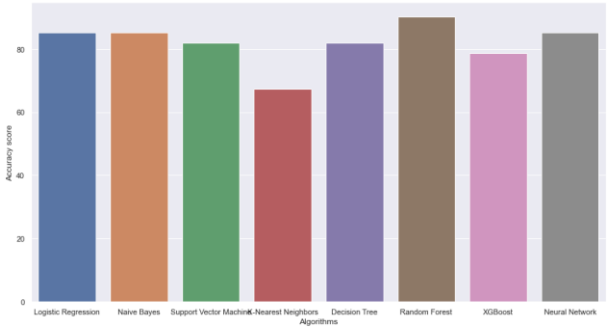


fig. 4: Comparison of various algorithms to find the better algorithm for heart disease

The figure above i.e. fig.4 represents the comparison of various algorithms used to predict the heart disease and which shows that Random forest has the highest accuracy in comparison to others. Similarly we are working on the other two diseases as well as heart disease too to improve the accuracy of model by trying with the different ML approaches possible.

VI. Acknowledgment

We express our sincere gratitude to **Dr. Sanjay U. Bokade**, **Principal,** and **Prof. S. P. Khachane, H.O.D.** of the Department of Computer Engineering at Rajiv Gandhi Institute of Technology, for providing us with the opportunity to undertake our project on "**Prediction of Multiple Diseases using Machine Learning**".

We would like to extend our heartfelt thanks to our project guide, **Prof. D. M. Dalgade**, for his valuable guidance, support and encouragement throughout the project.

We also thank our classmates for their support and cooperation in completing this project.

VII. FUTURE WORK

Our main aim for the future work is to improve the accuracies of these 3 diseases as it is related to health care so it possibly needs the highest accuracy as compared to other fields and we would try to reach accuracy as best as possible. Also we would connect these to frontend part so that it becomes more user friendly so that users can enter the specific values of their parameters defined and predict whether person has disease or not.

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Use of ai in Agriculture

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Abstract -**Artificial Intelligence (AI) has the potential to revolutionize the way we approach agriculture. By analyzing large amounts of data and making predictions based on that data, AI can help farmers optimize their practices to improve yields, reduce waste, and make the industry more sustainable. AI can also help with tasks such as predicting weather patterns, detecting crop diseases, and optimizing irrigation systems. The use of AI in agriculture has the potential to increase efficiency, lower costs, and ensure a stable food supply for a growing global population. However, the implementation of AI in agriculture also raises concerns around job displacement, privacy, and data ownership. As AI continues to evolve, it will be important to address these issues to ensure responsible and fair use of AI in agriculture.**

I. INTRODUCTION

Artificial Intelligence (AI) has the ability to revolutionize the way we approach agriculture. through studying massive quantities of records and making predictions primarily based on that information, AI can assist farmers optimize their practices to enhance yields, reduce waste, and make the enterprise extra sustainable. AI can also assist with duties inclusive of predicting weather styles, detecting crop illnesses, and optimizing irrigation systems. the usage of AI in agriculture has the capacity to increase efficiency, lower fees, and make sure a strong meals deliver for a developing worldwide populace. however, the implementation of AI in agriculture also raises concerns around job displacement, privateness, and records ownership. As AI maintains to strengthen, it'll be important to deal with these troubles to ensure the accountable and equitable deployment of AI in the agriculture sector.

Crop diseases are a major risk to food conservation, but their rapid identification remains difficult in many parts of the arena due to a lack of basic infrastructure. The combination of growing worldwide phone penetration and recent advancements in the imagination and foresight of portable computing, made possible through deep learning, has paved the way for mobile phone- based disease diagnosis. Using a public dataset of

54,306 photos of diseased and healthy plant leaves collected in controlled situations, we train a deep convolutional neural community to detect 14 crop species and 26 diseases (or their absence). The trial version achieves an accuracy of 99.35% on the test set, demonstrating the feasibility of this approach. In general, methods for training deep learning models on larger, publicly available photographic datasets represent a clear path to analyzing crop cell diseases on a global scale.

II. LITERATURE REVIEW

The integration of artificial Intelligence (AI) in agriculture is a hastily developing discipline with a growing frame of literature exploring its various programs and blessings. In recent years, AI technology which include gadget getting to know, pc imaginative and prescient, and robotics have been implemented to various factors of agriculture, ranging from precision agriculture to crop

monitoring, weather prediction, and pest and disorder control. In precision agriculture, AI algorithms are used to analyze information from various sources which includes satellite imagery, sensors, and drones to make unique selections on fertilizer and pesticide software, irrigation, and planting patterns. This allows farmers to optimize their practices, reduce waste, and enhance yields. as an instance, AI algorithms can analyze soil and crop facts to decide the most premier time to apply fertilizer and irrigation, accordingly decreasing the amount of fertilizer and water needed and decreasing the environmental effect of agriculture. In crop monitoring, AI is used to discover crop increase styles and become aware of problems along with disease outbreaks and nutrient deficiencies. as an instance, computer vision algorithms can analyze photos of crops to stumble on signs of ailment, allowing farmers to take proactive measures to control the spread of disease and minimize damage. In weather prediction, AI models are used to make extra correct predictions approximately future climate styles, which could assist farmers make informed choices about planting, harvesting, and storage. as an example, AI algorithms can examine historic climate records and expect destiny climate patterns, permitting farmers to put together for extreme climate occasions and limit crop loss. sooner or later, in pest and disorder control, AI is used to detect and predict outbreaks of pests and sicknesses, helping farmers to take proactive measures to manipulate them. for example, AI algorithms can examine pix of vegetation to discover signs and symptoms of pests, allowing farmers to take measures to govern pest populations earlier than they cause enormous damage. no matter the severa capacity blessings of AI in agriculture, there are also some worries. as an instance, there are questions on the accuracy and reliability of AI structures, information privacy and security, and the moral implications of AI-driven selection-making in agriculture. similarly, there's a need for extra research to recognize the monetary, social, and environmental effect of AI in agriculture. average, the literature on AI in agriculture highlights the good sized potential of these technology to revolutionize the manner we technique agriculture. but, it's far vital to cope with the issues and limitations related to AI to ensure that these technology are deployed in a responsible and equitable manner

III. METHODOLOGY

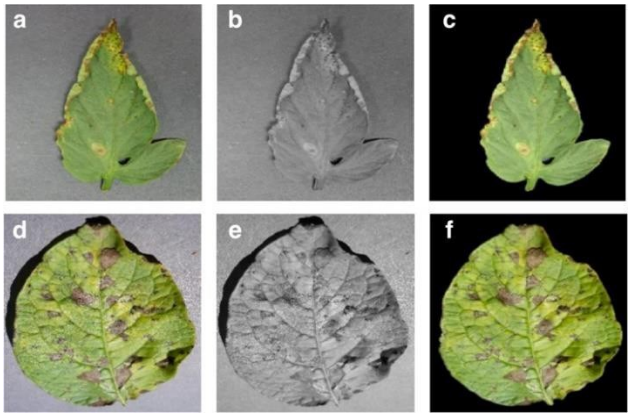
A. Disease Detection

Dataset Description we analyze 54,306 **plant leaf** images **labeled with** 38 **classes.** Each class label **represents** a crop-disease pair, and we **want** to predict crop-disease **pairs** given **only images** of plant **leaves. on figs.** 1 shows one example **for** each crop-disease pair **in** the

PlantVillage dataset. In all approaches described in this **article,** we resize images to **256×256 pixels** and perform both model optimization and **prediction** on these **scaled down** images.

All experiments use three different versions of the full PlantVillage dataset. We start with the PlantVillage dataset as it is, in color; then we experiment with a gray-scaled version of the PlantVillage dataset, and finally we run all the experiments on a version of the PlantVillage dataset where the leaves were segmented, hence removing all the extra background information which might have the potential to introduce some inherent bias in the dataset due to the regularized process of data collection in case of PlantVillage dataset. Segmentation was automated by the means of a script tuned to perform well on our particular dataset. We chose a technique based on a set of masks generated by analysis of the color, lightness and saturation components of different parts of the images in several color spaces (Lab and HSB). One of the steps of that processing also allowed us to easily fix color casts, which happened to be very strong in some of the subsets of the dataset, thus removing another potential bias.

This set of experiments was designed to understand if the neural network actually learns the "notion" of plant diseases, or if it is just learning the inherent biases in the dataset**.** Figure shows different versions of the same leaf for a randomly selected set of leaves.



SAMPLE IMAGES FROM THE THREE DIFFERENT VERSIONS OF THE PLANTVILLAGE DATASET USED IN VARIOUS EXPERIMENTAL CONFIGURATIONS. (A) Leaf 1 color, (B) Leaf 1 grayscale, (C) Leaf 1 segmented, (D) Leaf 2 color, (E) Leaf 2 gray-scale, (F) Leaf 2 segmented.

Measurement of Performance

To get a sense of how our approaches will perform on new unseen data, and also to keep a track of if any of our approaches are overfitting, we run all our experiments across a whole range of train-test set splits, namely 80–20 (80% of the whole dataset used for training, and 20% for testing), 60–40 (60% of the whole dataset used for training, and 40% for testing), 50–50 (50% of the whole dataset used for training, and 50% for testing), 40–60 (40% of the whole dataset used for training, and 60% for testing) and finally 20–80 (20% of the whole dataset used for training, and 80% for testing). It must be noted that in many cases, the PlantVillage dataset has multiple images of the same leaf (taken from different orientations), and we have the mappings of such cases for 41,112 images out of the 54,306 images; and during all these test-train splits, we make sure all the images of the same leaf goes either in the training set or the testing set. Further, for every experiment, we compute the mean precision, mean recall, mean F1 score, along with the overall accuracy over the whole period of training at regular intervals (at the end of every epoch). We use the final mean F1 score for the comparison of results across all of the different experimental configurations.

Approach

We evaluate the applicability of deep convolutional neural networks **to** the classification problem described above. We will focus on two popular architectures: AlexNet (Krizhevsky et al.

2012) and GoogLeNet (Szegedy et al. 2015), developed in the context of the Large

Task of Visual Recognition

(ILSVRC) (Rusakovsky et al.). al., 2015) ImageNet data set (Deng et al., 2009).

The AlexNet architecture (see Figure S2) follows the same design pattern as the 1990s LeNet- 5 architecture (LeCun et al., 1989). A variant

of the LeNet-5 architecture is a set of stacked convolutional layers, usually followed by one or more fully connected layers. A convolutional level can optionally have a normalization level and a pooling level, and every level of the network usually has a non-linear ReLu activation unit connected. AlexNet consists of 5 convolutional layers, 3 fully connected layers, and finally ending with a softMax layer. The first two convolutional layers (conv{1, 2}) are followed by regularization and union layers, and the last convolutional layer (conv5) is followed by a single union layer. The last fully connected layer (fc8) has 38 outputs feeding the softMax layer to the adapted version of AlexNet (corresponding to the total number of classes in the dataset). Finally, the softMax layer exponentially normalizes the input received from (fc8) to produce a distribution of values that sum to 1 across the 38 classes. These values are the current value of the given input image. for that class. There are ReLu nonlinear activation blocks associated with all first seven layers of AlexNet, and the first two fully connected layers (fc{6, 7}) have dropout layers with dropout coefficients of 0.5 connected.

GoogleNet architecture, on the other hand, is a much deeper and wider architecture with 22 layers, but with far fewer parameters (5 million parameters) in the network than AlexNet (60 million parameters). Using a network-within-a- *network architecture* in the form of seed modules (Lin et al., 2013) is a key feature of the GoogleNet architecture. The initial module can capture different features in parallel using 1×1, 3×3 and 5×5 parallel convolutions with max pooling parallel layers. From an implementation practical point of view, we need to control the amount of computation involved, so we add 1×1 convolutions (and after max pooling layers) up to the aforementioned 3×3, 5×5 convolutions to reduce

dimensionality. Finally, the filter pooling layer simply combines the outputs of all these parallel layers. This forms one seed module, but the version of the GoogLeNet architecture used in the experiment uses a total of nine seed modules. A detailed overview of this architecture can be found (Szegedy et al., 2015).

Train a model from scratch in one case, then use transfer learning to tune an already trained model (trained on the ImageNet dataset) to analyze the performance of these two architectures on the PlantVillage dataset. For transfer learning, reinitialize the weights of the fc8 layer for AlexNet or the loss layer {1,2,3}/classifier for GoogLeNet. Then, when training the model, we do not constrain the training of the layers as is sometimes done in transfer learning. That is the key difference between these two approaches to learning (translation vs. learning).

Learning from scratch) is in the initial state

of the weights of several layers, so pretrained AlexNet and GoogleNet models extracted from ImageNet (Russakovsky et al.,2015).).

In summary, there are a total of 60 experimental configurations with different parameters:

1. Choose a deep learning architecture: AlexNet.GoogLeNet.

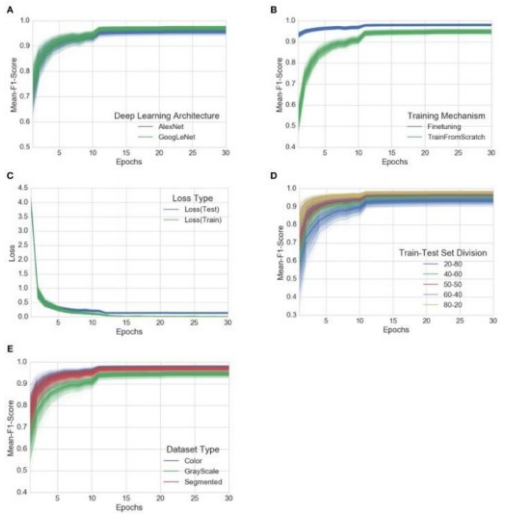
2.Select: Transfer Learning, Learning from scratch.

3. **Select data set** type: Color, Grayscale, Segment Sheet.

4. Select train and test set distribution: train: 80%, test: 20%, train: 60%, test: 40%, train: 50%, test: 50%, train : 40%, Exam: 60%, Training: 20%, Exam: 80%.

Throughout this paper, we have used the notation of Architecture:TrainingMechanism:DatasetType:Tr ain-Test-Set-Distribution to refer to particular experiments. For instance, to refer to the experiment using the GoogLeNet architecture, which was trained using transfer learning on the gray-scaled PlantVillage dataset on a train—test set distribution of 60–40, we will use the notation GoogLeNet:TransferLearning:

Each of these 60 experiments runs for a total of 30 epochs, where one epoch is defined as the number of training iterations in which the particular neural network has completed a full pass of the whole training set. The choice of 30 epochs was made based on the empirical observation that in all of these experiments, the learning always converged well within 30 epochs (as is evident from the aggregated plots (Figure 3) across all the experiments).



PROGRESSION OF MEAN F1 SCORE AND LOSS THROUGH THE TRAINING PERIOD OF

30 EPOCHS ACROSS ALL EXPERIMENTS,

GROUPED BY EXPERIMENTAL CONFIGURATION PARAMETERS. The intensity of a particular class at any point is proportional to the corresponding uncertainty across all experiments with the particular configurations. (A) Comparison of progression of mean F1 score across all experiments, grouped by deep learning architecture, (B) Comparison of progression of mean F1 score across all experiments, grouped by training mechanism, (C) Comparison of progression of train-loss and test-loss across all experiments, (D) Comparison of progression of mean F1 score across all experiments, grouped by train-test set splits, (E) Comparison of progression of mean F1 score across all experiments, grouped by dataset type. A similar plot of all the observations, as it is, across all the experimental configurations can be found in the Supplementary Material.

Results

First of all, on a dataset with 38 class labels, random guessing gives an average overall

accuracy of 2.63%. For all experimental configurations involving three visual

representations of image data (see Figure 2), the overall accuracy obtained for the PlantVillage dataset was 85.53% (AlexNet::TrainingFromScrat ch::GrayScale::80 - 20).) up to 99.34% (for GoogLeNet::TransferLearning::Color

::80–20), indicating great promise of deep learning approaches for similar prediction problems. Table 1 shows the average F1 score, average accuracy, average recall, and overall accuracy for all experimental configurations. All experimental configurations each run for a total of 30 epochs and converge almost consistently after the first learning rate decay step.

Table 1.

	AlexNet		GoogleNet	
	Transfer learning	Training from scratch	Transfer learning	Training from scratch
TRAIN: 20%, TEST: 80%				
Color	0.9736 (0.9742, 0.9737, 0.9738)	0.9118 (0.9137, 0.9132, 0.9130)	**0.9820** (0.9824, 0.9821, 0.9821)	0.9430 (0.9440, 0.9431, 0.9429)
Grayscale	0.9361 (0.9368, 0.9369, 0.9371)	0.8524 (0.8539, 0.8555, 0.8553)	**0.9563** (0.9570, 0.9564, 0.9564)	0.8828 (0.8842, 0.8835, 0.8841)
Segmented	0.9724 (0.9727, 0.9727, 0.9726)	0.8945 (0.8966, 0.8963, 0.8969)	**0.9808** (0.9810, 0.9808, 0.9808)	0.9377 (0.9388, 0.9380, 0.9380)
TRAIN: 40%, TEST: 60%				
Color	0.9860 (0.9861, 0.9861, 0.9860)	0.9556 (0.9557, 0.9558, 0.9558)	**0.9914** (0.9914, 0.9914, 0.9914)	0.9729 (0.9731, 0.9729, 0.9729)
Grayscale	0.9584 (0.9586, 0.9589, 0.9588)	0.9088 (0.9090, 0.9101, 0.9100)	**0.9714** (0.9717, 0.9716, 0.9716)	0.9361 (0.9364, 0.9363, 0.9364)
Segmented	0.9812 (0.9814, 0.9813, 0.9813)	0.9404 (0.9405, 0.9408, 0.9408)	**0.9896** (0.9896, 0.9896, 0.9898)	0.9643 (0.9647, 0.9642, 0.9642)
TRAIN: 50%, TEST: 50%				
Color	0.9806 (0.9807, 0.9806, 0.9807)	0.9644 (0.9647, 0.9647, 0.9647)	**0.9916** (0.9916, 0.9916, 0.9916)	0.9772 (0.9774, 0.9773, 0.9773)
Grayscale	0.9661 (0.9663, 0.9663, 0.9663)	0.9312 (0.9315, 0.9318, 0.9319)	**0.9788** (0.9789, 0.9788, 0.9788)	0.9507 (0.9510, 0.9507, 0.9509)
Segmented	0.9867 (0.9868, 0.9868, 0.9869)	0.9551 (0.9552, 0.9555, 0.9556)	**0.9909** (0.9910, 0.9910, 0.9910)	0.9720 (0.9721, 0.9721, 0.9722)
TRAIN: 600%, TEST: 40%				
Color	0.9907 (0.9908, 0.9908, 0.9907)	0.9724 (0.9725, 0.9725, 0.9725)	**0.9924** (0.9924, 0.9924, 0.9924)	0.9824 (0.9825, 0.9824, 0.9824)
Grayscale	0.9686 (0.9688, 0.9688, 0.9688)	0.9388 (0.9390, 0.9395, 0.9391)	**0.9785** (0.9789, 0.9786, 0.9787)	0.9547 (0.9554, 0.9548, 0.9551)
Segmented	0.9855 (0.9856, 0.9856, 0.9856)	0.9595 (0.9597, 0.9597, 0.9596)	**0.9905** (0.9906, 0.9906, 0.9906)	0.9740 (0.9743, 0.9740, 0.9745)
TRAIN: 80%, TEST: 20%				
Color	**0.9927** (0.9928, 0.9927, 0.9928)	**0.9782** (0.9786, 0.9782, 0.9782)	**0.9934** (0.9935, 0.9935, 0.9935)	**0.9636** (0.9639, 0.9637, 0.9637)
Grayscale	**0.9726** (0.9728,0.9727, 0.9725)	**0.9449** (0.9451, 0.9454, 0.9452)	**0.9800** (0.9804, 0.9801, 0.9798)	**0.9621** (0.9624, 0.9621, 0.9621)
Segmented	**0.9891** (0.9893, 0.9891, 0.9892)	**0.9722** (0.9725, 0.9724, 0.9723)	**0.9925** (0.9925, 0.9925, 0.9924)	**0.9824** (0.9827, 0.9824, 0.9822)

Each cell in the table represents the mean F_1 score (mean precision, mean recall, overall accuracy) for the corresponding experimental configuration. The bold values are the F_1 scores of the best performing models in the respective row/column.

Mean indicator F1 for various experimental configurations at the end of 30 epochs.

To solve the overfitting problem, even in the extreme case of changing the ratio of the test set to the training set, training on only 20% of the data and testing the trained model on the remaining 80% of the data, the model would be GoogLeNet::TransferLearning:: For Color::20–80, we achieve an overall accuracy of

98.21% (average score F1 0.9820). As expected, the overall performance of AlexNet and GoogLeNet degrades as you continue to increase the test-to-training set ratio (see Figure 3D), but the degradation is not as drastic as you would expect when the model is actually overweight.mounting.

Figure also shows that there is no divergence between the validation loss and the training loss, confirming that over-fitting is not a contributor to the results we obtain across all our experiments.

Among the AlexNet and GoogLeNet architectures, GoogLeNet consistently performs better than AlexNet (Figure 3A), and based on the method of training, transfer learning always yields better results (Figure 3B), both of which were expected.

The three versions of the dataset (color, gray-scale,and segmented) show a characteristic variation in performance across all the experiments when we keep the rest of the experimental configuration constant. The models perform the best in case of the colored version of the dataset. When designing the experiments, we were concerned that the neural networks might only learn to pick up the inherent biases associated with the lighting conditions, the method and apparatus of collection of the data. We therefore experimented with the gray-scaled version of the same dataset to test the model's adaptability in the absence of color information, and its ability to learn higher level structural patterns typical to particular crops and diseases. As expected, the performance did decrease when compared to the experiments on the colored version of the dataset, but even in the case of the worst performance, the observed mean F1 score was 0.8524 (overall accuracy of 85.53%). The segmented versions of the whole dataset was also prepared to investigate the role of the background of the images in overall performance, and as shown in Figure 3E, the performance of the model using segmented images is consistently better than that of the model using gray-scaled images, but slightly lower than that of the model using the colored version of the images. While these approaches yield excellent results on the PlantVillage dataset which was collected in a controlled environment, we also assessed the model's performance on images sampled from trusted online sources, such as academic agriculture extension services. Such images are not available in large numbers, and using a combination of automated download from Bing Image Search and IPM Images with a visual verification step, we obtained two small, verified datasets of 121 (dataset 1) and 119 images (dataset

2), respectively (see Supplementary Material for a detailed description of the process). Using the best model on these datasets, we obtained an overall accuracy of 31.40% in dataset 1, and 31.69% in dataset 2, in successfully predicting the correct class label (i. i.e. crop and disease information) out of 38 possible class labels. The average accuracy of the random classifier is only 2.63%. Across all images, the correct class was included in the top 5 predictions out of 52 predictions. 89% for data set 1 and 65.61% for data set 2. The best models for both datasets were

GoogLeNet:Segmented:TransferLearning:80–20 for dataset 1 and GoogLeNet:Color:TransferLearning:80–20 for dataset data 2. An example image of such a dataset can be seen in Figure 4 along with a visualization of the activations in the initial layer of the AlexNet architecture.

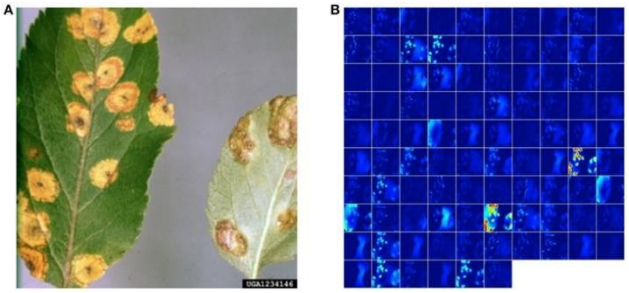


FIGURE 4. VISUALIZATION OF ACTIVATIONS IN THE INITIAL LAYERS OF AN ALEXNET ARCHITECTURE DEMONSTRATING THAT THE MODEL HAS LEARNT TO EFFICIENTLY ACTIVATE AGAINST THE DISEASED SPOTS ON THE EXAMPLE LEAF. (A) Example image of a leaf suffering from Apple Cedar Rust, selected from the top-20 images returned by Bing Image search for the keywords “Apple Cedar Rust Leaves” on April 4th, 2016. Image Reference: Clemson University - USDA Cooperative Extension Slide Series, Bugwood. org. (B) Visualization of activations in the first convolution layer(conv1) of an AlexNet architecture trained using *AlexNet:Color:TrainFromScratch:80–20* when doing a forward pass on the image in shown in panel b.

All results so far have been reported under the assumption that the model should determine both crop species and disease status. We can limit the problem to more realistic scenarios that provide crop species, since we can expect them to be known to those who grow them. To evaluate model performance in this scenario, we restrict ourselves to crops with n >= 2 (to avoid trivial classification) or n >= 3 classes per crop. If n >= 2, dataset 1 contains 33 classes distributed across 9 cultures. Random guesses on these data sets will reach zero accuracy.225, the accuracy

of our model is 0.478. If n >=3, the data set contains 25 classes distributed across 5 cultures. A random guess on such a data set achieves an accuracy of 0 .179, whereas the model has an accuracy of 0.411.Similarly, if n >= 2, data set 2 contains 13 classes distributed over 4 crops. Random guesses on these data sets achieve an accuracy of 0.314, while the model has an accuracy of 0.545. If n >= 3, the data set contains 11 classes distributed across 3 crops. Random guesses on these data sets achieve an accuracy of 0.288, whereas the model has an accuracy of 0.485.

IV. CONCLUSION

The performance of convolutional neural networks in object recognition and image classification has made tremendous progress in the past few years. Previously, the traditional approach for image classification tasks has been based on hand-engineered features, such as SIFT, and then to use some form of learning algorithm in these feature spaces. The performance of these approaches thus depended heavily on the underlying predefined features. Feature engineering itself is a complex and tedious process which needs to be revisited every time the problem at hand or the associated dataset changes considerably. This problem occurs in all traditional attempts to detect plant diseases using computer vision as they lean heavily on hand- engineered features, image enhancement techniques, and a host of other complex and labor- intensive methodologies. In addition, traditional approaches to disease classification via machine learning typically focus on a small number of classes usually within a single crop. Examples include a feature extraction and classification pipeline using thermal and stereo images in order to classify tomato powdery ildew against healthy tomato leaves ; the detection of powdery mildew in uncontrolled environments using RGB images the use of RGBD images for detection of apple scab the use of fluorescence imaging spectroscopy for detection of citrus the detection of citrus huanglongbing using near infrared spectral patterns and aircraft-based sensors the detection of tomato yellow leaf curl virus by using a set of classic feature extraction steps, followed by classification using a support vector machines pipeline, and many others. A very recent review on the use of machine learning on plant phenotyping extensively discusses the work in this domain. While neural networks have been used before in plant disease identification, the approach required representing the images using a carefully selected list of texture features before the neural network could classify them. Our approach is based on recent work which showed for the first time that end-to-end supervised training using a deep convolutional neural network architecture is a practical possibility even for image classification problems with a very large number of classes, beating the traditional approaches using hand-engineered features by a substantial margin in standard benchmarks. The absence of the labor-intensive phase of feature engineering and the generalizability of the solution makes them a very promising candidate for a practical and scaleable approach for computational inference of plant diseases.

Using the deep convolutional neural network architecture, we trained a model on images of plant leaves with the goal of classifying both crop species and the presence and identity of disease on images that the model had not seen before. Within the PlantVillage data set of 54,306 images containing 38 classes of 14 crop species and 26 diseases (or absence thereof), this goal has been achieved as demonstrated by the top accuracy of 99.35%. Thus, without any feature engineering, the model correctly classifies crop and disease from 38 possible classes in 993 out of 1000 images. Importantly, while the training of the model takes a lot of time (multiple hours on a high performance GPU cluster computer), the classification itself is very fast (less than a second on a CPU), and can thus easily be implemented on a smartphone. This presents a clear path toward smartphone-assisted crop disease diagnosis on a massive global scale.

V. ACKNOWLEDGMENT

The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression “one of us (R. B. G.) thanks ...”. Instead, try “R. B. G. thanks...”. Put sponsor acknowledgments in the unnumbered footnote on the first page.*Comput. Vis.* 88, 303–338. doi: 10.1007/s11263-009-0275-4

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Automated System to Detect Liveness of a Person

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Abstract— **Face recognition has drawn a lot of attention during the last several years. Face authentication has recently gained a lot of popularity due to its simplicity and the effectiveness of face recognition technologies. Face biometric systems are frequently used to identify an individual's real identity based on physiological characteristics and behavioral patterns. However, this can be faked by malicious users who deliberately try to get around the system's face recognition feature by using different characteristics, such as a snapshot or video of the subject held in front of the camera. In our facial recognition framework, we attempted to distinguish between "genuine" and "false" faces using anti-face spoofing techniques. The suggested method enhances liveness accuracy findings by detecting potential spoofing attempts including placing a 3D printed photo, an eye and mouth photo impostor, and a video of a person in front of the camera.**

***Keywords*— Liveness Detection, Face Spoofing Detection, Anti-face spoofing**

I. INTRODUCTION

Our suggested work's major goal was to use anti- face spoofing algorithms to discern between "Actual" and "Non Real" faces. In order to develop the Convolution Neural Network algorithm, which is frequently used for image processing work, we employed Python programming and the OpenCV, Keras, and TensorFlow frameworks. We have researched several existing systems that typically start with capturing a user's image from a camera, followed by face detection, feature extraction, matching stored features, and determining whether or not there is a match. These systems' vulnerability to spoofing assaults is a problem. It is simple to steal facial data used in biometrics from social media sites or online forums and use it to impersonate devices. To spoof the user's face, videos can be played or a 3D dummy mask of the user can be placed in front of the camera. When physiological signals of life are present in the database, integrated liveness detection may be employed to solve specific challenges. We trained a CNN to discriminate between real and fake faces for a given image input.

II. LITERATURE REVIEW

When liveness of a face is detected, protection against spoofing depends on the features used, such as blinking and different face configurations. Depending on the method used to prevent spoofing, face liveness detection methods are classified primarily based on motion, frequency, or quality. Gang Pan et al. [1] present image spoofing in face recognition using real-time liveness detection using pulsed eye blinks. This method requires only a standard camera and no other hardware to avoid spoofing attacks in an unobtrusive way. Blinking is the physical process of instantly opening and closing the eyelids in less than a minute. A regular camera captures 15 frames per second and creates two face frames used for anti-spoofing purposes. Two frames captured in a sequence are considered independent. Hidden Markov Mod els (HMMs) generate features from a finite set of states. Normal blinking activity

Using the HMM feature detects a spoofing attack.

Tan et al. [2] presented an unobtrusive real-time face spoof detection method. Their methods

included analysis of the Lambert model. To evaluate this method, we collected a large database of facial simulations of 15 subjects under various lighting conditions. Over

50,000 photos were taken with a regular webcam.

Evaluation of the proposed method showed promising performance for forgery detection. Li et al. [3] proposed a method using the Fourier spectrum analysis met hod to classify real and fake face images. king etc. et al. [4] proposed a system using single images or groups of images u sing Fourier spectra to obtain the definition of face liveness. The features of liveand fake faces are unique. During this technique, albedo surface definition is used to differentiate real and fake faces. The Fourier spectrum provides a unique light reflectance that makes a huge difference between real and fake faces. For example, the fake face's Fourier spectrum contains higher amplitude frequency components than the real face. There are different approaches to deep learning such as convolutional neural networks (CNNs), multilevel autoencoders [5], deep belief networks (DBNs) [6], [7]. CNNs have commonly used algorithms for image and face recognition. A CNN can be a complete artificial neural network that uses convolutional methodologies to extract features from computer files to increase the number of features. CNN was first proposed by LeCun and first applied to handwriting recognition [8]. P. Huang et al.[9] proposed an adaptive linear discriminant regression classification (ALDRC) algorithm by specifically studying various additions to training samples. ALDRC used different weights to distinguish different training sample additions and used this type of weight information to test for interclass reconstruction errors (BCREs) and intraclass reconstruction errors (WCREs). ALDRC then tries to find the optimal projection matrix that can increase the ratio of BCREs to WCREs. Extensive experiments performed with AR, FERET and ORL face databases have shown the effectiveness of ALDRC. More recent attempts include Niinuma et al. For Multiview 2D face recognition, we use 3D Morphable Model (3DMM) [10]. In their approach, 3DMM models are fitted to each face gallery image and used to enhance the gallery set with various pose images. For

the input 2D face images, poses are evaluated and a subset of gallery images with parallel poses are used for matching. Taranga et al. [11] achieved 68% accuracy using PCA for facial recognition in an attendance system. The proposed method is a relatively good way for teachers to take pictures of each student at school and upload them to the computer backend system after school [12]. The server then identifies and crops faces from each photo. Finally, students can log in, select a face, and record their attendance. The Haar function proposed by Viola et al. [13] Fast face recognition is possible when used with the AdaBoost cascade classifier. Since then, many researchers have used more advanced features to improve the accuracy of face recognition, such as Local Binary Patterns (LBP) [14], Oriented Gradient Histograms (HOG) [15], and Scale Invariant Feature Transformation (SIFT). devoted to) [16].

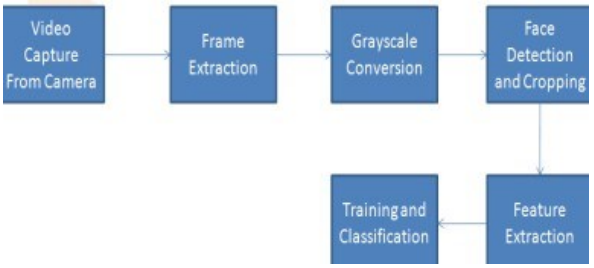
III. METHODOLOGY

We have used Python programming, which has a comprehensive library, to integrate liveliness in face recognition. This allows us to develop solutions much more quickly. In order to develop and train deep learning models, we used the TensorFlow framework and TensorFlow's high- level API binding is provided by Keras. In Keras, building and training models is significantly simpler. We utilized the OpenCV library for reading images and the NumPy library for array operations like rescaling, transforming, and other operations. We examined CNN and ResNet architecture for liveness, and CNN performs better than ResNet. Therefore, CNN was utilized in the final solution. For CNN to generalize the model, a lot of data is needed. Model generalization, which demands a huge amount of data for CNN, illustrates how a deep learning model performs on unknown input. We gathered, analyzed, and used

1.7 million photos to train our framework in order to generalize the model. Eighty percent of the data were used for training, while twenty percent were used for validation. We implemented the concept of transfer learning to reduce training time. We utilized a lightweight MobileNetmodel for quicker training and inference. We have gathered a sizable dataset from public releases. Included Raw image size: 1.2 TB from the LCC-FASD extended, NUAA Imposter, CASIA anti-spoof, and CelebA- Spoof. The photos in CelebA-Spoof include a wide range of lighting, settings, and illumination circumstances and number over 0.6 million. Face anti-spoofing algorithms are trained and evaluated using CelebA-Spoof. Geometric normalization and face detection in the NUAA Photograph Imposter Database. Using a photo or video, the CASIA face Antispoof and LCC FASD datasets detect fake facial identification. Only live photos taken with a mobile device are included in the LCC-FASD expanded dataset, from which we created fake data.

A. Face Liveness Detection

The block diagram of the face liveness detection system is as shown in Fig. 1e



Compared to other security systems, face recognition is utilised for security purposes more frequently. Using digital photos or videos, face recognition is performed. But as we all know, face recognition can also be readily faked, making it risky for our security system, just like other biometric technologies. A security system can be spoof using pictures and video frames. Our system now uses liveness detection technologies to guard against these types of scams and spoofing.

Based on the many approaches employed for liveness detection, the face liveness detection approach was identified. This classification facilitates comprehension of various spoof attack scenarios. The major goal is to provide a straightforward route and a more secure face liveness detection method. The input biometric element is guaranteed to be from a living user using liveness detecting technology, not generated artificially. The aliveness detection method is employed in a variety of contexts to bring out

- Using Hardware- An additional piece of hardware that can be utilised to determine whether the user's input

biometric sample is alive. Given the estimated expense of adding an additional device to more quickly identify liveness than the alternative approaches, it is a comprehensive method.

- Using Different Software- The liveness sample is recognised by procedure software. This will happen during the converting process. This method is used because, although it is equally as sluggish as the other early methods, it is less expensive than hardware-based solutions.

- Combination of hardware and software- For liveness detection, they might combine hardware and software solutions. For the purpose of identifying signs of life, the human body's various inherent qualities, such as consumption, reflectivity, etc., as well as impulsive signals from the human anatomy, such as blood pressure, are also used.

B. **Preprocessing of face liveness detection**

The preprocessing method includes grayscale conversion. The system receives its input from the visual stream. For further processing, the frame is removed and added to the video stream. The extracted frames have RGB color settings. Additionally, the frames must be converted to grayscale in order to detect faces using the Haar cascade classifier. Therefore, the RGB frame is turned into grayscale at the preprocessing stage. Red has greater intuitive power than the other two colors, whereas green has less intuitive power than

red but also has a softer effect on the eyes. thus, the equation for this:

$$\text{e} = (0.3 \times R + 0.59 \times G + 0.11 \times \text{B})$$

In this equation, Red contributed 30%, Green provided 59%, making it the most important hue among the three, and Blue contributed 11% as well.

C. **Face detection**

The most reliable method for detecting objects is a cascade classifier based on Haar features. This method is based on machine learning, and it instructs a cascade function using a set of both positive and negative images. This is used to identify objects in related photos. Face detection is how we operate here. To train the classifier, the method first requires a large number of both positive and negative images. After that, we were asked to draw forth its qualities. By subtracting the total of the pixels below the white rectangle from the sum of the pixels below the black rectangle, each feature is given a single value.

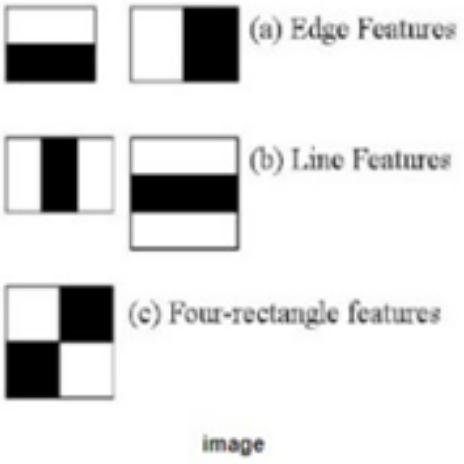
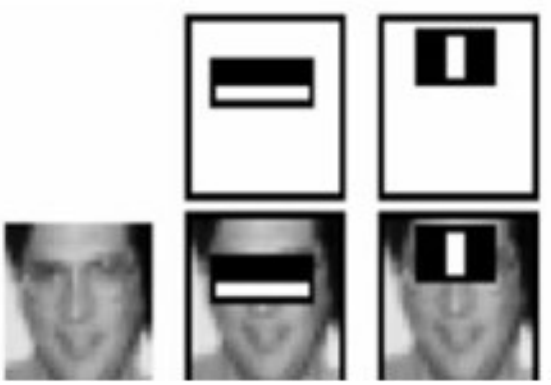


Figure 1 -Haar Feature based cascade classifier

All kernel's possible measurements and positions were used to calculate ever-increasing features. There's a lot of math involved here. We must calculate the total of the pixels beneath the white and black rectangle in the 24*24 window result, which has over 160000 features overall. To overcome this, create an integral image that is so vast that it only needs four pixels to calculate the value of a particular pixel. It produces things rapidly. Therefore, the greatest among all of these attributes is incorrect. Examine the picture below as an illustration. Two superior qualities may be seen in the top row. The first feature chosen says that it is intended to draw attention to the fact that the surface of the eyes is typically darker than the surfaces of the nose and cheeks. The next feature chosen is determined by the thing whose eyes are darker than its nose. So it doesn't matter if the same window is placed in the cheeks or another location. Therefore, choosing from the 160000+ feature is challenging. Adaboost achieves it. Lets see the e.g. of Haar cascade classifier in thee given fig-

IV. FEATURE EXTRACTION



To extract features from photos, a wide variety of techniques have been used. However, the following are some typical approaches:

- Color features
- Spatial features

A. Color features

Three-dimensional colour spaces play a crucial role in defining colours. The concept of three colour stimuli is used to convert the colour span representation into a form that is more hardware and user-friendly. This is achieved by using RGB (Red, Green, Blue), CMY (Cyan, Magenta, Yellow), and YIQ (Yellow, In-phase, Quadrature) colour spaces. The RGB colour space is the most widely used and is applied in LCDs, monitors, and graphics cards. The colour space is made up of three primary colours; red, green, and blue, which are blended together to form the final hue. By adjusting the levels of each of the base colours, it is possible to create any colour that can be seen on a monochromator. For example, by combining red and green, yellow is formed, and by combining red and blue, magenta is formed. White can be created by mixing all three root colours thoroughly, thus any colour can be made by adjusting the intensity of the root colours.

To better understand the concept of colour formation within the colour space, consider the green base colour, which is set on the vertical Y- Axis with an arbitrary range of 0-100%. 0% is represented by black and 100% represents full intensity. By fixing the green colour to a stable value and adjusting the red and blue components, it is possible to see the different colours that can be formed. The colour cube model shows how different horizontal sections and scenarios can be efficiently assembled from the top.

In conclusion, three-dimensional colour spaces provide a useful tool for defining colours and their various combinations. By using RGB, CMY, and YIQ colour spaces, it is possible to convert the colour span representation into a form that is more hardware and user-friendly, allowing for the creation of a wide range of colours.

B. Spatial features

Only a cropped image of the user's face, either real or artificial, is used as the input for the feature extraction block. The illumination qualities that are brightness factor for photo attack and the utilized mask texture

factor are features that are used to determine the liveness of the users. Other fundamental image qualities, such as energy, entropy, mean RGB values, skewness, standard deviation, and mean YCbCr values are used in the liveness detection in order to improve the system's efficiency and accuracy. There is significantly more room to define a threshold to distinguish between real and phoney faces because these values differ for the real and fake faces. **Luminance**- The density of light that is emanating from a flat surface in a particular direction is known as luminosity. It displays the intensity of light reflected from a certain surface. The value of this lighting feature depends on the type of surface and changes depending on how contrasty the surface is. When a real face's brightness is calculated, it has a different value from a fake face's picture. The brightness value for the live face from each portion is random due to the 3D influence of the eyes, nose, etc., however for the fake face, the value is roughly the same due to the lack of variations in the structure or form of the image photo or mobile photo's plane surface.

Using an image's RGB values, a calculation is

made. The following formula will be used to determine luminous intensity.

$$\text{luminance} = (0.299 \times R + 0.587 \times G + 0.114 \times \text{blue})$$

Red, Green, and Blue are the three fundamental color component mean values in this equation. **Variance-** To indicate grey size values, it offers numerous oscillations in grey size values. **Standard Deviation-** By taking the square root of the color distribution's variance out, the second color moment, the standard deviation, will be considered.

C. Classifier

Identifying a fresh perspective into a firm of classification on the basis of a training set of data that includes perceptions whose grouping association is known

D. KNN

A supervised learning classifier is the K-nearest neighbor algorithm. It extracts the K-nearest Sample from the training data and labels the trial case with the label of the closest neighbor with the highest number of votes.

The KNN classification algorithm is:

1. The new sample and a positive integer value k are defined.

2. From our dataset collection, we select the k data entries that correspond to the new testing sample.

3. We determine which category of these entries is

the most comparable.

4. Using the value of K, we provide several samples to the new sample, and this is the categorization.

5. K's value is changed until results are unsatisfactory.

KNN is the most straightforward classification method that may be used in supervised learning applications. In feature space, the goal is to locate the most accurate match to the test data. The KNN algorithm's classification is displayed in the following figure.

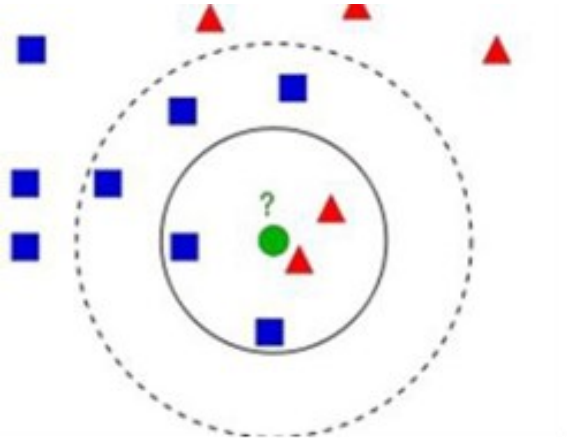


Fig 3-Classification of KNN algorithm

Two families—Blue Squares and Red Triangles— can be found in the aforementioned Fig. Each family belongs to a class. The homes are depicted in the above diagram and are also referred to as feature space. He can build a new home, as seen in Fig. 5, when new residents join the community, as indicated by the green circle.

V. CONCLUSION

The use of a system for detecting liveness and recognizing faces has become a popular research area due to its potential benefits. The system typically captures an image using a camera and then uses a Haar cascade classifier model to detect faces within the image. Once the face has been identified, the image is then sent to a deep learning algorithm for further processing and recognition. This approach offers several advantages over traditional face recognition methods. For example, the use of deep learning algorithms allows for more accurate recognition, while the automated nature of the process saves time compared to manual methods. Additionally, the use of liveness detection helps to prevent fraud by ensuring that the person being recognized is actually present and not using a photograph or other fake representation. By combining these techniques, the system provides a powerful tool for recognizing individuals with a high degree of accuracy and reliability.

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Face Detection Using Deep Learning

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Abstract-**With the rapid growth in multimedia contents, among such content face recognition has got much attention especially in past few years. Face as an object consists of distinct features for detection; therefore, it remains most challenging research area for scholars in the field of computer vision and image processing. Face is the crucial part of the human body that uniquely identifies a person. Using the face characteristics as biometrics, the face recognition system can be implemented. The most demanding task in any organisation is attendance making. In traditional attendance system, the students are called out by the teachers and their presence or absence is marked accordingly. However, these traditional techniques are time consuming and tedious. In this project, the OpenCV model integrates a camera that captures an input image, encoding and identifying the face, making the attendance in a spreadsheet and converting it into pdf file.**

***Keywords*- OpenCV, camera, biometric, face recognition, spreadsheet**

I. INTRODUCTION

Nowadays Educational institutions are concerned about regularity of student attendance. This is mainly due to students' overall academic performance is affected by his or her attendance in the institute. Mainly there are two conventional methods of marking attendance which are calling out the roll call or by taking student sign on paper. They both were more time consuming and difficult. Hence, there is a requirement of computer-based student attendance management system which will assist the faculty for maintaining attendance record automatically. In this project we have implemented the automated attendance system using PYTHON. We have projected our ideas to implement "Automated

Attendance System Based on Facial Recognition", in which it imbibes large applications. The application includes face identification, which saves time and eliminates chances of proxy attendance because of the face authorization.

Hence, this system can be implemented in a field where attendance plays an important role. The system is designed using PYTHON platform. The proposed system uses Principal Component Analysis (PCA) algorithm which is based on eigenface approach. This algorithm compares the test image and training image and determines students who arc present and absent. The attendance record is maintained in an excel sheet which is updated automatically in the system. Problem Statement Attendances of every student arc being maintained by every school, college and university. Empirical evidences have shown that there is a significant correlation between students' attendances and their academic performances. There was also a claim stated that the students who have poor attendance records will generally link to poor retention. Therefore, faculty has to maintain proper record for the attendance. The manual attendance record system is not efficient and requires more time to arrange record and to calculate the average attendance of each student. Hence there is a requirement of a system that will solve the problem of student record arrangement and student average attendance calculation. One alternative to make student attendance system automatic is provided by facial recognition.

Face recognition can be applied for a wide variety of problems like image and film processing. human-computer interaction, criminal identification etc. This has motivated researchers to develop computational models to identify the faces, which are relatively simple and easy to implement. The existing system represents some face space with higher dimensionality and it is not effective too. The important fact which is considered is that although these fact images have high dimensionality, in reality they span very low dimensional space. So instead of considering whole face space with high dimensionality, it is better to consider only a subspace with lower dimensionality to represent this face space. The goal is to implement the system (model) for a particular face and distinguish it from a large number of stored faces with some real-time variations as well. The Eigenface approach uses Principal Component Analysis (PCA) algorithm for the recognition of the images. It gives us efficient way to find the lower dimensional space. "Eigenfaces for recognition" (Mathew Turk and Alex Pentland) IR here they have developed a near-real time computer system that can locate and track a subject's head. and then recognize the person by comparing characteristics of the face to those of known individuals. The computational approach taken

in this system is motivated by both physiology and information theory, as well as by the practical requirements of near-real time performance and accuracy. This approach treats the face recognition problem as an intrinsically two-dimensional recognition problem rather than requiring recovery of three-dimensional geometry. taking advantage of the fact that these facts are normally upright and thus may be described by a small set of two-dimensional characteristic views. Their experiments show that the eigenface technique can be made to perform at very high accuracy, although with a substantial -unknown - rejection rate and thus potentially well suited to these applications. The future scope of this project was-in addition to recognizing face, to use eigenface analysis to determine the gender of the subject and to interpret facial expressions. "Fast face recognition using eigenfaces" (Arun Vyas and Rajbala Tokas) [2], their approach signifies face recognition as a two-dimensional problem. In this approach, face reorganization is done by Principal Component Analysis (PCA). Face images are faced onto a space that encodes best difference among known face images. The face space is created by eigenface methods which are eigenvectors of the set of faces, which may not link to general facial features such as eyes, nose, and lips. The eigenface method uses the PCA for recognition of the

images. The system performs by facing pre-extracted face image onto a set of face space that shows significant difference among known face image. Face will be categorized as known or unknown face after imitating it with the present database. From the obtained results. it was concluded that, for recognition. it is sufficient to take about 10% eigenfaces with the highest eigenvalues. It is also clear that the recognition rate increases with the number of training images.

II. System Analysis

The present system of attendance marking i.e. manually calling out the roll call by the faculty have quite satisfactorily served the purpose. With the change in the educational system with the introduction of new technologies m classroom such as virtual classroom, the traditional way of taking attendance may not be viable anymore. Even with rising number of course of study offered by universities, processing of attendance manually could be time consuming. Hence. In our project we aim at creating a system to take attendance using facial recognition technology in classrooms and creating an efficient database to record them.

III. Requirements and Specifications

A. Scope of the system

We are setting up to design a system comprising of two modules. The first module is facing detector, which basically, a camera application that captures student faces and stores them in file using computer vision face detection algorithm face extraction technique. The second module is a web application that does face recognition of captured images in the file, marks the students register and then stores the results in a database for future analysis.

B. Objective of the System

The main objective of this project is to offer system that simplify and automate the process of recording and tracking students' attendance through fact recognition technology. It is biometric technology to identify or verify a person from a digital image or surveillance video.

C. System Requirements

a. Software Requirements

❖ Operating system - Windows 7

Ultimate.

❖ Coding Language - Python.

❖ Front-End - Python b. Hardware Requirements

➢ Processor - Pentium -IV

➢ RAM - 8 GB (min)

➢ Hard Disk - 200 GB

➢ Key Board - Standard Windows

Keyboard Mouse - Two or Three

Button Mouse

➢ Monitor - SVGA. D. System Design

a. Input Design

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required. controlling the errors. avoiding delay. avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and case of use with retaining the privacy. Input Design considered the following things:

➢ What data should be given as input?

➢ How the data should be arranged or coded?

➢ The dialog to guide the operating

personnel in providing input.

➢ Methods for Preparing input validations and steps to follow when error occur

b. Objective

Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.

2. It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.

3. When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus, the objective of input design is to create an input layout that is easy to follow.

c. Output Design

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing arc communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision making. I. Designing computer output should proceed in an organized, well thought out manner, the right output must be developed while ensuring that each output clement is designed so that people will find the system can use easily and effectively. When analysis

design computer output, they should Identify the specific output that is needed to meet the requirements.

IV. Design Requirements

We used some tools to build the HFR system. Without the help of these tools, it would not be possible to make it done. Here we will discuss about the most important one. 4.1 Software Implementation OpenCV: We used OpenCV 3 dependency for python OpenCV is library where there are lots of image processing functions are available. This is very useful library for image processing. Even one can get expected outcome without writing a single code. The library is cross- platform and free for use under the open-source BSD license.

V. Test Objectives

➢ All field entries must work properly.

➢ Pages must be activated from the identified link.

➢ The entry screen, messages and responses must not be delayed.

A. Test Approaches

Field testing will be performed manually and functional tests will be written in detail.

B. Types of Testing a. Unit Testing

Unit testing involves the design of test casts that validate that the internal program logic is functioning properly, and that program input produce valid output. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application. It is done after the completion of an individual unit before integration. This is a structural testing. that relics on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process. application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

b. Integration Testing

Integration tests are designed to test integrated software components to determine if they actually run as one program Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing. the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

c. Functional Testing

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is cantered on the following items: Valid Input-identified classes of valid input must be accepted. Invalid Input identified classes of invalid input must be rejected. Functions- identified functions must be exercised. Output-identified classes of application outputs must be exercised. Systems/Procedures: interfacing systems or procedures must be invoked. Organization and preparation of functional tests is focused on requirements, key functions.

VI. Result and Analysis

Using the all the functions we have created: we have tested for output in using existing test images as well as in real-time. Following section. the screenshots of the output of different functions arcgiven. We have tested the system with the help of four volunteers. Taking images from cam to create the test database

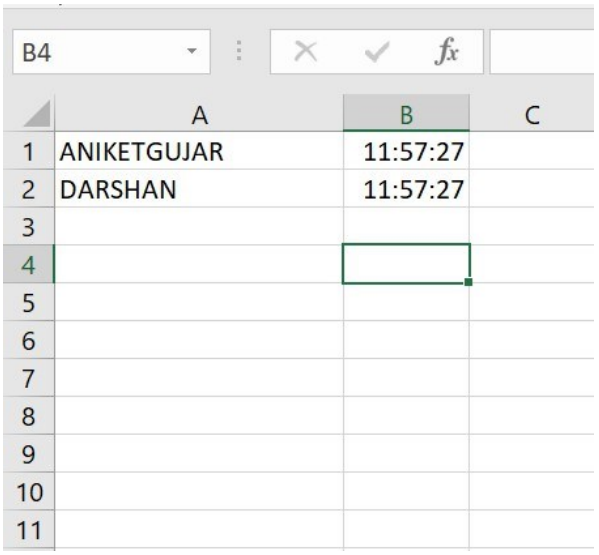
Collect Training Dataset Using the function TrainDatabase we create a database of the enrolled students which is stored in the folder.

For more accuracy we can increase the number of training images but with a compromise in the speed of calculation. However, for our application calculation speed variation won't be problem since a class timing is typically at least one hour and this period is just a lot more than the computation time takes by the algorithm. One thing we have keep in mind during this phase is to take the picture in ambient lighting and the frontal fact must be clearly visible. Also, there must be slight variation on the position or expression of the student in each captured image for better results. In normal lighting conditions and based on the proper sitting posture of the students the faces are efficiently captured. The classroom lighting has to be efficiently maintained. Also, in cast of blackouts appropriate alternatives have to be arranged. All the detected faces which can be seen in figure, are cropped and saved in the Test Database folder. From this location the next algorithm read the image and further processing are carried out. The path of the folder must be exactly specified. Also, the name each of the faces are given as numbers

automatically. This helps in easier reading of the images from the folder. Face Recognition Cropped facial images arc fed into the face recognition algorithm and we get the results. The Eigen faces algorithm is applied to the image and compared with the database. We get the output as in figure after this process. If a person whose database is not present in the database, his image is simply ignored.

VII. Output

Output in MS Excel We get the output as given below. After that we can derive the results in appropriate format using different function in the spreadsheet as in figure. We can get the following parameters by using this format as output as shown in the figure. This function is performed using the Spreadsheet Link Ex toolbox of the PYTHON. • If a person is present. a '1 is passed on to the particular field of the student • The date and time are also passed on to the sheet. We can include any number of students' data using this system and provided we use a better quality of an image capturing device. In the next section we describe how we integrate all these function y using the Graphical User Interface (GUI). This gives an easy-to-use interface to the users.



	A	B	C
1	ANIKETGUJAR	11:57:27	
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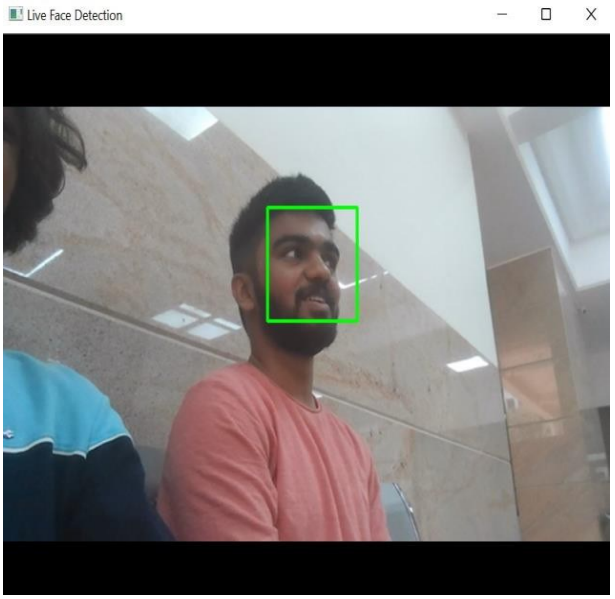

VIII. Conclusion

In this system we have implemented an attendance system for a lecture. section or laboratory by which lecturer or teaching assistant can record students' attendance. It saves time and effort, especially if it is a lecture with huge number of students. Automated Attendance System has been envisioned for the purpose of reducing the drawbacks in the traditional (manual) system. This attendance system demonstrates the use of image processing techniques in classroom. This system can not only merely help in the attendance system. but also improve the goodwill of an institution.

IX. Future Scope

Face recognition attendance system automatically identifies and confirms a person and records attendance based on their face detection. Face recognition attendance systems are catching the attention of both small and large businesses. Facial recognition is a category of biometric security. Other forms of biometric software include voice recognition, fingerprint recognition, and eye retina or iris recognition. So, it can be extended towards security field.

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[5] International journal of research in advance computer science engineering SMART ATTENDANCE SYSTEM USING FACE RECOGNITION

Unlocking the Power of Autonomous Vehicles with Deep Learning for Traffic Sign Detection

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Abstract - **This paper presents a comprehensive examination of the use of deep learning, specifically Convolutional Neural Networks (CNN), for the detection and recognition of traffic signs with the aim of improving road safety in autonomous vehicles. Despite the extensive deployment of traffic signs and the significant investments made to reduce the incidence of road accidents, the high cost of smart vehicles equipped with these technologies remains a barrier to widespread adoption. The study takes an academic approach to evaluate the level of confidence in prediction and performance using CNN for the detection and recognition of traffic signs and provides recommendations for improvement. The paper aims to further the understanding of the use of deep learning in road safety for autonomous vehicles and to address the challenges associated with existing methods, including issues with accuracy, computational complexity, and real-time performance. By exploring the potential of CNN for the detection and recognition of traffic signs, the paper seeks to contribute to the development of more effective road safety technologies for autonomous vehicles and to improve the overall safety of drivers and other road users.**

Index Terms - Deep learning, Convolutional Neural Networks (CNN), Traffic sign detection and recognition, Autonomous vehicles, Road Safety.

I. INTRODUCTION

Traffic signs also referred to as road signs, have been instrumental in road safety and navigation for over eight decades. Despite their widespread use, road accidents continue to occur at alarming rates, with human error being one of the main causes. To improve road safety, governments worldwide have invested significant resources in developing new technologies aimed at reducing road accidents.

One such technology is the integration of artificial intelligence and machine learning in road safety. With advancements in technology, smart vehicles with intelligent designs have emerged, promising to reduce the rate of road accidents by detecting and recognising traffic signs in real time.

One subset of deep learning, Convolutional Neural Networks (CNN), is particularly effective for the detection and recognition of traffic signs. CNNs are designed to mimic the workings of the human visual cortex, allowing them to recognise patterns and objects in images and videos. This makes them ideal for detecting and recognising traffic signs, which often have distinctive shapes, colours, and symbols.

Despite the potential benefits of smart vehicles, their high cost makes them inaccessible to the average consumer. This presents a significant challenge for the widespread adoption of these technologies and raises questions about their impact on road safety.

This paper aims to address these challenges by taking an academic approach to the development of deep learning for the detection and recognition of traffic signs, specifically using CNN. The paper will investigate the ultimate level of confidence in prediction and performance using CNN in the detection and recognition of traffic signs. This information will be used to develop recommendations for the improvement of traffic sign detection and recognition, with the goal of reducing road accidents and improving road safety for drivers and other road users.

In conclusion, the proposed paper seeks to contribute to the body of knowledge on the application of deep learning in road safety and to provide valuable insights into the potential impact of smart vehicles on road accidents and road safety. It is important to note that despite the potential benefits of using deep learning for traffic sign detection and recognition, there are several challenges associated with existing methods, including issues with accuracy, computational complexity, and real-time performance. These challenges must be addressed in order to achieve the full potential of these technologies in improving road safety.

II. RELATED WORK

Traffic sign detection and recognition have become essential aspects of the modern world. From communities, and countries, to expert systems such as traffic assistance systems and automatic driving systems, traffic signs play a crucial role in promoting road safety and reducing the number of accidents. These signs are road facilities that convey important information such as guidance, restrictions, warnings, or instructions through the use of symbols or words [1].

Leading vehicle companies such as Audi, Mercedes-Benz, and BMW have been at the forefront of the development of autonomous intelligent technology and have heavily invested in advanced driver assistance. These companies use state-of-the-art CNNs to equip their vehicles with the ability to detect and recognize traffic signs on the road in real-time. This implementation of real-time traffic sign detection and recognition using CNNs is meeting the growing demands of both drivers and users, contributing to a reduction in the number of road accidents globally.

Conducting a comprehensive literature review is a crucial component of the proposed paper, as it aims to provide an overview of existing studies in the field of traffic sign detection and recognition using deep learning. The review will focus on the substantive findings and methodologies of previous studies, examining the various deep learning architectures and how effectively they have been applied. By analyzing

the contributions made by other researchers, the paper can provide a comprehensive understanding of the current state of the field and determine the direction for future research.

i. *Deep Learning – Artificial Intelligence*

Deep learning, a subset of artificial intelligence, is a technique that mimics the human brain's ability to process data and identify patterns for decision-making. It utilizes a Deep Neural Network (DNN), which is capable of learning from unstructured or unlabeled data in an unsupervised manner [2]. As noted by Hargrave, DNN possesses the following key capabilities:

- Deep Learning (DL) is a subset of Artificial Intelligence (AI) that mimics the functioning of the human brain in data processing and pattern recognition for decision-making.
- This technique, known as Deep Neural Network (DNN), is capable of recognizing objects in images, speech recognition, language translation and decision-making without the need for human intervention, as it can learn from unstructured and unlabeled data.
- DNN can also be applied in various fields, such as detecting fraud and preventing money laundering.

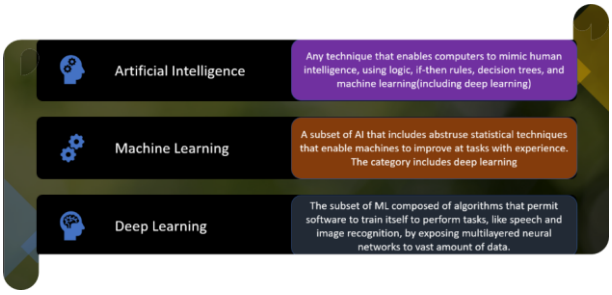

Figure 1. Illustration of the Relationship between Artificial Intelligence, Machine Learning, and Deep Learning.

As stated in [2], deep learning is a component of machine learning that employs artificial neural networks. These networks are comprised of interconnected circles, known as neurons, which are organized into three main sections: the Input layer, Hidden layers, and Output layer. These layers work together to process and categorize the input data, leading to informed predictions and decision-making.

According to the same source [2], the Input layer of a deep learning neural network receives the incoming data and transfers it to the first Hidden layer. The Hidden layers carry out mathematical computations on the inputs and determining the appropriate number of layers and neurons per layer can be a challenge in building neural networks. The Output layer then returns the processed information, with each neuron in the network playing a crucial role in data processing. These neurons have an activation function which normalizes the output from the neuron and enhances the overall effectiveness of the network.

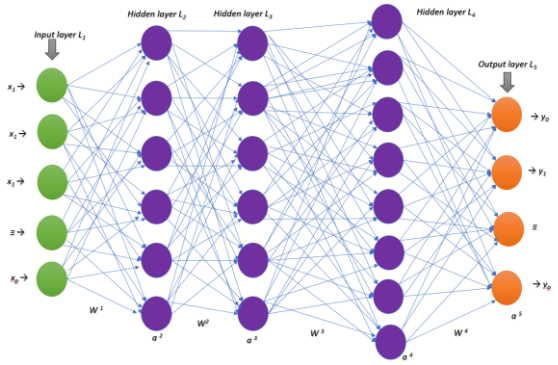

Figure 2. An illustration of Deep Learning Neural Network

A. *Deep Learning Architectures*

Different types of DL architecture exist, including deep neural networks, deep belief networks, recurrent neural networks, and convolutional neural networks. However, this study particularly focuses on Convolutional Neural Networks (CNN), also referred to as ConvNets in some research works. CNN is a type of neural network that incorporates one or more convolutional layers, making it ideal for processing auto-correlated data, such as images, for classification, segmentation, and other tasks [3]. According to the author in reference [4], CNNs have proven highly effective in image recognition and classification, with successful results in identifying faces, objects, and traffic signs, and in powering vision in robots and self-driving vehicles. The architecture of CNN is outlined in Table 1, according to the author in [5].

Table 1. The architecture of CNN.

Convolutional layer	***Creates a feature map to predict the class probabilities for each feature by applying filter that scans the whole image, few pixels at a time.***
Pooling layer(down-sampling)	*Scales down the amount of information the convolutional layer generated for each feature and maintains the most essential information; and the process of the convolutional and pooling layers usually repeats several times.*
Fully connected input layer	*Flattens the outputs generated by previous layers to turn them into a single vector that can be used as an input for the next layer.*
Fully connected layer	*Applies weights over the input generated by the feature analysis to predict an accurate label.*
Fully connected output layer	*Generates the final probabilities to determine a class for the image.*

B. *Techniques in Convolution Neural Network*

There are several techniques developed through various research works, depending on the primary objectives of the researchers. These techniques play a crucial role in the system, from feature extraction to image classification and producing outputs. Researchers emphasize the importance of these techniques in achieving their research goals and objectives. In their journals, they often use the terms "technique" or "method" interchangeably to refer to the same concept. Therefore, in the following subsections, the main two classification methods that are widely used in this field, are briefly discussed.

i. *Linear Discriminant Analysis*

Linear Discriminant Analysis (LDA) is a statistical and machine learning technique used for the characterization and separation of two or more classes of objects or events. The method finds a linear combination of

features that effectively distinguishes between the classes. In machine learning, LDA is a supervised classification method that creates models for applications such as predictive analysis in marketing and image recognition [6]. According to [7], LDA is particularly useful in image recognition tasks where large amounts of pixel values are present, as it reduces the dimensionality of the data and prepares it for the classification process. For example, in face recognition, LDA is utilized to simplify the number of features, allowing for more effective classification.

LDA is a widely used statistical method for pattern recognition and classification. It is a supervised learning technique that aims to find a linear combination of features that characterizes or separates two or more classes of objects or events. The technique works by projecting the original data into a new lower-dimensional space, where the separation between classes is maximized.

In machine learning, LDA is used to build predictive models for various applications such as image recognition, marketing predictive analysis, and face recognition. When dealing with large datasets that contain a lot of pixels, LDA is used to reduce the number of features by extracting the most important ones, which in turn makes the subsequent classification process more efficient.

LDA has several advantages over other dimensionality reduction techniques. One of its main benefits is that it is highly effective in separating classes of objects or events that are well-defined and linearly separable. Additionally, it is computationally efficient and does not require a large amount of computational resources.

However, LDA has some limitations that should be taken into account when considering its use in a specific application. For example, LDA assumes that the classes are normally distributed and have equal covariance matrices, which is not always the case in real-world data. Furthermore, LDA is not suited for complex, non-linear distributions and may not perform well in situations where the classes are highly overlapping.

On the other hand, one of the advantages of using LDA in image classification for autonomous vehicles is its ability to achieve high accuracy in image classification, making it possible for autonomous vehicles to correctly identify and respond to traffic signs and other objects on the road. In addition, LDA is a relatively simple method to implement and does not require a large amount of computational resources.

However, there are also some limitations to using LDA in image classification for autonomous vehicles. One of the main limitations is that LDA assumes that the data is normally distributed and that the covariance matrices of each class are identical. This assumption may not hold in real-world scenarios, resulting in lower accuracy in image classification. Another limitation is that LDA is only capable of solving binary classification problems, meaning that it may not be suitable for applications that require multi-class classification.

Despite these limitations, LDA remains a widely used technique in image classification for autonomous vehicles due to its simplicity, efficiency, and high accuracy. It is an important tool for improving the performance of autonomous vehicles and ensuring that they are able to navigate roads safely and efficiently.

In conclusion, LDA is a powerful and versatile technique that has many applications in machine learning and pattern recognition. While it has some limitations, it is still a widely used method in various fields due to its simplicity and efficiency. It is important to consider the specific requirements of the application and the nature of the data before deciding whether to use LDA or another dimensionality reduction technique.

ii. Support Vector Machines

Support Vector Machines (SVMs), which is also recognised as support vector networks, are a type of supervised machine learning algorithms that are employed for both classification and regression analysis. According to [8], SVMs analyse data for these tasks. The SVM technique categorizes data by creating a dividing line, known as a hyperplane, in a multi-dimensional data plane. This enables the separation of scattered data that doesn't follow a linear pattern, achieved through transforming the classification plane to a higher dimension using a nonlinear kernel function. This function is implemented using a technique called the "kernel trick." In a study by [9], they transformed original images into greyscale images by using SVM and then applied CNN with both fixed and learnable layers for detection and recognition.

Kumar A. D [10] proposed a novel method for Traffic Signs detection by using the deep learning architecture called Capsule Networks. According to Kumar A. D, this technique consists of capsules, which are groups of neurons that represent the instantiating parameters of an object. Though the authors have used dynamic routing in agreement algorithms, it was not specified what these "agreement algorithms" are. Nevertheless, it can be assumed that the choice of classification and identification techniques would be left up to the researcher or user to decide. Kumar A. D found that the Capsule Networks performed exceptionally well on the German Traffic Signs dataset in his research.

However, there are limitations and gaps in the proposed method that need to be addressed. The concept of "agreement algorithms" used in dynamic routing is not clearly defined, and it is left up to the users or other researchers to decide on their own. Additionally, the validity and reliability of the method in real-world applications and the generalization ability of the model to new and unseen data have yet to be thoroughly tested and evaluated. The proposed method may also face challenges when dealing with complex and dynamic traffic sign scenes, such as those encountered in real-world autonomous vehicle scenarios.

Overall, while the proposed method by Kumar A. D holds promise, further research and evaluation are needed to fully understand its potential and limitations. In particular, the development of robust and scalable

algorithms and models that can effectively handle complex and dynamic traffic sign scenes, while ensuring high accuracy and reliability, is of critical importance in the field of autonomous vehicles.

III. Proposed Approach

The study concluded with the significant outcome of the application of Convolutional Neural Networks (CNN). This was highlighted in the Literature Review section of the study. There are many tools and techniques to consider when exploring the phases involved in conducting a study on CNN. These phases are at the core of the CNN process. This study, unlike others focused on Websites, Robotic Games, and Embedded Systems emphasizes accuracy and the evaluation and validation of models (algorithms) examined after undergoing pre-defined phases, from feeding the CNN with input images to processing through deep layers and neuron computations. The CNN prototype is based on such models to produce the desired output.

A. Data Collection

The importance of obtaining relevant data for the successful completion of this study cannot be overemphasized. The study requires the collection of data to create its prototype artefact. Like a mathematical machine that requires inputs to function, the artefact requires input images of the objects under investigation, which in this case are images of traffic signs. There is a vast amount of data available globally, accessible through the web, with no restrictions on the collection of data according to the needs of the researcher. The acquisition of the necessary datasets, along with the development of the required skills, tools, and application of techniques, is crucial for the success of the study. Throughout the course of this study, the pursuit of gaining knowledge, skills, and advice has been ongoing.

Figure 3 provides an example of the collected images of traffic signs.

The research study on CNN required a comprehensive understanding of the tools and techniques involved in the field. The gathering of relevant data and information was imperative for the successful implementation of the project. The research process was a learning journey, which provided an opportunity to gain knowledge and skills on how to experiment with CNN using software libraries like TensorFlow, Python, and PyTorch.

The project was focused on the accuracy of the model and the evaluation of the algorithms after undergoing pre-defined phases. The prototype of the CNN model was based on the results obtained from these algorithms. To aid the research process, Google Colab, an Integrated Development Environment (IDE) was selected. Google Colab, a product from Google Research, provides users with the ability to write and run any Python code from a browser. It is especially advantageous for machine learning, data analysis, and education, as it offers free access to GPUs for speedy processing and does not require any setup.

Consequently, the information gathered without testing would be useless, as it would not show the validity of the model applied to the images. It is imperative to carry out experiments and validate the models to arrive at meaningful conclusions. The selected images of traffic signs were used as the input data for the project, and the outcome was a dependent open-source platform in the real world.

The following steps show the stages of our proposed solution's development.

Input Image:

The input image is a crucial part of the study as it forms the foundation for the development and prediction. The researchers at the Institute for Neuroinformatics in Germany have created a dataset containing over 40,000 images related to 43 different traffic signs. This dataset will be used for the development of the study's artefact.

Convolutional Layer:

The convolutional layer is the core building block of a CNN and is responsible for performing the majority of the computational work. The Literature Review section of the study report (as described in the related work Section) highlights the fact that each layer in a CNN is comprised of neurons with mathematical computational capabilities. However, it is essential to understand the convolutional layer phase of the system or application to appreciate the significance of this phase.

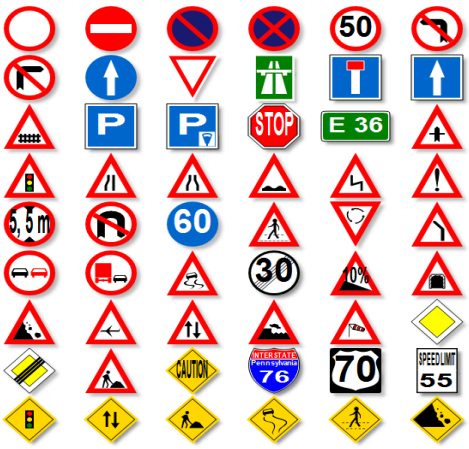

Figure 3. Examples of Traffic and Road Sign Symbols (Pinterest)

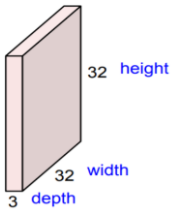

Figure 4. Example input volume in red (32 x32 x 3) and a volume of neurons in the first convolutional layer [11].

The study focuses on the application of CNN to enhance and accomplish its objective. The collection of appropriate datasets, comprising images of traffic signs, is a crucial aspect of this study. The researchers sourced the images from the Institute fur Neoroinformatik in Germany, which includes over 40,000 images of 43 different traffic signs [12].

The core building block of the CNN is the Convolutional Layer, which performs the bulk of the computational work. Each layer contains neurons with mathematical computational abilities, as described in the related work Section.

The Pooling Layer is another important component that is inserted between successive Conv Layers in the CNN architecture. Its purpose is to progressively reduce the spatial size of the representation, thereby reducing the number of parameters and computation in the network, and ultimately controlling overfitting.

Input images in the datasets often come in varying sizes and thus need to be pre-processed by resizing them. In this study, the images were resized to a dimensional size of 32 x 32 x 3, as demonstrated by Figure 4. The following images in Figure 5, are samples from the dataset.

Figure 5. Sign of speed limit: 20 miles/hr, Sign of Go Straight or Turn Right and Sign of Roundabout.

The samples above show the sizes of the images are not the same. It is cumbersome to try to go through all the images in their thousands at different sizes. This is not paramount now; therefore, the tools and techniques of the CNN architecture would resolve all the anticipated issues of concern.

Artificial Neural Network/Fully Connected Layers:

This phase is where the front and backward work or processing of the images is carried out. In this phase of architecture, the decision of choices must be made for the materialisation of the artefact or application. The 2D Convolution is necessary to work on the input images for the CNN experiment. The choices are:

- The quantity of filters and size of the 2D convolutional kernel.
- The size of the Max Pooling kernel in the Pool Layer.
- The quantity of units in the Full Connection layer.
- The batch quantity.
- The optimization method, learning rate, activation function for each layer, and the number of training cycles.

Inside the system of convolution, the stages of pre-processing the images will look like the figure below.

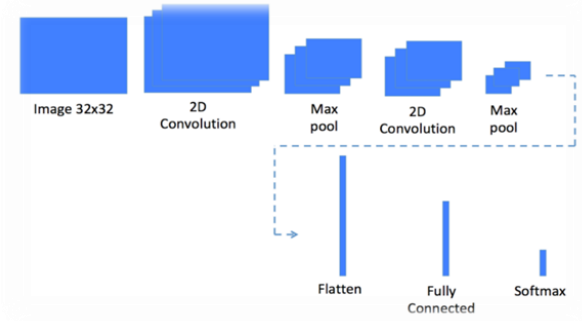

Figure 6. Example of a network architecture [12].

The images in Figure 6 have a resolution of 32 x 32 pixels, yielding a total of 1024 pixels. The 2D Convolution is a hidden layer in the network where many computations occur, transforming the 2D matrix of features into the output pixel on the input layers. While the mathematical operations are not the primary focus of this artefact, it is worth noting that max-pooling involves various dimensional layers, such as 1D, 2D, and 3D, depending on the input matrix dimensionality. According to Computer Science Wiki, max pooling is a sample-based discretization process that transforms continuous functions into discrete counterparts, making them suitable for numerical evaluation and digital computer implementation [12]. The goal of max pooling is to reduce the input representation dimensionality by down-sampling the image or hidden layer output matrix.

The model of the architecture of the convolutional neural network of this artefact would be built using a special model like Sequential, Resnet50 or any other related model. For instance, in Sequential the following parameters are parsed: Conv2D, MaxPooling2D, Flatten, and Dense and the process repeats for several iterations known as the epoch. This would result in the downsizing (or down-sampling) of input images gradually until a desired output of loss and accuracy is achieved.

Output:

In this phase, all CNN input images have been pre-processed thereby giving the output. A typical example of the whole CNN system is shown in Figure 7.

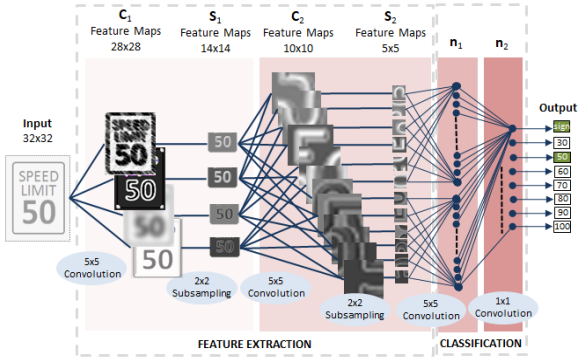

Figure 7. Convolution Neural Network of Traffic Signs Phases. (Folens J, Texas Instruments)

The figure shows when an input image of dimension 32x32 is fed into the CNN. The image undergoes convolutional layers and at the same time, some of the architecture functions do transformation, especially the down-sampling (or subsampling) until the image is a (1 x 1) pixel. In the final phase, the output is at a high confidence limit.

IV. Performance Evaluation

The evaluation and assessment of the classifiers is a crucial step in the study. To gauge the performance of the classifiers, a set of test data, comprising unaltered images, was utilized. These images were carefully chosen to include challenging examples that may have been affected by geometric distortion, blurring, deterioration, and partial occlusion. The aim of including such images is to simulate real-world scenarios and test the robustness of the classifiers. As previously discussed in the Literature Review section, the test data is not expected to be flawless, however, the results of the model's performance are benchmarked against similar findings from prior research studies.

Table Performance Results of the Proposed Model

Loss	Accuracy	Validation loss	Validation accuracy
0.074	0.981	0.087	0.951

The results of the study demonstrate the exceptional performance of the optimizer used in executing the dataset. The accuracy of the model reached 98.1% while the loss was 7.4%, showcasing the effectiveness and efficiency of the chosen optimizer. The utilization of the EarlyStopping function was also instrumental in ensuring that the training process was terminated at the optimal point, minimizing the loss and improving the overall performance of the model.

Moreover, the significance of this study lies in the potential benefits it holds for the future of road sign detection in the field of autonomous vehicles. The development of highly accurate and reliable systems for road sign detection is essential for the safe and efficient operation of autonomous vehicles. This research serves as a stepping stone in that direction and holds the promise of paving the way for more advanced and sophisticated systems in the future.

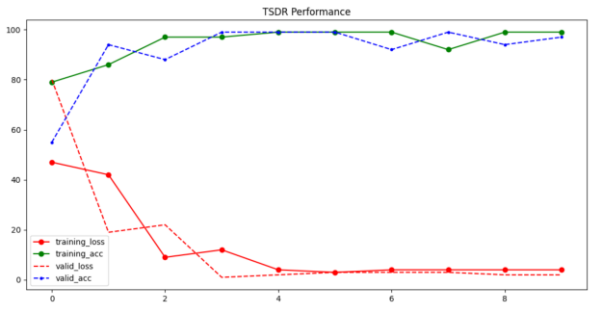

Figure 8. Chart of the Accuracy Vs Loss for the model Performance with TSDR dataset.

It is clear from Figure 8 that the model appears to be improving although there is some improvement to be made. Having run the application for several times the training accuracy and the validation accuracy are closely in a good trend. The model does well when the validation accuracy is not high above the training accuracy in the trending curve. The performance chart is a reflective performance of the model underpinned.

The loss function in machine learning and deep learning refers to a metric that assesses the accuracy of a given algorithm in modelling a specific dataset. The objective is to minimize the error in prediction, which is accomplished through an optimization function. One common loss function is the Mean Squared Error (MSE), which calculates the average of the squared differences between the predictions and actual observations. The formula for MSE will be discussed later in the article.

$$\boldsymbol{MSE} = \frac{\sum_{i=1}^{n}(y - \mu)^2}{n}$$

From the formula μ = mean of the y values. This takes care of the negative values since the expression on the numerator is a perfect square. The above figure shows the behaviour of the loss function as the number of epochs increases. It gradually decreases in value to less than 0.1 or 10%. This is the situation whereby the loss shows that learning of the model of the dataset is improving; not deviating too much from the proposed outcome. If, for example, the predictions deviate too much from actual results, then the loss function would begin to cough up very large values or numbers. This, then indicates that there is a problem with the model.

V. Conclusion

In conclusion, this study successfully proposed and implemented a method of deep learning for traffic and road sign detection and recognition. Despite the initial challenges and uncertainties, the project achieved its goals with the support of a supervisor, a literature review, and personal development in the areas of TensorFlow, Keras, and Python. The study involved using a pre-processed dataset of over 39,000 images collected from different traffic signs, which were fed into a convolutional neural network architecture optimized with the Adam optimizer and the sparse categorical cross-entropy loss. The results of the study showed a high accuracy of detection and recognition of

traffic signs, with an accuracy of 98.1% and a loss of 7.4%. The increasing interest in autonomous vehicles and advanced driving systems has heightened the importance of accurate and reliable traffic sign detection and recognition. The proposed convolutional neural network algorithm provides a promising solution, with results comparable to or even surpassing the benchmark of previous research in this field. Overall, this study contributes to the ongoing efforts towards the development of safer and more efficient autonomous driving systems.

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Review on Clinical Decision support system using Artificial Intelligence Techniques

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Abstract—: **A clinical decision support system (CDSS) provides clinicians, staff, patients, or other individuals with knowledge and person-specific information, to help health and health care. It is called health information technology.CDSS includes a variety of tools to improve decision-making in the clinical work. These tools include computerized signals and notices to care patients, clinical guidelines, condition-specific order sets. It is focused on patient data reports and reviews, documentation patterns, diagnostic support, and contextually relevant reference information, among other tools. There are several applications for CDSS. Among the principal of applications are, Supporting clinical decision- making including patients, Selecting the best treatment plans for certain patients, Aiding general health strategies by evaluating the clinical and economic outcomes of varied strategies, Predicting treatment outcomes when techniques like randomized trials aren't appropriate. In this paper, we provide an overview on the use of clinical decision support systems in medication, including the diverse types, current use cases with proven efficiency, common drawbacks, and potential harms. We conclude with evidence-based references for minimizing risk in CDSS design, implementation, evaluation, and maintenance.**

Keywords— Clinical Decision Support System,Artificial Intelligence

I. INTRODUCTION

CDSSs as "software that designed to be a direct aid to clinical decision-making, in which the features of an distinct patient are matched to a high-tech clinical knowledge base and patient specific valuations or references are then presented to the clinician or the patient for a decision". The main purpose of the review is to recognize what have been attained in dealing with those matters in the past and to search for new strategies to advance the ambiguity handling capability of CDSSs. The databases used for searching related literature in CDSSs for this review include: SicenceDirect, IEEE Xplore and Google..

II. EXISTING SYSTEM

CDSS architecture

A typical CDSS contains three core elements: a base or data management layer, inference engine or processing layer, and user interface.

A data management layer combines

- a clinical database storing information on diseases, diagnoses, and lab findings;
- patient data; and
- a knowledge base in the form of if-then rules or machine learning models.

In inference engine or processing layer applies rules or algorithms and datasets from the knowledge base to available patient data. The results are displayed via a user interface layer — a mobile, web or desktop application, an EHR system dashboard or mobile text alerts.

Preserving the same structure, under the hood CDSSs vary in ways they come to a conclusion, falling into two types — knowledge-based and nonknowledge-based systems.

Knowledge-based CDSS

Systems of this type are built on top of a knowledge base in which every section of data is organized in the form of if-then rules. For instance, if a new order for a blood test is placed and if the same blood test was made within the past 24 hours, then a repetition is possible.

The inference engine runs the built-in logic to combine the evidence-based rules with the patient's medical history and data on his or her current condition. The results come in the form of alerts, reminders, diagnostic proposals, a series of treatment selections or ranked lists of possible solutions while the final word rests with a human expert.

Non-knowledge based CDSS

Systems that do not use a set of defined a priori rules, but as an alternative use artificial intelligence algorithms to

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induce the rules through machine learning methods, allowing the system to learn from hundreds or even thousands of happenstances, rebuilding the "model" set of rules as environmental variables change. These systems can be based on neural networks, genetic algorithms, support vector machines, decision trees, or any other machine learning technology, which "learns" to recognize patterns in data sets case by case.

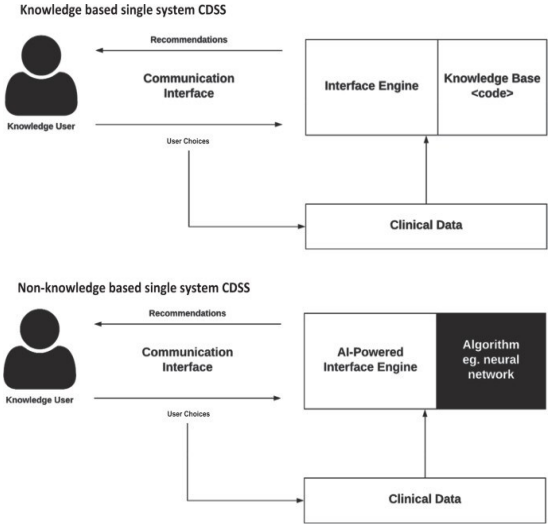

Fig 2.Non Knowledge Based CDSS

They are collected of (1) base: the rules that are programmed into the system (knowledge-based), the algorithm used to model the decision (non-knowledge based), as well as according data available, (2) inference engine: takes the programmed or AI-determined rules, and put on them to the patient's clinical data to generate an output, which is presented to the end user (eg. physician) through the (3) communication mechanism: the website, application, or EHR frontend interface, with which the end user interacts with the system9.

Hybrid CDSSs

Hybrid CDSSs have been developed to allow the end user to synthesize the results from both knowledge and clinical experience, and make a clinical decision based on the results of both. (examples in the literature include Santelices et al., 2010).

In such a hybrid system, multiple predicted outcomes are posed for the physician, based on data input from knowledge and experience bases, and furnished with associated probabilities to permit the selection of the appropriate decision. As we continue to learn more about cognitive science, and distil this knowledge into principles, we can apply them to improve these "intelligent" systems to help us make the best clinical decisions possible at the time. This practice of continuous incorporation of patient data, cognitive knowledge, and clinical experience is referred to often as "rapid learning." Rapid learning approaches that continuously update the CDSS as new data become available provide an ability to create decision models that adapt to the availability of new treatments, interventions, and metrics (variables) that can be input to the modeling process.

Based on such 'training data', ML applications can make

predictions, guide decisions and automatically improve through their own experience. Machine learning is often used within health care as a technological background for clinical decision support systems (CDSS), which serve as a direct aid to clinical decision making and aim at supporting clinicians' practice by matching the characteristics of individual patients with a computerized clinical knowledge database.

FUNCTIONS AND ADVANTAGES OF CDSS

- Patient safety Strategies to reduce medication errors commonly make use of CDSS . Errors involving drug- drug interactions (DDI) are cited as common and preventable, with up to 65% of inpatients being exposed to one or more potentially harmful combinations.

- Clinical management Adherence to clinical guidelines, follow-up and treatment reminders, etc.

- Cost containment Reducing test and order duplication, suggesting cheaper medication or treatment options, automating tedious steps to reduce provider workload, etc.

- Administrative function/ automation Diagnostic code selection, automated documentation and note auto-fill.

- Diagnostics support Providing diagnostic suggestions based on patient data, automating output from test results.

- Diagnostics Support: Imaging, Laboratory, and Pathology Expanding the extraction, visualization, and interpretation of medical images and laboratory test results.

- Patient decision support Decision support administered directly to patients through personal health records (PHR) and other systems.

- Better Records.

- Workflow improvement CDSS can improve and expedite an existing clinical workflow in an EHR with better retrieval and presentation of data.

Challenges in CDSS:

- Poorly designed or implemented, clinical decision support systems can cause more problems than they solve. Alarm fatigue, physician burnout, and medication errors are all detrimental side effects of unintuitive clinical decision support technology, with these events having a harmful impact on patient outcomes and organizations' bottom lines.

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Alert fatigue A phenomenon where too many insignificant alerts or CDSS recommendations are presented, and providers

Alert fatigue A phenomenon where too many insignificant alerts or CDSS recommendations are presented, and providers start to dismiss them regardless of importance. Negative impact on user skills One example is reliance on, or excessive trust in the accuracy of a system. Financial challenges Setup can be expensive (capital or human resource), and long-term IT testing/debugging during development and implementation stage.

III. LITERATURE REVIEW

In pap er[1], they proposed machine learning structure includ es two stages. Stage I applies online learning using hierarchical temporal memory (HTM) to enable real time stream processing and provides cost-effectiveness is not guaranteed.

- System and content maintenance challenges As practice changes, there can be difficulty keeping the content and knowledge rules that power CDSS up to date

- User distrust of CDSS Users may not agree with the guideline provided by the CDSS.

- Transportability/interoperability CDSS face challenges regarding integration with other hospitals or systems, making it inefficient for otherwise high-quality systems to be disseminated and scaled

- Dependency on computer literacy CDSS may require a very high technological proficiency to use.

- Inaccurate and poor-quality data/ documentation CDSS may aggregate data from multiple sources that are not synced properly. Users may develop manual workarounds that compromise data.

Explanation of solution:

- Prioritize critical alerts, minimize use of disruptive alerts for non-critical indications.
- Avoid prescriptiveness in system design.

Evaluate system impact on an ongoing bas.

- Design and plan for longitudinal cost analysis at the outset. Specify measurements for non- financial benefits where possible.
- Knowledge Management (KM) Service in place, with a focus on translation to CDSS systems. (2) System for measurement and analysis of CDSS performance. (1) Knowledge Management (KM) Service in place, with a focus on translation to CDSS systems. (2) System for measurement and analysis of CDSS performance.
- Reference expert knowledge— include scientific references in messages where appropriate.
- Adoption of industry standards.
- Secure cloud services and blockchain.
- Conform to existing functionality.
- Adequate training made available at launch.
- Expert Knowledge of interlinked systems.

unsupervised predictions. Stage II is a long short-term memory (LSTM) classifier that forecasts the status of the patient's MAP ahead of time based on Stage I stream predictions.

This is the key finding of this paper that ML constitutes a field of artificial intelligence (AI) concerned with the question of how to construct computer programs that automatically improve the accuracy of their output with experience. ML algorithms use sample data (also known as a training data).

The proposed system saves extensive offline modelling, uncertainty, and delays associated with conventional systems. In this model, HTM provides unsupervised predictions in real time, and LSTM provides the classification, it is used to analyze and train on predicted streams. The average prediction time per patient was 150 seconds and the delayed predictions were 75 seconds on average[1].

In paper[2] ,ML Methods used (literary work):KGT

tool is used

Decision Tree-Different platforms have been developed to allow for the creation of DT models to analyse clinical data by non- expert users

ii.The KGT consist on three main modules: DT building, which implements machine learning methods to extract automatically decision trees (DTs) from clinical data frames; an authoring tool (AT), which enables the clinicians to modify the DT with their expert knowledge, and the DT testing, which allows to test any DT, being able to test objectively any modification made by clinician's expert .

Key finding of this paper is according to the review of Safdar (Safdar et al., 2018), which works with ML-based CDSSs for heart disease diagnosis, the use of ML (logistic models, Bayesian neural networks and neural networks) in CDSS improves the diagnosis of Acute Myocardial Infarction from 84 to 95%. In the case of ischemia detection, the use of a CDSS based on a neural network improves its sensitivity from 81 to 86%[2].

In [3] paper, Machine learning is often used within health care as a technological background for clinical decision support systems (CDSS), which aim at supporting clinicians' practice by matching the characteristics of individual patients with a computerized clinical

knowledge database. Among ML techniques, Deep

Review on Clinical Decision support system using Artificial Intelligence Techniques Learning (DL) is the subfield concerned with medical imaging related tasks. Based on imaging, DL model automated the diagnosis of acute ischemic infarction using CT studies, and analysing echocardiographic images.

Key finding of this paper is ML algorithms allow computers to automatically discover patterns in the data and improve with experience. An echocardiographic based DL model was shown to improve the prediction of in-hospital mortality among coronary heart disease and heart failure patients as compared to traditionally used prediction models.

Different tasks where ML can support clinical decision making are Data acquisition, Feature extraction, Interpretation and decision support. clinical validation of this platform will be performed in future[3].

In [4] paper,Applications and Start up in machine learning explained Machine learning can be applied to health care data to develop robust risk models.

The key finding is Healthcare industry is already overburdened with the exploding population and lack of trained doctors. The ratio of doctor to patients in India is

1:1700 which is far higher than the recommended ratio of 1 in every 1000 patients by WHO. Major companies like Enlitic, MedAware, and Google, have launched massive projects focused on improving machine learning and artificial intelligence systems for healthcare system. The spontaneous increase of efficient healthcare providers is not possible. Use of machine learning and artificial intelligence technologies can enhance the productivity and precision of existing ones. Use of these technologies will help in serving

develop a machine learning model that be flexible in recommending books for both new and existing users. Using this application would reduce the time required for selecting a book to read.

Users may find new books that were previously unknown to them. They can find what they should read with the

help of other user's choices and making it convenient for a reader to select a book of his choice from this website.

IV.CONCLUSIONS

AI systems are gradually being adopted from well-established pre-clinical scenarios to the bedside in multiple domains and various use cases. The extensive and unique contributions of AI systems to clinical decision making may generate a substantial impact but necessitate continued rigorous research and tackling of challenges and biases. Regulatory authorization of AI-based medical pipelines constitutes another challenge, given their inherent dynamic and constantly improving analytical nature much-needed uniformity is sought in terms of guidelines for protocols and publications. These require more randomized control trials evaluating, in a standardized manner, the performance of new AI systems in real-life settings. As these challenges are gradually met and existing hurdles are overcome, AI may eventually meet its expectations in integrating into clinical decision making and transforming the data-driven evolution of precision medicine.

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Traffic Flow Prediction in Urban Areas

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Abstract—**Traffic jams are a common occurrence across the whole world, particularly in a country with a large population like India. As a result, people make every effort to solve this issue in order to get where they want to go quickly to save time. These days, there is a lot of interest in traffic-related research because it will be helpful to everyone who lives in crowded cities. Smart cities are one new innovative solution brought about by the Internet of Things (IoT) that allows people to live more effectively, conveniently, and intelligently. The Intelligent Transportation System (ITS), which improves commuter and transportation processes, is a component of several smart city applications. ITS seeks to address traffic issues, particularly congestion. Research on traffic network was also done to find the most suitable traffic value to forecast or predict the traffic value using time series forecasting models. Traffic forecasting is an integral part of the process of designing of road facilities, starting from investment feasibility study to developing of working documentation. Traffic time- series analysis, which is crucial, is the only subject that deals with both traffic prediction and traffic control. The study reveals a significant difference between the various models' ability to predict traffic reliably and precisely.**

Keywords—Time series models,Traffic forecasting

I. INTRODUCTION

India is more severely congested than any other country in the globe due to its second-highest population after China. India has an uneven distribution of vehicles. It is common knowledge that traffic moves at the speed of its slowest component.The majority of cities have bicycles, scooters, motor vehicles, buses, lorries, and railroads.

But in India, networks of auto-rickshaws, two-wheelers, bullock carts, and hand-pulled rickshaws have been startlingly outnumbering motorised cars in India by a factor of a hundred.. These additional modes of urban transportation contribute significantly to the congestion. However, the growth of the road system has not kept pace with this expansion.

Small traffic control and information approaches are needed to combat the major issue of growing and ongoing traffic congestion in Indian cities, which can then lessen traffic congestion and raise demand for public transportation.

Congestion on metropolitan roadways makes it difficult for vehicles to move, which exacerbates already unpleasant trip delays. Congestion can be temporarily relieved by building new roads or widening existing ones, but in the long run, these actions only serve to boost the number of new vehicles on the road and discourage the use of public transportation.

There are many reasons due to which congestion happens like such as when traffic signals are broken, pedestrians cross the street against the light, an area is overdeveloped when the traffic load on the roads is already heavy,etc Slower speeds, lines, and longer travel times are all symptoms of congestion, which raises economic expenses and has an effect on metropolitan areas and the people who live there.

Indirect effects of congestion include those on quality of life, stress levels, and safety, as well as effects on non- vehicular road space users including those who use sidewalks and properties along roads.

To combat congestion more and more drivers are relying on navigation applications and devices to guide them through the fastest routes and avoid hitting congestion. The best navigation devices use advanced traffic prediction services for accurate estimated times of arrivals (ETAs) and optimized routes during a driver's journey.

For traffic predictions a massive role is being played by Machine Learning. Traffic predictions is critical for two types of organizations.

1. National/local authorities: Many cities have embraced ITS in the last ten to twenty years to aid in the planning and administration of urban transportation networks. These systems make use of real-time traffic data and forecasts to increase transportation efficiency and safety by notifying users about current road conditions and altering road infrastructure. Using this method, the general public can be better informed about TF and weather data on the roadways, minimizing the risk of accidents and increasing overall road safety [1-2].

2. Logistics Companies: Another use is in the logistics industry. Transportation, delivery, and field service are just a few of the businesses that depend on precise scheduling and efficient route planning [3].Travel frequently involves thinking about both the present and the future. For businesses like these, successful planning depends on having accurate projections of traffic and road conditions.

Time-series analysis was used for making Traffic Forecasts and also choosing a model that will be quite beneficial for all people living in congested cities as it helps them get a overview of the traffic hours or a day before they plan to go to a particular place.The Analysis of traffic time series is very important to predict the travel time and usually,it is also using a traffic control system.This is a system that operates on time-series data.The meaning of the time series is,in a fixed time of period data would generate in a series.The aim of the project is to the predict the future traffic that will help us to know the traveling time.On the other hand it impacts the financial growth also.For example,the forecast of the electricity bill of next month can help in deciding anyone to save money for next month.

II. BACKGROUND

A statistical method for analyzing and manipulating statistical data may be called time series analysis. It is constructed from data points that were gathered at regular intervals. Time-series, as we all know, is a collection of data taken at regular intervals. Forecasting is another method that makes the system a little bit more sophisticated.If forecasting is combined with time series, things start to become interesting. It is a method of machine learning. In this case, the input is historical time series data. A number of published publications were looked at to have a better understanding of time series analysis and time series forecasting.

A. Literature Review

The understanding of the inner vehicle frame-work development rule is crucial for control and anticipation. In the paper [4]. For the purpose of converting the traffic stream time arrangement into networks, a permeability chart computation is used. due to the organisations' recent changes. From the first traffic stream, a few attributes will be discovered to identify traffic states. Two broad approaches— multiracial detruded vacillation examination (MFDFA) and permeability diagram—have been offered in order to thoroughly investigate traffic stream time arrangement in different thicknesses. They collected roughly 3000 instances from a street on the left side of the roadway that was designated as their inspection location.

This paper presents a transport traffic estimation method which leverages road network correlation and sparse traffic sampling via the compressive sensing technique. This strategy has been tested with traffic data of over 4400 taxis from Shanghai town, China.The author suggests a strategy to estimating traffic that reduces the effort of people and enhances automation. Accuracy estimates are used to validate this method [5].

In the Citywide Crowd Flows Deep Spatio-Temporal Residual Networks, crowds are expected to move. They play an important part in traffic management. Many factors such as events, weather etc. affect it.They suggested a profound deep learning strategy, known as ST-Res Net, to forecast crowds in all regions of a town. The results of the three remaining neural networks can be aggregated on the basis of

data and are assigned to various branches and regions by ST- Res Net. Two kinds of crowd-flows are experimented with in Beijing and New York City.[6]

In the Real-Time Crash Prediction Dynamic Bayesian Network Motor, the data paper has suggested the Bayesian network dynamic (DBN) system. DBN systems in Shanghai, China were constructed with a time series for the real-time research of 551 accidents and related velocity data, gathered on express ways. A comparison assessment of the model DBN and other machine learning algorithms was also carried out[7]. Machine learning techniques that entail creating and predicting network training structures or LSTM-based prediction models were used to create them. The next objective is to use deep learning techniques to address potential prediction errors that may arise throughout the prediction process. Big data that has been gathered from the performance measuring system is used in this manner.The results of the experiments then reveal that the LSTM model was successful.

A traffic stream prediction model was put forth in this paper [8] for obstructions. This model's star feature is that it depends on the timing. This model will have the capability of predicting future traffic conditions at a particular crossing site. The model is capable of estimating the traffic flow with an accuracy of 88.74% and 81.96% for 15 minutes prior to and 1 hour prior to, respectively.

This model was developed, according to the diary [9], to solve the truck bottleneck problem in a particular area in Bombay. The experts conducted a basic investigation and acquired data. They conducted an extraterrestrial examination subsequently. They then shaped the information according to norms. ARMA and ARIMA models were selected for the problem based on MMSE and MLR criteria. These two were taken into consideration when deciding on the ideal model for each hallway. From that moment on, they showed their approval.

Two combinational conjecture models depending on GM, ARIMA, and GRNN are proposed in this work [10] to increase the traffic stream's ability to be accurately predicted. It then suggests using neural networks to select variable weight coefficients and constructs the Elman combinational estimate model based on GM, ARIMA, and GRNN, which carries out the coordination of these three individuals.

In paper [11], it is discovered that ARIMA performs better than all other scenarios. Nevertheless, this accuracy comes at the expense of the complex nature of calculation

B. Algorithms/Models

Time series can be trend cycles, cyclic, seasonal or irregular. These four components are discussed below:

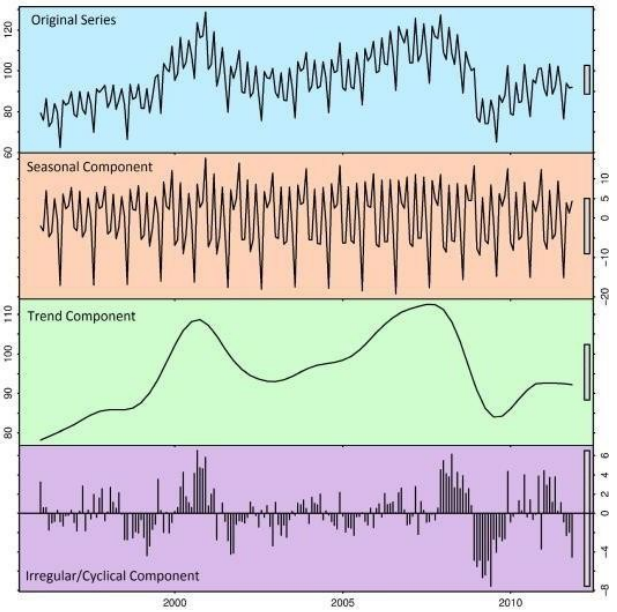

Fig.1 Trend,Seasonal,Cyclical and Irregular graphical

Representation

1) Trend-It is the change in data over a period of time. Underlying rationale, random time series character is provided by a trend that can be deterministic.

2) Seasonal-It is often to know and fixed frequency. A seasonal pattern occurs when seasonal factors affect the time Series-seasonal factors like a particular time of day or year.

3) Cyclic-It is the fluctuation of data. Cyclic does not have a fixed frequency unlike seasonal.

4) Irregular-Data which are represented in a random manner which is due to unknown,unpredicatable non seasonal and short term factors for which future cannot be predicted here.

In this work,a medium scale comparison study for time series models is done which would show the highest accuracy in forecasting the traffic data of the seasonal time series dataset. The models or algorithms considered are Autoregressive integrated moving average (ARIMA) model,Seasonal naïve(SNAIVE),Exponential Smoothing,and PROPHET which are based on time series.

ARIMA: This deals which various types of time-series data for which it uses its resourceful method which is quite simple but sophisticated in making forecast for the data. It stands for autoregressive integrated moving average which is a generalization of auto-regressive moving average with the integration element added. They are class of statical algorithms which is used for forecasting and analyzing data.

ETS: Exponential Smoothing method handles weighted averages of previous observations to forecast future data.As observations became aged in time, these values priority get smaller at an exponential rate since the current values are given more importance in the series. They are a family of forecasting models.

Seasonal naïve(SNAIVE): Sometime the data available is not enough and data which is of time-series type.In such circumstances,the naïve method is used which is used which uses previous data from the last observation to make the prediction for the net data. Now seasonal naïve works for data which are very seasonal works for data which are very seasonal in nature .SNAIVE makes prediction in the same way as naïve month expect for it predicts the last observed data from the same season of the year.

Prophet: The Prophet is an open-source library, developed by Facebook, which is developed for building forecast for univariate time series datasets.It is also known as Facebook Prophet which was published by facebook's core data science team .It is very easy to use. It is built in such a way that it can make accurate forecasts for data having seasonal and trend behaviour. This model is a perfect match for time series data containing having rich seasonal traits.Also seasonal historical data works like a charm for this model. This study shows us the significant difference between each of the models.

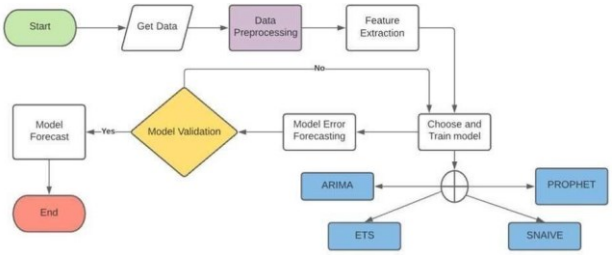

Fig 2.Workflow Diagram

III. PROPOSED METHODOLOGY

Seasonal patterns can be seen in the data, which is a time series data type.The analysis of the traffic data plotted for each street reveals a seasonal pattern-like increase in slope. For the dataset to get to the Implementation stage, data pre processing and feature extraction has to be completed.

1) Programming Tools-

The forecasting models are implemented using python language in jupyter notebook.

2) Target Variables for Time series-

As is well known, time series models must be based on a time variable, and they must also have a target variable that may be predicted in the future. In the data pre processing section, the data is changed of the hour data, which involved combining the date and time columns into a single column and changing.Furthermore, as to anticipate the number of vehicles, "Total Vehicles" is selected as the goal variable. Finally, The cleaning up of the road names and the "road name" is used as a distinctive identifier.

3) Plotting after data cleaning-

Time is used as the independent variable, with which "Total Vehicles" is plotted with time after cleaning the dataset to meet the requirements. The graphic demonstrates the significant seasonality and seeming stationary nature of all the series. The volume of traffic that passes through a street varies greatly depending on the time of year, and almost all streets exhibit seasonality.

4) Forecast Models-

Over a hundred different roads exist here. Even though the majority of them contain seasonal data, some of them also have erratic data. In order to determine which forecasting model works best with which type of data, four distinct models are used.

Four popular and sophisticated forecasting models are—"ARIMA," "ETS," "SNAIVE," and "PROPHET. The prophet is used and tale frameworks to put these models into practice. Multiple time series can be handled simultaneously by the fable package.IV. FUTURE SCOPE

Future versions of the system are frequently enhanced with additional traffic management-related aspects using techniques like deep learning, artificial neural networks, and even big data. The users can then employ this strategy to look for the path that will make reaching their

location the simplest. The algorithm can assist users in making search suggestions and in locating the most straightforward option in an area with less traffic. Road traffic jam forecasting has already used a variety of forecasting techniques. Although there is more room to improve the accuracy of the congestion prediction, there are more techniques that produce reliable predictions.

Additionally, during this time, employing the more recent forecasting algorithms with the improved traffic data available helps enhance the prediction. Today, traffic forecasting is crucial for pretty much every region of the country as well as the entire world. Therefore, this form of prediction might be useful for forecasting traffic in advance. The grade and accuracy are important factors in traffic forecast for better congestion prediction. In the future, it is anticipated that established order accuracy prediction will be estimated using simpler, more approachable techniques so that people will find the prediction model useful and won't waste their time trying to predict the data.

V. CONCLUSION

The most suitable prediction model based on time-series which helps in predicting the future traffic data when

enough dataset is provided was searched but after further research on the project the model which is to be found is not a prediction but rather a forecasting model.

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Automated Air Pollution Monitoring and Forecasting System Using Machine Learning

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Abstract - **Recently, many air quality monitoring systems, including WRF-Chem, the community Multi-scale air quality model (CMAQ), and NAQPMS, have been created and implemented. Drawbacks include the fact that WRF-source Chem's list was not promptly updated, that the precise origin of the pollutants and other factors was frequently unknown, and that the quantity of gases discovered was very low. A system that can monitor more gases in a shorter length of time and at a lower cost of deployment was required. The proposed system employs an Arduino Mega, a MQ135 gas sensor module, a 16x2 LCD, a buzzer, a potentiometer, resistors, and other components to automatically monitor and anticipate air pollution using machine learning. Gases such NH3, NOx, smoke, CO2, SO2, and other substances that are the primary cause of poor air quality are detected by the MQ135 gas sensor. Live data is gathered from the module and simultaneously saved. Utilizing Scikit and Flask Framework, a machine learning framework for forecasting models, a model is trained using the gathered data using Polynomial Regression Machine Learning for optimum prediction purposes. The proposed model is expected to detect harmful gases in chemistry labs, washrooms, private organizations, public places etc. The proposed model monitors the upcoming data in no time and if the value goes beyond the threshold value it activates the buzzer and the server is notified. The future scope of the system can be extended by integrating it with more number of sensors to detect more amounts of harmful gases precisely.**

I. INTRODUCTION

Globally, air pollution is getting worse every day. Rapid car growth, inefficient industrial gas disposal, rapid population growth, and climatic conditions including global warming are all contributing to this. As a result, air quality deteriorates due to the discharge of dangerous chemicals such as carbon monoxide, nitrogen oxides, ground-level ozone, particle pollution, sulphur oxides, and lead, among others. According to the World Health Organization (WHO), air pollution causes 4.2 million premature deaths annually in urban and rural regions worldwide1. Particulate matter of a diameter of less than ten micrometres (PM10) is one of the contaminants with the greatest detrimental effect on public health, according to the US Environmental Protection Agency2 (EPA), since it can easily enter the respiratory tract and cause serious health problems. According to Valdivia and Pacsi3, Metropolitan Lima (LIM) is sensitive to high PM10 concentrations because of its rapid industrial and economic growth as well as its substantial population—29% of all Peruvians live there. The system that has been already developed have many limitations. To overcome all the drawbacks of previous models a system is designed and developed using sensor and machine learning algorithm. The system developed in this project is based on Arduino Mega. The sensor used for monitoring the air pollution is MQ135 gas sensor module. To forecast the air pollution condition for a given time, a model is trained using Polynomial Regression algorithm and further the prediction is done based on the trained data.

It has been critical for people to comprehend the impact of air pollution and the trends of pollution since the 1960s, as a result of advancements in air pollution research and control. As a result, air pollution forecasting was underway. Potential predictions, statistical models, and numerical models are the three categories into which forecasting pollution using various patterns of performance can be classified. It is separated into pollution potential forecasting and concentration forecasting for various elements. Forecasts for concentration are produced by statistical and numerical modelling techniques. The meteorological conditions for atmospheric dilution and diffusion capability serve as the basic foundation for potential forecasts. A warning will be issued when it is anticipated that the weather will meet the criteria for potential significant pollution. A concentration forecast will predict the amount of contaminants present. In a concentration prediction, the pollutants' actual concentration in a given area is predicted, and the forecast's outcomes are quantified. These methods for predicting air pollution can be categorized as parametric and nonparametric, or deterministic and nondeterministic, models. It is simple to tell apart deterministic models from nondeterministic models and parametric models from nonparametric models, however it might be challenging to tell apart parametric models from deterministic models.

Artificial intelligence (AI) model-based statistical techniques are the most widely used. Although neural network (NN) forecasting models are more accurate than other statistical models, they still need to be improved. As a result, several researchers have begun using other techniques to increase forecast accuracy.

The AQI quality index categorization is shown with categorization and its impact on human and animal health is described in the following figure.

AQI Category (Range)	PM_{10} 24-hr	$PM_{2.5}$ 24-hr	NO_2 24-hr	O_3 8-hr	CO 8-hr (mg/m³)	SO_2 24-hr	NH_3 24-hr	Pb 24-hr
Good (0-50)	0-50	0-30	0-40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory (51-100)	51-100	31-60	41-80	51-100	1.1-2.0	41-80	201-400	0.6 -1.0
Moderate (101-200)	101-250	61-90	81-180	101-168	2.1- 10	81-380	401-800	1.1-2.0
Poor (201-300)	251-350	91-120	181-280	169-208	10.1-17	381-800	801-1200	2.1-3.0
Very poor (301-400)	351-430	121-250	281-400	209-748*	17.1-34	801-1600	1201-1800	3.1-3.5
Severe (401-500)	430 +	250+	400+	748+*	34+	1600+	1800+	3.5+

Fig. 1 AQI quality index categorization

The following figure shows the air quality which impacts to human health.

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health warnings of emergency conditions. The entire population is more likely to be affected.
Hazardous	301 to 500	Health alert: everyone may experience more serious health effects

Fig. 2 Air Quality Index Levels

II.RELATED WORK

Air pollution is viewed as an inescapable fact. Much has been written on environmental pollution accidents in recent years, particularly air pollution incidents. If environmental concerns are overlooked in the process of societal growth, the earth's natural environment would steadily deteriorate, putting the planet in risk every day. It is commonly understood that, as compared to land and water contamination, the air pollution's effects are more severe. Scholars have done a number of studies on air pollution, ranging from pollution sources to pollution management and forecasting, as well as the issue of pollutants inventories, pollution analyses, and pollution alarms. These themes serve as the foundation for the air pollution research discussed in the subsequent sections.

Smart cities have attracted a lot of attention in the context of urban development strategies. Web and broadband networking advancements are viewed as facilitators of e-services and are becoming increasingly important for urban development. Cities are increasingly accepting a major role as growth drivers in areas such as health, consideration, the environment, and business [5]. As a result, there are numerous considerations associated with action control cities [6], and this point is identified inside urban communities. Quality checking is a topic that is connected to actively controlling and is discussed in the same section.

Many of the efforts in the field of discussing connected to actively controlling and is discussed in the same section. Many of the efforts in the field of discussing pollution in smart cities center on the testing criteria regarded as hazards. A big data analytical technique [7] employs Ozone, CO, NO2, and SO2 levels, as well as data from smart cities, activity, time, and observation, to aid in urban planning decision making. In any event, these studies do not suggest any approach for anticipating contamination or detecting relevant factors for the next days. With ever-increasing air pollution levels, it is critical to implement effective discuss quality monitoring models based on data obtained by pollution sensors, which aid in anticipating the concentration of artisans and providing an evaluation of air contamination in each place. As a result, air quality evaluation and forecasting have emerged as critical study areas. There is an unmistakable bigger piece of usage of Artificial Neural Networks (ANN) in association with works inside the composition that do consider the hypothesis of air defilement contrasted with other models, for example, multiple linear regressor (MLR) [8]. Because this is the most popular viewpoint, it is crucial to note that ANNs have a few shortcomings for this topic, as identified [9]. An explanatory technique for show determination and they follow a long-running procedure to achieve the most precise demonstration. To summarize, contemporary ways that integrate machine learning methods with the use of air pollution information to get it and make strides forecasting air pollution [10].

III.PROPOSED WORK

A novel method to monitor air pollution using sensor and forecast it using Machine Learning algorithm. This system aims at developing a cost effective Air Pollution monitoring and forecasting system which could detect different air pollutants and harmful gases. Ammonia, Nitrogen Dioxide, alcohol, benzene, smoke, Carbon dioxide, Sulphur dioxide, and other gases are detected by the MQ135 gas module.

MQ135 module is connected to Arduino Mega which sends the collected air quality values to the storage. The prediction model is trained using Regression and Polynomial Regression algorithms which belong to for the prediction of air quality. The model is applied on the collected and forecasting is done using Scikit and Flask Framework which consist of libraries used for prediction.

Calculation of AQI:

1. The Sensors are used to measure the concentration of gases in parts per million or mass per volume.
2. The goal is to convert the pollution concentration into a number between 0 and 500. The AQIs of 0, 50, 100, 150, …500 are referred to as breakpoints.
3. The conversion can be done using online AQI conversion tool. Each AQI breakpoint corresponds to a defined pollution concentration.
4. The AQI is determined by the pollutant with the highest index. For example, if the PM2.5 AQI is 125, SO2 is 30, NOx is 50, and all other pollutants are less than 125, then the AQI is 125–determined ONLY by the concentration of PM2.5.

The architecture of the proposed system is shown in the following figure:

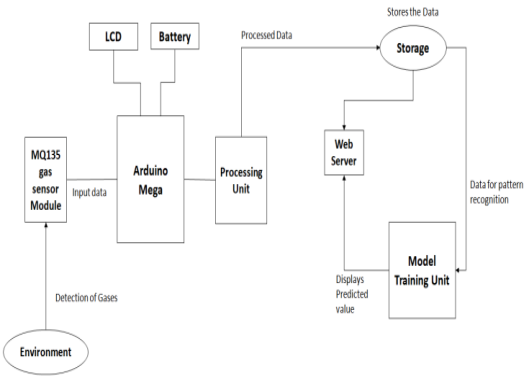

Fig. 3 Proposed Architecture

Number of gases detected by the system plays a major role on the performance of the system. As per shown in the proposed architecture, the various gas sensor modules will read the amount of gas present in the sir. The Arduino Mega microcontroller will transfer the data from sensors to cloud server. The collected data will be processed and prediction model will be trained to predict the amount of gas in the air. from the identified amount, the air quality will be checked and categorized as good or bad quality.

The flowchart of the system is given below:

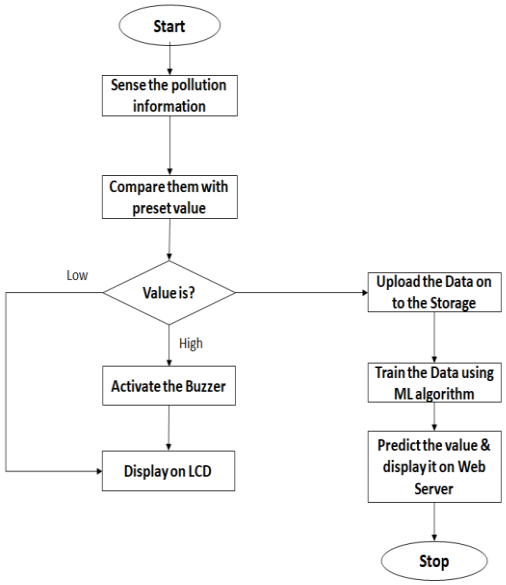

Fig. 4 Flowchart of the Working System

IV.RESULT & DISCUSIION

The air pollution databases were extracted from kaggle. In the proposed system, the dataset contains parameters as listed Station Id, Date, PM2.5, PM10, NO, NO2, NOx, NH3, CO, SO2, O3, Benzene, Toulene, Xylene, AQI. The dataset is of a city which contains various gases used to predict the AQI. As mentioned earlier the machine learning approach is used to prepare the prediction model and the results are displayed on web application connected to the server. Here AQI prediction levels are as follows 0-Good, 1-Moderate, 2-Poor, 3-Satisfactory, 4-Severe, 5-Very Poor. The dataset is shown in the following figure:

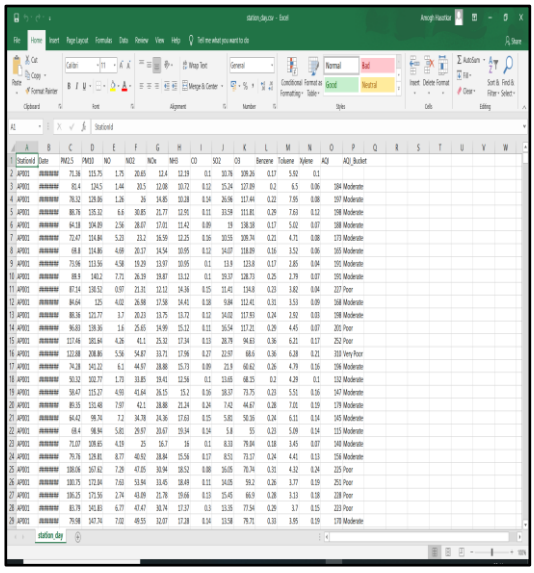

Fig 5. Dataset

Following are the hardware and software requirements of the proposed system.

Software Requirements:

1. Windows OS
2. Arduino software Development Environment (ASDE)
3. SciKit & Flask Framework
4. Python IDLE

Hardware Components:

1. Arduino Mega
2. MQ135 gas sensor module
3. 16x2 LCD
4. 10K Potentiometer
5. Breadboard
6. Resistors (100 Ohm & 220 Ohm)

The Arduino IDE along with its serial monitor displaying the sensor read values from the environment. The values are being displayed on the serial monitor through port COM6 with Baud Rate of 9600. The predefined threshold value is defined in the provided code. If the sensor read values goes beyond that threshold value, the buzzer gets activated.

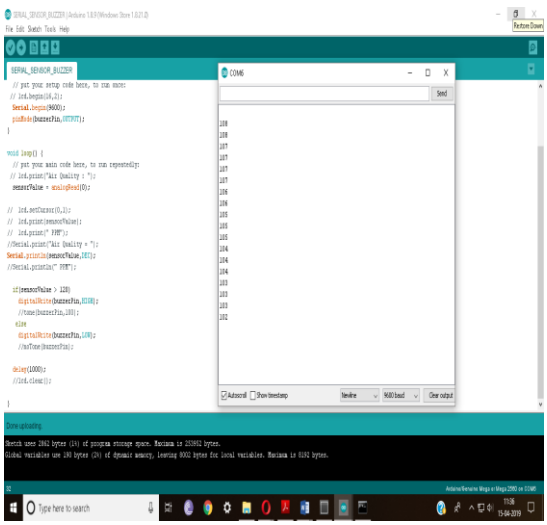

Fig. 6 Arduino IDE & Serial Monitor displaying read values

Fig 7 Activation of the web server using Flask Framework

Web server displays the predicted value for a manually selected event. Polynomial Regression Machine learning Algorithm is used to train the stored data.

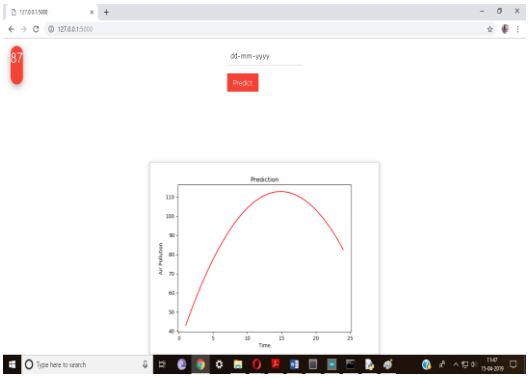

Fig 8 Predicted Result 1

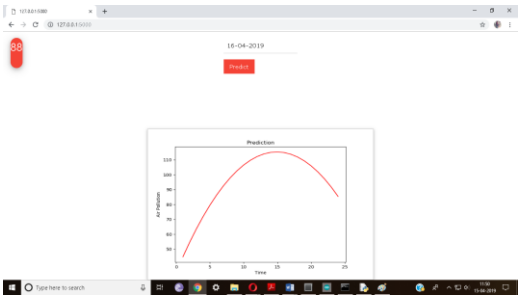

Fig 9 Predicted Result 2

Also, the performance of the model is tested using various metrics which are shown below:

```
In [18]: from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_score
         print('\nAccuracy: {:.2f}\n'.format(accuracy_score(y_test, y_pred)))

         print('Micro Precision: {:.2f}'.format(precision_score(y_test, y_pred, average='micro')))
         print('Micro Recall: {:.2f}'.format(recall_score(y_test, y_pred, average='micro')))
         print('Micro F1-score: {:.2f}\n'.format(f1_score(y_test, y_pred, average='micro')))

         print('Macro Precision: {:.2f}'.format(precision_score(y_test, y_pred, average='macro')))
         print('Macro Recall: {:.2f}'.format(recall_score(y_test, y_pred, average='macro')))
         print('Macro F1-score: {:.2f}\n'.format(f1_score(y_test, y_pred, average='macro')))

         print('Weighted Precision: {:.2f}'.format(precision_score(y_test, y_pred, average='weighted')))
         print('Weighted Recall: {:.2f}'.format(recall_score(y_test, y_pred, average='weighted')))
         print('Weighted F1-score: {:.2f}'.format(f1_score(y_test, y_pred, average='weighted')))


Accuracy: 0.81

Micro Precision: 0.81
Micro Recall: 0.81
Micro F1-score: 0.81

Macro Precision: 0.78
Macro Recall: 0.74
Macro F1-score: 0.76

Weighted Precision: 0.81
Weighted Recall: 0.81
Weighted F1-score: 0.81
```

Fig. 10 Accuracy Metrics

Precision is the percentage of results that are relevant of the entire result . According to our model micro precision is 81% i.e. 81% of the total result is relevant. The precision results differ in Macro precision i.e. 78% and weighted precision i.e. 81%.

Recall refers to the percentage of total relevant results correctly classified by your algorithm. According to our model micro recall is 81% that means out of the relevant results found from precision 81% of them are correctly classified by our Algorithm. The results differ in Macro recall i.e. 74% and weighted recall i.e. 81%. By analyzing the results shown and mentioned above the accuracy of our model is 81%

V. CONCLUSION

- Air quality has been degraded over the years due to industrialization, increase in population, increase in vehicles, meteorological factors, global warming etc. This project aims to monitor the air quality and predict the quality for the future scene.
- For the proposed model, hardware and the software components used for the development of the system are Arduino Mega, MQ135 gas sensor module, Scikit, Flask Framework, Arduino IDE etc.
- The proposed project works for predicting harmful gases like Carbon Mono-oxide (CO), Carbon di-oxide (CO2), Sulphur Dioxide (SO2), Ozone (O3), NH2 etc.
- We have followed various phases and worked on it to know about the existing system and their drawbacks. Which can be further used to analyse the better things to be done in proposed system
- The proposed model tries to improve upon the existing system providing with better efficiency, accuracy and low-cost budget.
- The proposed system has future scope in which same system can be integrated with more than one sensor for predicting many other gases.
- There are areas in which the proposed system can be improved upon and further improve the robustness and capabilities of the system.

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A Feature Selection Algorithm for Brain Tumor dataset

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Abstract-**Brain Tumor dataset produces huge amounts of data with large features. This data measure implies low quality, unreliable, redundant, and noisy data to examine useful. Therefore, researchers require relevant and high-quality data from big data using feature selection techniques. Feature selection technique (FST) is important preprocessing of data that recues irrelevant features from dataset and increase the performance in terms of computational speed. It brings immediate effects for application: speeding up a data mining algorithm, improving the data quality and data mining performance, and increasing the comprehensibility of the mining results. A different type of attributes (features) selection techniques include in the machine learning area. The primary role of this process is to eliminate unrelated or disused elements from the dataset. The data mining algorithms have improved the performance with chosen feature, relevant or important feature subset; hence computationally enhance the accuracy of data mining and MLTs. Various FSTs of big data, such as filter approach, wrapper approach, hybrid approach. In this paper we are using the brain tumor datasheet. Brain Tumor and we can select their important features by using the PCA, Genetic Search algorithm, Best First, Greedy Stepwise feature selection technique.**

Keywords: Feature Selection technique (FST), Brain Tumor, Machine Learning (ML), PCA, Genetic Search algorithm, Best First, Greedy Stepwise

I. INTRODUCTION

Brain Tumor (BT) dataset such as lung cancer and brain tumor diagnosis is a main, crucial, and difficult task in medical science and healthcare. It is required the patient's exact diagnosis for an enhanced result with the help of clinical study and examination. There are various types of computer-based information and Decision Support System (DSS) available in the medical science and healthcare area. These are the computer-based tools that help doctors and healthcare practitioners for an accurate diagnosis. The disease can be easily and quickly diagnose by analysis and study of disease samples, and can be timely treated. It helps the reduction of time, money, and suffering of the patients. The objectives of the study are to develop a model for feature selection and classification techniques. Feature selection technique (FST) and Dimension reduction technique (DRT) used to choose a feature subset from the available original features of a dataset, which better helps in the learning process. Feature selection is an important step in various tasks, where feature selection techniques (FSTs) are more attractive due to their simplicity and fast speed. The principal focal point of this work is to dimensionally reduce the features and find out important features of the lung cancer dataset. We have likewise utilized two distinctive FSTs to choose related subsets and enhanced the accuracy of classification. We have used FSTs namely Correlation Based Feature Subset (CFS) and Ranker for selecting relevant features of Brain Tumor (BT) dataset. The results demonstrated that distinct selected feature of BT dataset by using Genetic Search, Greedy Stepwise, Best First, and Ranker (PCA) search methods. Classification techniques includes decision trees (DT) like Classification and Regression Analysis Tree Tree (CART), Random Forest (RF), J48 or C4.5, Artificial Neural Network (ANN) like Radial Basis Function Network(RBFN) , Statistical methods like Bayesian Network (BN) , Naive Bayes (NB) and Ensemble Models.

II. ROLE OF FEATURE SELECTION WITH BT DATASET

BT dataset produces huge amounts of data with large features. This data measure implies low quality, unreliable, redundant, and noisy data to examine useful patterns [1]. Therefore, researchers require relevant and high-quality data from big data using feature selection techniques. Feature selection technique (FST) is important preprocessing of data that recues irrelevant features from dataset and increase the performance in terms of computational speed. It brings immediate effects for application: speeding up a data mining algorithm, improving the data quality and data mining performance, and increasing the comprehensibility of the mining results [2]. Feature selection is a crucial technique to explain dimensionality in ML by choosing appropriate and non-redundant features [3], [4]. The FST is also called the feature optimization technique, which removes the unrelated feature subset from the original feature space. A different [5] type of attributes (features) selection techniques include in the machine learning area. The primary role of this process is to eliminate unrelated or disused elements from the dataset. The reduce number of features have increased benefits to classification and cluster analysis [6]. It decreases number of functions that appear in the models discovered to help and make the models easier to understand. In addition [1], feature selection does not modify the original representation of data in any meaning. The data mining algorithms have improved the performance with chosen feature, relevant or important feature subset; hence computationally enhance the accuracy of data mining and MLTs. Various FSTs of big data, such as filter approach, wrapper approach, hybrid approach [7]. The wrapper approach is useful for remove the irrelevant features and prepare new feature space with a learning algorithm and testing the effect of feature exclusion on the prediction metrics. In case of filter approach, a statistical measure is used as a criterion for retrieving the new useful features and utilizes the similar quality based data itself, and works individually from the learning algorithm. The hybrid approach and embedded method is the combination of above filter approach and

wrapper approach to handle larger datasets. In this approach, the feature set is evaluated using both independent measures and a data mining algorithm. Filter-based FST processes the algorithm without using learning classifiers. In contrast, the wrapper method processes the algorithm using the learning classifiers, including awareness about the specific construction of the regression or classification function, and can consequently combine with any learning mechanism. The FSTs have a vital role in the categorization of BT dataset [8].

III. OPTIMIZATION OF BRAIN TUMOR DATASET

Big data analytics through optimization and classification of BT dataset helps the researcher, doctors, and medical students for early detection and diagnoses of diseases. In this research work, different machine learning, data mining, and evolutionary techniques or FSTs to build an intelligent model to achieve the better solution. All organizations are working in the health-care business can tremendously benefit from data mining techniques [9]. GEPLC dataset is a large amount of data generation in healthcare.

Intelligence techniques can capture human beings and collective knowledge extending a knowledge-base with the help of ML techniques. It does knowledge detection or discovering principles from unknown neural networks and data mining play very important role to find patterns in datasets.

This research begins with a short-lived associated work, after that explored the standard FSTs, a description of our research methods, and utilization outcomes of BT datasets. This research has focused on a specific type of gene expression profiling (GEP) dataset like lung cancer disease that is named as BT dataset. It offered some activities to increase awareness in the medical science area by investigating different methods to examine lung cancer problems.

We have used data mining methods to assess lung cancer dataset samples and normalized the dataset in case of start stage. The second stage applied different FSTs to determine the important feature for the BT dataset. The third stage proposed the different classification models to analysis the performance of the lung cancer dataset. We proposed different types of ensemble models for BT dataset in the fourth stage. Finally, the extra useful objective of this thesis is the recommendation of models, and their comparative study was done based on their performances.

IV. LITERATURE REVIEW

Many researchers have been working in the area of BT datasets. In this research work, we have focus on the BT dataset that is also work done by done by different authors with ML techniques. The BT dataset is a big data due to large number of features. [10] described the issue of high dimensional dataset and also discussed just one track of main challenges that currently arises is the classification of high dimensional databases, with very few samples and high-class imbalance. The properties of gene expression microarrays are presented in biomedical databases, presenting class imbalance problems, using a limited number of samples in high dimension when the number of samples in one class is much larger than the number of samples in the other class or classes, it is called class imbalance problem. This issue has been described as one among the most popular significant challenges facing by the big data. They worked with gene expression big data and used Multilayer Perception Deep Learning as a classifier. [11] Identified two other types of cancer: small cell lung cancer (SCLC) and non-small cell lung cancer (NSCLS). They used filter and wrapper-based FST for selecting features of the GEPLC dataset. Using the modified stochastic diffusion search (SDS) algorithm, a novel wrapper-based FS algorithm is proposed. In support of classification, neural networks (NN), Nave Bayes (NB), and decision trees (DT) were used. The experiment results found that classification accuracy of CFS-DT, CFS-NB, CFS-NN, and SDS-decision tree are 82.22 %, 81.48%, 85.19%, and 87.41% respectively. [12]suggested various data mining based classification techniques like ANN, RF and SVM in order to classify tumour disease with FST. According to the classification results obtained, a prediction is made whether the tumour is benign or malignant. They proposed model in order to classify tumour disease into begins malignant or benign categories. The ML techniques like ANN, RF and SVM have used as classifiers, and achieved the accuracy of RF, SVM and ANN are 79%, 86%, and 92 % respectively.

[13]compared the individual classifiers like DTs, KNN, SVM, and NB with their proposed ensemble model and determine the team's performance suggested ensemble model. The suggested ensemble model that is combination of different classifiers that given better accuracy as 92.85% with real time dataset. [14] proposed a new wrapper method WERFE, which belong to a RFE framework. The suggested WERFE method gives the advantages with multiple gene selection algorithms. The gene selection algorithms are selected a few number of gens and classifiers obtained better classification accuracy as 77.30% [15] proposed two statistical models along with two tree ensemble learning methods like GB and RF, and compared predictive model to ability against two common deep learning algorithms, MLP and CNN.

[16] suggested deep learning (DL) for analysing the medical image data. The sensing and analysis steps that permit medical imaging to be used for quantifying disease. [17] worked on microarray datasets, and experiments produce a huge amount of gene-expression data from a single sample. The suggested method is a generalised strategy that balances exploration via the Lightweight Infantry Group (LIG) to discover a viable starting baseline while optimising outcomes beyond that baseline. The LIG swiftly converges to a discovered result of 70 to 88 percent. [18]explored about the high dimensional microarray gene expression data that the number of samples is small in comparison to the number of genes. They have proposed robust algorithm for essential gene selection and achieved better accuracy with different microarray data.

V. METHODOLOGY

I have explored the different data mining based classification techniques considered in this research work in order to classify BT dataset. A BT dataset is very useful to improve the researchers, doctors, and medical students to detect lung cancer. We describe the pre-processing steps used in our experiments, and potential solutions to the problem.

A. PROPOSED ARCHITECTURE FOR FEATURE SELECTION OF BRAIN TUMOR DATASET

The investigation of background information for BT using intelligent techniques was the first step during the research phase. The figure 1 has shown the proposed architecture for feature of BT dataset using different feature selection techniques. The proposed research process is described in different phase.

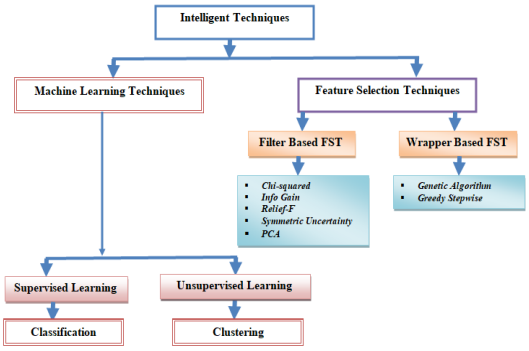


Figure 1 Proposed architecture for feature selection of BT dataset

B. DATASET AND DATA PREPROCESSING

The ELVIRA Biomedical dataset Repository (DBC Repository), which is a section of machine learning repository of the proceedings of the national academy of sciences (PNAS), is a collection of databases, domain theories, and data generators. The machine learning group uses this dataset to do empirical research on machine learning methods. In 2001, the archive (collection) was developed as an FTP archive by Arindam Bhattacharjee, William G. Richards, and its team from Departments of Adult Oncology and Pediatric Oncology, Dana–Farber Cancer Institute, Harvard Medical School, and Department of Biostatistics, Harvard School of Public Health, Boston.

The BT datasets collected from the ELVIRA Biomedical dataset Repository (DBC Repository) have been utilized in this research. The dataset contains 10368 features and 50 the numbers of samples with five classes. Table 1 show details of classes and number of samples of the BT dataset.

C. FEATURE SELECTION TECHNIQUES (FST)

The procedure for determining and reducing as much useless and redundant information as feasible selection of feature subsets is referred to as feature subset selection. This decreases the data's dimensionality, allowing learning algorithms to work more quickly and efficiently. In some circumstances, the outcome is a better option compact, readily understandable representation of the goal notion; in others, the outcome is a better accurate future categorization. The Feature selection [19]–[21] is a data mining technique for picking a portion of relevant characteristics (variables, predictors) that use in model construction. The variable selection is a term that describes the process of selecting variables, attribute selection, or variable subset selection. [22].

1. FILTER METHODS

The Rankers use the common properties of the algorithm for learning differs from the data and performs in a different way. Ranker primarily based procedures are now not structured on classifier and are wrapper-based approaches are generally quicker and more scalable. [4], [23].

- **CORRELATION-BASED FEATURE SUBSET SELECTION (CFS)**

Features are selected for responsibility the relationship between characteristics may be used to classify data in ML, and such a FS procedure can be beneficial for basic ML algorithms. In this section, offers a CFS based on this assertion; it examines the effectiveness of the CFS under various scenarios and demonstrates that CFS may find relevant machine learning characteristics [24].

- **INFORMATION GAIN (IG):**

In machine learning, information gain is able to help feature ranking in benefits. Information gain (IG) [23], [25], [26] is an informal technique for selecting features based on contribution of information to the class variable without taking into account feature interactions. Therefore, the information gain is based on what proportion information was obtainable before knowing the feature value and what proportion was accessible after it.

- **GAIN RATIO**

Method has been developed to get the ratio. This method submits to application-specific types of normalization with consider to the obtained information called split information. The Information Gain [27]–[29] measure preferentially selects features having a significant number of values.

- **Relief-F (RFF):**

The Relief-F [30] is a filter based feature selection (FS) methods, it is a unique opportunity effective, easy and broadly used method to feature weight estimation. The weight designed for features of a dimension vector is define in expressions of feature relevance. In a probabilistic explanation of Relief is prepared, which situations that the informed weight for a feature is propositional to the variation between two conditional possibilities.

2. SEARCH METHODS

- **GREEDY STEPWISE SEARCH (GSS):**

A Greedy Stepwise Search [31] is an algorithmic hypothesis, which adheres to the problem in resolution the principle of creating the optimal choice locally in every stage with the intention of finding the global optimal. In several issues, a greedy strategy Typically, no generate an optimal solution, however still a greedy heuristic can locally produce the optimum solution that estimates the optimal solution globally at the affordable time. When [32] beginning It chooses the first item from an empty set variable by further selection and eliminates the useless variable by selecting backwards to discover the most effective feature subset.

- **GENETIC ALGORITHM (GA):**

Genetic Algorithms (GA) [24], [33], [34] has discovered to mimic numerous of the method observed in natural evolution. The basic concept of GA is accustomed to the command of evolution to solve optimization problems. The earliest introduction of the unique Genetic Algorithm was by John Holland who pretends it early in the 1970s. Genetic algorithm [35] is adaptive search techniques on the basis of the principles of natural selection in biology.

- **BEST FIRST SEARCH (BFS):**

Heuristic search algorithms, which include the BFS, are a division of search algorithms. Heuristic search is on the basis of premise that instead of exploring all conceivable search pathways at each step, we try to figure out which ones they seem to be moving us closer to our desired state [36].

- **RANKER SEARCH (RS):**

Ranks attributes by their individual evaluations. Use in conjunction with attribute evaluators (ReliefF, GainRatio, Entropy etc) [37]. Generate Ranking - A constant option. Ranker is only capable of generating attribute rankings. Specify the number of attributes to retain.

- **PRINCIPAL COMPONENT ANALYSIS (PCA):**

PCA [38] is an move towards to reduce the number of dimensions in a dataset consisting of a huge number of interrelated variables while keeping as a lot as feasible of the version existing within the database [5], [39].

VI. FEATURE SELECTION WITH BRAIN TUMOR

Feature selection is an optimization technique used to remove the unsuitable feature from original dataset and increase the accuracy of models. This research work has used Genetic algorithm (GA) or Genetic Search (GS) as options selection. We have also used Principal Component Analysis (PCA) [40] for dimensional reduction and FSTs [1] are used to select the relevant features from original dataset. Genetic-Algorithms (GA) [41], [24] were utilized to select the relevant features from BT dataset and prepared new dataset with less number of features, hence, we can improve the performance of models. The most cited presentation of the one-of-a-kind Genetic algorithmic standard developed by John Holland described it [42].

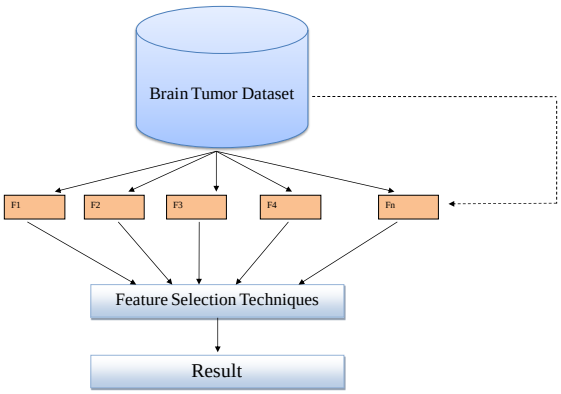


Figure 2 Process of feature selection with BT dataset

VII. THE ARCHITECTURE OF FEATURE SELECTION TECHNIQUES (FSTS)

To reduce features of the BT dataset, we have used different search techniques with different learning algorithms applied in the BT dataset and got the reduced feature subset of the BT dataset.

STEPS OF GENETIC SEARCH/ BEST FIRST/ GREEDY STEPWISE/ RANKER

a). Select attribute to indicates the relevance of the attribute

b). Applied the first search method as Genetic Search /Best First/Greedy Stepwise/ Ranker

c). Select the Attribute Evaluator as Correlation Feature Subset Evaluates (CFS Subset Evaluator)

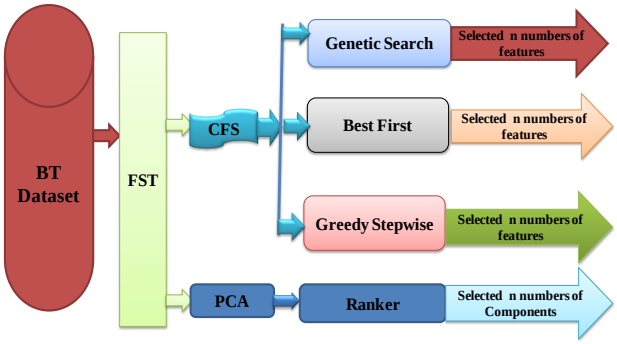
d). Set tuning parameters of Genetic Search.

e). Select attribute selection mode

f). Select full training set and partition into training and testing with cross-validation

g). Start attributes selection to select the relevant features

h). Now got reduce selected numbers of features using Genetic Search /Best First/Greedy Stepwise/ Ranker with Correlation Feature Subset Evaluates (CFS)



MODIFIED GENETIC ALGORITHM (MGA)

Pseudocode-1: Pseudocode of Main Algorithm of Modified Genetic Algorithm (MGA)

Pseudo-code 1 shows the proposed MGA, i.e., another form existing search-based FSTs as simple Genetic Algorithms.

Step 1: First set the limit of highest number of execution of GA

Set ← fu upper-limit

Step 2: Secondly set the limit of lowest number of execution of GA

Set ← fl lower-limit

Steps 3: Repeat the step 3 and step 4

For count=1 to N

Call GA_M

Step 4: Check

If we found the constant features

Stop step 3 and step 4

else

Repeat step 3 and 4

Step 5: Stop

Step 6: *Returns selected features By MGA*

VIII. FEATURE SELECTION OF BT DATASET WITH PROPOSED MODIFIED GENETIC ALGORITHM (MGA)

Brain Tumor dataset was used to compare different filter based feature selection methods for the prediction of disease risks. The feature selection methods are

Sr. No	Algorithm	FST	Total Number of Features Brain Tumour (Malignant glioma types)	Selected Features
1	CFS Subset Evaluator	Best first	**10368**	99
2	CFS Subset Evaluator	Greedy Stepwise	**10368**	95
3	CFS Subset Evaluator	Linear Forward Selection	**10368**	39
5	Classifier Subset Evaluator	Genetic search	**10368**	1484

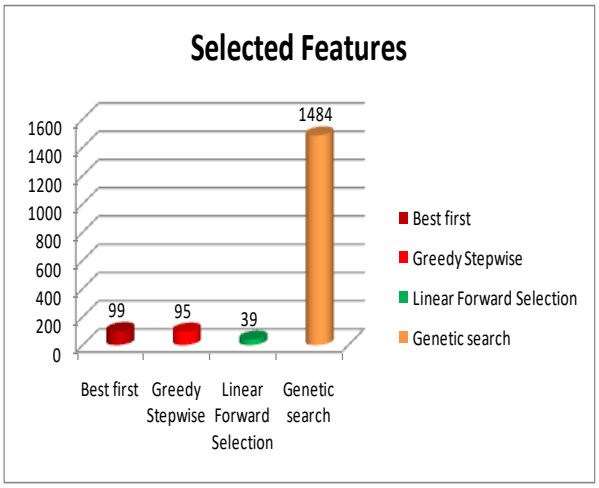


Table 1 and figure 3 show the selected features of BT Dataset was used to compare different feature selection methods for the prediction of disease risks. Six feature selection techniques are used with classification algorithms. CFS Subset Evaluator with Genetic search are performed better result as compare to other feature selection algorithm.

IX. CONCLUSION

We have used the two FSTs namely Correlation Based Feature Subset (CFS) and Ranker for feature selection with BT dataset. The principal focal point of this work is to dimensionally reduce the features and find out important features of the GEPLC dataset. We have likewise utilized two distinctive FSTs to choose related subsets and enhanced the accuracy of classification technique. The results demonstrated with distinctive selected feature. We have used Genetic Search, Greedy Stepwise, Best First and Linear Forward Selection search methods for selecting the relevant features of BT dataset where 1484 features selected by the Genetic Search, Greedy Stepwise search method selects 95 features, similarly Best First search method selects 99 features and Linear Forward Selection search methods selects 34 features. Experiment results revealed that Genetic Search selects a higher number of features and Best First selected the less number of features

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Deep Sentimental Analysis of Airline Service Reviews Data Using Hybrid Convolution Neural Network Model

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ABSTRACT – **Deep learning has become an effective technique in the field of sentiment analysis. In this research we have utilized the airline service review datasets for six different Indian airlines where the various passengers share the different positive and negative reviews. We have applied specified textual data based stringtowordvec technique which produced different word occurrence for similar text with different weight values. To select the important features we have used latent semantic analyzer named technique where the sentiment and score have been used for future classification of sentiments. We have initially used standalone standard classifiers as Output Layer, CNN, Dense Layer and LSTM which performs better accuracy rate for sentimental analysis along with the different configurations such as Cnntextfileembeddinginstance as instance iterator, Activation Sigmoid as layer activation function, LossMultilabel as loss function which have played very important role to improve the performance of classifiers. In this research finally we have found that the hybridization of standard classifiers such as the combination of OL, CNN, DL , LSTM produced the highest accuracy rate as 89.57% for Air India airline so we have concluded for this research that we can recommend the passengers for Air India airline as best airline in India on the basis of services that we have used in our collected dataset.**

KEYWORDS: Classification, Dl4jmlp Classifier, CNN, Hybridization technique, Sentimental Analysis,

I. INTRODUCTION

Sentiment analysis has long been one of the most popular deep learning research areas. Airlines include various machine learning and deep learning methods. The sentiment of two class datasets was then classified using statistical analysis, latent semantic analysis, and structural equation modeling (SEM) hybrid methodologies. The majority of the papers focused on the fact that many of the data sources for the airline industries come from the web, such as Twitter, Skytrax, and TripAdvisor. Some projects concentrate on real-time sentiment data from aircraft passengers. In A literature Deep learning models have outperformed traditional machine learning approaches in a variety of text classification tasks, including sentiment analysis, news categorization, question answering, and natural language inference. In their paper, they have provided a comprehensive review of more than 150 deep learning-based text classification models developed in recent years, as well as a discussion of their technical contributions, similarities, and strengths. They also provide a summary of more than 40 popular text classification dataset[1]. Deep learning has emerged as a powerful machine learning technique that learns multiple layers of representations or features of the data and produces state-of-the-art prediction results. Along with the success of deep learning in many other application domains, deep learning is also popularly used in sentiment analysis in recent years. This paper first gives an overview of deep learning and then provides a comprehensive survey of its current applications in sentiment analysis. Deep learning is the application of artificial neural networks (neural networks for short) to learning tasks using networks of multiple layers. It can exploit much more learning (representation) power of neural networks, which once were deemed to be practical only with one or two layers and a small amount of data. Based on network topologies, neural networks can generally be categorized into feedforward neural networks and recurrent/recursive neural networks, which can also be mixed and matched. Researchers have mainly studied sentiment analysis at three levels of granularity: document level, sentence level, and aspect level. Sentence level sentiment classification classifies individual sentences in a document. However, each sentence cannot be assumed to be opinionated. A brand-new paradigm for social media sentiment analysis based on deep learning models and aimed to create a semantic dataset after processing these particular phrases in order to support future study [2]. In our study we have use sentimental level sentimental classification to determine the sentiment expressed in a single givens sentence. As discussed earlier, the sentiment of a sentence can be inferred with subjectivityclassification48 and polarity classification, where the former classifies whether a sentence is subjective or objective and the latter decides whether a subjective sentence expresses a negative or positive sentiment [3]. In existing deep learning models, sentence sentiment classification is usually formulated as a joint three-way classification problem, namely, to predict a sentence as positive, neural, and negative.

II. RELATED WORK

In our research work we have worked with various airline service reviews where the sentiment feature played an important role for deep learning based classification techniques [4]. The branch of study known as sentiment analysis, or opinion mining, examines people's attitudes and sentiments towards various objects, including goods and services, and their characteristics. In this research work we have applied different Dl4j classifiers CNN, Output Layer, LSTM and Dense Layer where the ensemble model performed best accuracy rate.

III. DATASETS

Data collection is the primary component of sentimental analysis, which is a difficult task due to privacy concerns such as the fear of exposing personal information. We collected social media data on airline service provider passenger real-time reviews [5]. This dataset is used by the machine learning group to conduct empirical research on machine learning methods. We used the Web Harvey tool data extractor tool to collect reviews from various travel websites, including Tripadvisor, Skytrax, mouthshut, Makemytrip, and trustpiolet. These data sets demonstrated the importance of pre-processing data by detecting single abbreviations and lemmatization, as well as correcting and stopping word removal. The data is separated into train and validation sets during the pre-processing stage, and the reviews are then vectorized into TF-IDF vectors. Because the given file is in text, the class converts the text into positive and negative words and removes the terms that have weak predictive ability or are strongly correlated to other terms in order to balance the final dataset [6]. To do this, we use the string to vector feature extraction technique. Additionally, we divide the datasets into categories for domestic and foreign routes in order to identify specific customer satisfaction as well as the best airline in India.

IV. EXPERIMENT & RESULT

In our experiment we have used the following layer function classifiers of deep learning approach associated with Neural Network Configuration- Output Layer, Convolution Neural Network, LSTM, and Dense Layer. In the below figure we have described the data set about airline reviews and applied different stand alone classifiers such as OL , CNN , LSTM and Dense Layer where OL has used as common layer specification classifier.

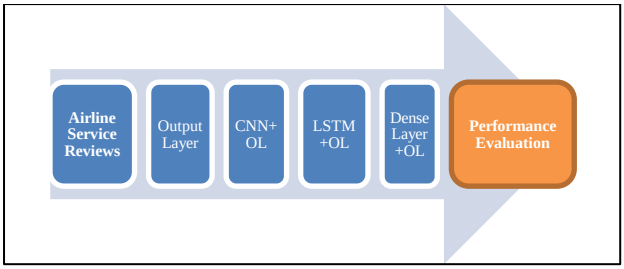

Fig 1 -Flowchart of proposed deep learning based ensemble model

In this work we have used deep learning approach named as DL4J package where the different classifiers layer specification with sigmoid activation function and cnntextfileembedding technique used for custom net technique.

Table I - Performance of Deep Learning Classifiers for six airlines

Deep Learning Technique (Dl4jmlp Classifiers with Neural Network Configuration)	**Air India**	**Air Asia**	**Spice Jet**	**Vistara**	**Indigo**	**Go Air**
Output Layer	98.5%	98.9%	99.85%	97.33%	99.80%	99.55%
CNN	68.10%	61.90%	63.26%	64.50%	65.94%	77.13%
LSTM	68.66%	61.90%	63.20%	64.50%	65.90%	77.10%
Dense Layer	68.11%	61.56%	63.26%	64.55%	66.90%	77.12%
Proposed Hybrid Model (OL+CNN)	98.9%	99.11%	**99.88**%	97.35%	99.84%	99.63%

In the above table the performance of all classifiers have mentioned where the association of Convolution Neural Network and Output Layer have produced highest accuracy rate as 99.88 % for Spice Jet airline service review so we can recommend the passengers for this airline according to our collected service reviews.

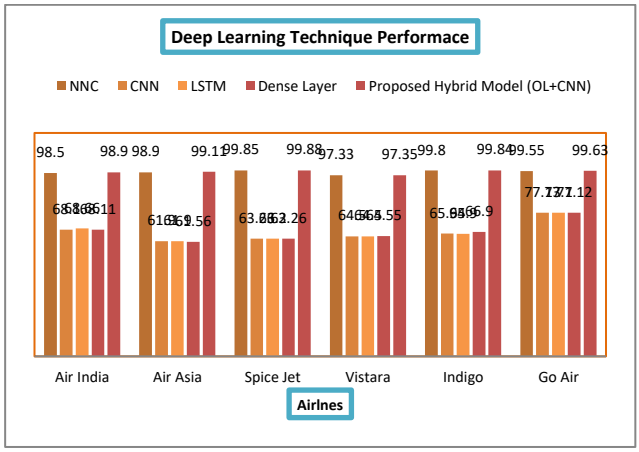

Fig 2– Graphical Representation of Performance of Deep Learning Classifiers for six airlines

In our work we have used different DLT for classification but we have found that the Output layer and CNN associated NNC have produced highest accuracy rate so we combine or hybridize both the classifier which gave best accuracy rate for all the airlines and for spice jet we have obtained maximum accuracy rate for recommendation.

In the below figure 2 the ROC curve performance has shown in which the ROC curve is obtained by plotting recall and FPR on the y-axis and x-axis, respectively. It is a good measure for imbalanced datasets because it is not skewed toward the majority class. Its value ranges from 0 to 1. However, ROC only considers the recall/true positive rate, so it focuses on positive records and ignores the negative ones.

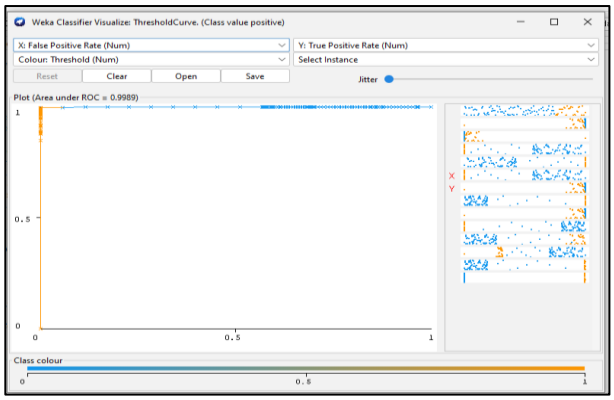

Fig 3 – ROC curve of Performance of Hybrid Deep Learning Classifiers recommended spice jet airline

V. CONCLUSIONS

This study conducted experiments on the Indian Airline Review dataset with five different deep learning methods associated with NNC (OL, CNN, LSTM, and Dense Layer) and a proposed hybrid model with the combination of OL and CNN were used for recommendation of best airline. Our Proposed hybrid model gives the best accuracy of 99.88% among all the classifiers for spice jet airline. The accuracies were determined to compare each categorization technique and the total sentiment count for all six airlines of India was displayed in terms of facilities, services and punctuality of airlines.

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ML Algorithm To Predict Diabetes At Early Edge

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Abstract- **The aim of this ML model is to create a portal which will be useful for the rural area to help them reduce the mortality rates. Nowadays research's shows that diabetes has become one of the most common health issues. Childrens in rural areas are diagnosed with diabetes at an early age. Detection of diabetes has become very difficult for them to detect. Diabetes is a chronic condition that affects millions of individuals globally, and early diagnosis is essential for optimal treatment and the avoidance of complications. Using information from a variety of sources, such as medical records, genomic data, and lifestyle factors, machine learning algorithms have demonstrated encouraging results in the early detection of diabetes. This paper reviews the state-of-the-art research on utilizing machine learning to diagnose diabetes in children, highlighting the main issues and promising directions for further study. The Behaviour Analysis here is built on the dynamic analytics where the generic model would be going to filter the data according to the request input of the user and also framing the question according to that. Taking out the intuition from the analysis is the difficult task after plotting the**

visualization. The paper also focuses on making intuition by using the Deep learning transformer which results in the intuition in a human-readable statement. The purpose of this paper is to provide a predictive and new analysis approach for the better decision making in the prediction of diabetes at an early age in rural areas

I. INTRODUCTION

High blood sugar levels are the hallmark of diabetes, a chronic disease that can cause catastrophic side effects like heart disease, renal failure, and blindness. Millions of people around the world are impacted by the illness, and its incidence is fast rising, especially among younger people. For efficient care and the avoidance of complications, diabetes must be discovered as soon as possible. By evaluating vast volumes of data from numerous sources, such as medical records, genomic data, and lifestyle factors, machine learning algorithms have the potential to increase the precision and effectiveness of diabetes detection. High blood glucose levels are a hallmark of diabetes, a metabolic condition brought on by the body's inefficiency in producing or utilizing insulin. Diabetes must be identified and treated early in order to avoid or postpone problems like cardiovascular disease, nerve damage, kidney damage, and blindness. Machine learning (ML) has been an effective technique for analyzing big and complicated datasets in recent years, allowing the discovery of patterns and associations that can be used to forecast the course of disease.

II. LITERATURE SURVEY

2.1Introduction

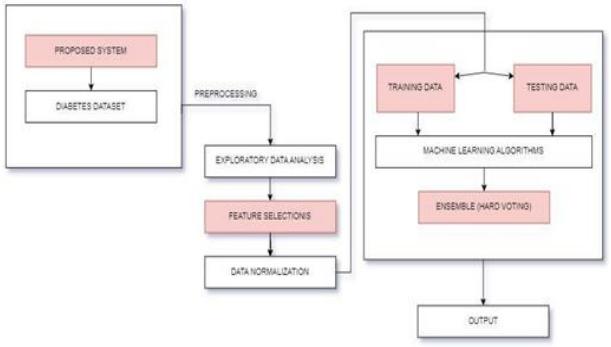
Predictive models have been created using a variety of techniques, according to a review of the most recent studies on the use of machine learning to diagnose diabetes in children and adolescents. Deep learning, unsupervised learning, and supervised learning are some of these methods. Algorithms are trained on labeled data in supervised learning to determine whether diabetes is present or absent. To find patterns in the data, unsupervised learning employs clustering and dimensionality reduction techniques. On the other hand, deep learning techniques employ numerous artificial neural network layers to extract characteristics and generate predictions.

3.2 Research Background

The previous advancement in the field of decision making for the patrolling procedure and the predictive policing are: D.V Singh, R.K. Singh and A.V Shrivastav, "Predicting diabetes in early age using machine techniques", This paper discusses the existing the system is better than the present existing system. In this paper Decision tree based algorithms outperformed other techniques for predicting diabetes in early age. [1] L.Arora and M.K. Jain ,"Early prediction of type 2 diabetes using machine learning algorithm." This paper focuses on Support vector machines and random forests were the most accurate for predicting type 2 diabetes in early age [2]. [3] A. A. Al Safar et al."Diabetes risk prediction using machine learning in the Saudi population." This paper investigates the use of machine learning algorithms for predicting diabetes risk in the Saudi population. The authors used a dataset containing several risk factors such as age, gender, family history, BMI, and blood pressure. They compared the performance of several machine learning algorithms and found that artificial neural networks were the most accurate. [4]D. K. Singh et al."Using machine learning to predict the onset of type 2 diabetes in young adults."This paper investigates the use of machine learning algorithms for predicting the onset of type 2 diabetes in young adults. The authors used a dataset containing several risk factors such as age, gender, family history, BMI, waist circumference, and blood pressure. They compared the performance of several machine learning algorithms and found that decision trees and random forests were the most accurate

Methodology: Models for predicting the likelihood of getting diabetes can be created using ML algorithms like logistic regression, decision trees, and random forests. These algorithms are built on statistical and computational methods that make it possible to identify pertinent risk factors and compute the likelihood of various outcomes. Using a set of predictor factors, such as age, sex, body mass index (BMI), and family history of

diabetes, the logistic regression approach, for instance, estimates the likelihood that an event will occur, such as the onset of diabetes. A collection of clinical and demographic data of young patients can be gathered and preprocessed in order to create a machine learning (ML) model for the early diagnosis of diabetes. A training set and a testing set can be created from the dataset, where the testing set is used to gauge the model's performance and the training set is used to train the ML model. A variety of algorithms can be used to train the ML model, and their performance can be improved by modifying the hyperparameters. The likelihood of acquiring diabetes in new patients can be predicted using the ML model after it has been trained. In order to direct treatments and prevention measures, the model can also be used to determine the most important risk variables linked to the onset of diabetes. In conclusion, ML approaches can be utilized to create precise and trustworthy models for early diabetes identification in kids and teenagers, opening the door to early intervention and better patient outcome



Preprocessing of data is necessary to make sure that it is correct and consistent. This process involves dealing with outliers, managing missing numbers, and normalising the data. To enhance the performance of the model, choose the features that are most pertinent and strongly associated with diabetes. Both statistical and feature ranking strategies can be used for this step. Model selection: Choose a machine learning method that is appropriate for the task at hand, has a good track record, and can handle the input data. Logistic regression, decision trees, random forests, and support vector machines are examples of frequently used algorithms. Split the dataset into training and testing subsets for the model. Use the testing subset to assess the model's performance once it has been trained and its hyperparameters have been adjusted. Validate the performance of the model using methods like k-fold cross-validation or leave-one-out cross-validation

Hyperparameter tuning: To enhance the performance of the model, adjust its hyperparameters. Evaluation of the model: Measure the model's effectiveness using parameters like accuracy, sensitivity, specificity, and AUC-ROC. Deployment: To make sure the model is accurate and useful, deploy it in the actual world and keep an eye on how it performs. In conclusion, considerable consideration must be given to data preparation, feature selection, model selection, and hyperparameter tuning when creating a diabetes prediction model using machine learning.

III. RESULT

The early detection of diabetes using machine learning (ML) models can offer several benefits, including: Early intervention: Early detection of diabetes allows for timely interventions and treatments, which can help prevent or delay the onset of complications associated with the disease. Improved outcomes: Early detection and intervention can improve health outcomes for patients with diabetes, such as reducing the risk of developing complications like cardiovascular disease, kidney disease, and nerve damage. Personalized treatment plans: ML models can help identify patients who are at high risk of developing diabetes or its complications, and provide personalized treatment plans that take into account individual patient characteristics, such as age, sex, family history, and lifestyle factors. Reduced healthcare costs: Early detection and intervention can lead to a reduction in healthcare costs associated with diabetes, such as hospitalizations, emergency room

visits, and medication costs. Efficient use of resources: ML models can help identify patients who are at low risk of developing diabetes or its complications, which can help healthcare providers allocate resources more efficiently and effectively. Population health management: By identifying patients who are at high risk of developing diabetes or its complications, ML models can help healthcare providers implement population health management strategies that target high-risk groups and improve overall health outcomes in the community. Overall, early detection of diabetes using ML models can improve health outcomes, reduce healthcare costs, and improve the efficiency and effectiveness of healthcare delivery.

IV. DISCUSSION

There are a number of difficulties employing machine learning algorithms for diabetes detection, despite the encouraging results. Lack of high-quality data, particularly for genomic and lifestyle factors, is a significant problem. Also, there is a need for more reliable algorithms that are visible and simple for doctors to understand. The ethical and legal ramifications of applying machine learning algorithms for diabetes detection also require further study.

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Artificial Intelligence in Education: Opportunities and Challenges

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Abstract-**Digital technologies have already become an integral part of our life. They change the way we are searching for information, how we communicate with each other, even how we behave with each other. This digital transformation applies to so many areas, including education (all levels). The main objective of this article is to identify prospective impact of artificial technologies to the imparting skills and to predict possible changes in educational landscape. In this article we considered customized educational content (videos, chats pdf etc), innovative teaching methods, technology enhanced assessment, communication between student and teacher. After the Covid -19 pandemic the significance and application of artificial intelligence practices in education sector increased all over the world. It makes possible the education to become interactive and effective in comparison to traditional tools of education. Application of Artificial intelligence in education creating new opportunities to empower students with needed skill so that they can excel in career. Chatbots, virtual reality, robots, metaverse , mobile applications creating a new era of education. Artificial intelligence will benefit students, teachers, parents and educational organizations altogether.**

Keywords – Artificial Intelligence, Education, Innovative teaching methods, Customized Educational Content.

I. INTRODUCTION

The process of using computers, software, hardware, devices and machines to mimic human perception, decision-making, and other processes to complete a task is known as Artificial intelligence. There are any ways to understand the nature of AI. Two basic types of AI include the AI which based on rules and the AI which based on machine learning. The rules based AI uses rules of decision making to produce or suggest a recommendation or a solution. An example of this is an intelligent tutor system, which can provide grammar and specific correction feedback to students.

Machine learning-based AI is much more powerful since the machines (computer oriented) can actually learn and become superior over time, particularly as they work with large, multilayered datasets. In education, machine learning-based AI tools can be used for a variety of tasks such as monitoring student activity and creating models that accurately predict student behavioral outcomes. Within AI, there is one more subfield which is natural language processing, which is the use of software to understand, predict, translate and record text content. Technique such as automated essay scoring uses natural language processing to grade written essays. There are AI systems based on voice recognition. Such systems are used in voice command tool as and Alexa and Siri . Experts have been exploring ways to use voice-based AI to diagnose reading and other academic issues. Nowadays the use of AI which is machine-based is already adopted in education. For example, several testing companies (ex. Pearson) use natural language processing for scoring essays. Massive online open courses allowing unlimited participation through the web, run by companies such as Coursera and Udamy, have also integrated AI scoring to analyze essays within their courses.

Nabiyev (2010) defines "AI as the ability of a computer-controlled device to perform tasks in a human-like manner". Here human-like qualities include mental processes like reasoning, meaning making, generalization, and learning from past experiences. Norvig and Russell (2003) define AI as a Machine Intelligence, or Computational Intelligence. AI enables to execute normal and specific tasks for ex. playing games, solving mathematical theorems, writing content, giving speech, diagnosis diseases etc. Nilsson (2014) defines AI as an algorithmic construction to copy human intelligence. In other words AI is combination of machines, software, hardware and tools which work similar or more effective than human intelligence but we cannot deny the fact that AI is also a product of Human Intelligence.

II. THE POTENTIAL BENEFITS AND USES OF ARTIFICIAL INTELLIGENCE IN EDUCATION SYSTEM

AI does not distract or keep away students from classroom but enhances the educational experience in many ways. Such as-

Personalization: AI systems adapt to each individual student's learning needs and target according to their strengths and weakness.

Tutoring: AI systems analyses and observe student's current style of learning and pre-existing abilities then deliver customized content pattern and support.

Grading: AI systems do grading not only objective answers but also on descriptive answers.

Meaningful and Real Time Feedback to students: With AI, students feel free to make mistakes which are an integral part of learning and then receive real

time feedback to do necessary correction.

Free up time: With AI the education centres can reduce time of teachers from various tedious task and use that free up time for much productive execution of course.

Adaptive Learning: Used to teach students at entry level then gradually move next stage by completing the previous one so they can become proficient.

Assistive Learning: AI can enable students to access equitable education as per need, for example by reading content to a visually impaired student.

Early Childhood Education: AI is currently used to present interactive games which teaches and develops the basic ethical and academic skills in children.

Data and Learning Analysis: Nowadays AI used by faculties and education administrators to analyse and interpret educational data.

Scheduling: In educational institutions it helps administrators to schedule classes, courses and teachers to make and plan their daily, weekly, monthly and sessional curriculum schedules.

Facilities Management: AI is very effective at monitoring the current status of various facilities in educational institutions such as power, wifi, water and staff.

Overall School Management: Currently AI is used to manage schools, records of students, vehicles, IT, time tables and budget.

Content Writing: AI applications which convert voice into text are widely used.

Different aspects through which AI empowering education system include:

- Classroom/Behaviour Management
- Lesson Planning for classes
- Classroom Audio-Visual content
- Parent-Teacher Communication
- Language Learning
- Test Prep
- Assessment of test , exams and assignments
- Learning Management Systems
- Faculty Scheduling and Substitute faculty Management
- Plagiarism Detection and removal
- Exam Integrity
- Chatbots for Enrolment and Retention of students
- Learning Management Systems
- Recording of Faculty Lectures
- Enhanced Online Discussion Boards
- Analysing Student Success Metrics
- Academic Research
- Virtual reality / animation
- Connected Campuses

III. CHALLENGES AHEAD

Along with these benefits, there are other major concerns. One major and important issue is privacy. How do these educational tools protect user privacy? How do educational institutions gain consent of both students and parents when introducing them? Should that data would be shared with researchers, companies and other external groups? Another issue is related with human experience of education .in other words AI cannot replace teachers. Experts also point out drawbacks of Artificial intelligence; it will reduce the cognitive ability of both teachers and students. Too much dependence on technology will create negative impacts also. The digital burden of content will create unnecessary pressure on students. We have to make AI supplement to teachers not the replacement of teachers. Excessive use AI should not be imposed on teachers and students.

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Multiple Disease Prediction System Using Machine Learning

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Abstract - **Machine learning is becoming a valuable tool for predicting multiple diseases in healthcare. These systems use a variety of data sources, including medical images, demographic information, and laboratory test results, to predict the likelihood of a patient having a specific disease. The process of building such a system involves data collection and cleaning, feature engineering, model selection, training, and evaluation. The selection of a suitable machine learning model is crucial, as it determines the accuracy of the predictions. The model is trained using the engineered features and disease labels, and its performance is evaluated using various metrics.**

Multiple disease prediction systems using machine learning have the potential to transform healthcare by enabling early diagnoses and effective treatment plans. However, it is important to keep in mind the limitations of such systems, including the risk of biased data and the need for ongoing evaluation and improvement. Despite these challenges, the benefits of multiple disease prediction systems using machine learning make them an exciting and rapidly evolving area of research and development in healthcare.

This study was conducted as a means to develop a predictive and enhanced analysis approach for better decision making within

healthcare, ultimately reducing the risk of adverse events.

Keywords – Multiple disease prediction, Machine Learning, Healthcare, Supervised Learning, Laboratory test results, Accuracy, Precision, Limitations, Bias, Ongoing improvements

I. INTRODUCTION

The field of healthcare is constantly seeking ways to improve patient outcomes and reduce the burden on the healthcare system. One promising area for improvement is the use of machine learning for multiple disease prediction. These systems use various data sources, such as medical images, demographic information, and laboratory test results, to make predictions about a patient's health status. The use of machine learning algorithms in multiple disease prediction has several benefits over traditional methods, including increased accuracy, reduced costs, and improved patient outcomes.

In building a multiple disease prediction system using machine learning, several key steps must be taken, including data collection and cleaning, feature engineering, model selection, training, and evaluation. The choice of machine learning model is crucial as it determines the accuracy of the predictions. Common models used in multiple disease prediction include

decision trees, random forests, support vector machines, and k-means clustering. While the use of machine learning in multiple disease prediction offers many benefits, there are also challenges that must be addressed. These include the risk of biased data, the need for ongoing evaluation and improvement, and the complexity of building and maintaining such systems.

1.1 Description

In this paper, we will provide a comprehensive overview of multiple disease prediction systems using machine learning. This will include their benefits and challenges, and the key steps involved in building these systems. During a lot of analysis of existing health care systems, only one disease was considered at a time. There is no common system available that can analyse more than one disease at a time. The purpose of this is to provide accurate and timely disease predictions to users at the time they enter their symptoms. For example, article

[2] is used to analyse diabetes, article [3] is used to predict heart disease, article [4] is used to predict breast cancer. In the future, other diseases like skin diseases, fever analysis, and many others can be included. The user does not need to traverse different places in order to determine whether he/she has a particular disease or not. In the multiple diseases prediction system, the user needs to select the name of the particular disease, enter its parameters, and then click on submit. The corresponding machine learning model will be invoked and it will predict the output and display it on the screen.

1.2 Problem Statement

Many of the existing machine learning models for health care analysis focus on one disease per analysis. For example, liver analysis, cancer

analysis, lung diseases, heart disease, skin disease, etc. If a user wants to predict more than one disease, he/she has to browse through different sites. There is no common system where one analysis can perform more than one disease prediction. Some of the models have low accuracy which can seriously affect patients' health. When an organization wants to analyse their patients' health reports, they have to deploy many models. In addition to increasing the cost, it also takes longer. Some of the existing systems consider very few parameters which can yield false results.

II. LITERATURE SURVEY

2.1. INTRODUCTION

A literature survey of disease prediction models in machine learning can provide insights into the current state of the field, the most commonly used methods, and the trends and challenges in this area of research.

Machine learning techniques have been widely used for disease prediction and risk assessment in various

domains, including medical diagnosis, epidemiology, and public health. Some of the most commonly used machine learning methods in disease prediction include decision trees, random forests, support vector machines (SVM), artificial neural networks (ANN), and deep learning models such as convolutional neural networks (CNN) and recurrent neural networks (RNN).

III. RESEARCH BACKGROUND

Common Diseases

Dahiwade et al. [9] proposed a ML based system that predicts common diseases. The symptoms dataset was imported from the UCI ML depository, where it contained symptoms

of many common diseases. The system used CNN and KNN as classification techniques to achieve multiple diseases prediction. Moreover, the proposed solution was supplemented with more information that concerned the living habits of the tested patient, which proved to be helpful in understanding the level of risk attached to the predicted disease. Dahiwade et al. [9] compared the results between KNN and CNN algorithm in terms of processing time and accuracy. The accuracy and processing time of CNN were 84.5% and

11.1 seconds, respectively.

Kidney Diseases

Serek et al. [12] planned a comparative study of classifiers performance for Chronic Kidney disease (CKD) detection using The Kidney Function Test (KFT) dataset. In this study, the classifiers used are KNN, NB, and RF classifier; their performance is examined in terms of F-measure, precision, and accuracy. As per analysis, RF scored better in phrases of F-measure and accuracy, while NB yielded better precision. In consideration of this study, Vijayarani [13] aimed to detect kidney diseases using SVM and NB. The classifiers were used to identify four types of kidney diseases namely Acute Nephritic Syndrome, Acute Renal Failure, Chronic Glomerulonephritis, and CKD. Additionally, the research was focused on deter- mining the better performing classification algorithm based on the accuracy and execution time. From the results, SVM considerably achieved higher accuracy than NB, which makes it the better performing algorithm.

Heart Diseases

Marimuthu et al. [16] aimed to predict heart diseases using supervised ML techniques. The

authors structured the attributes of data as gender, age, chest pain, gender, target and slope [16]. The applied ML algorithms that were deployed are DT, KNN, LR and NB. As per analysis, the LR algorithm gave a high accuracy of 86.89%, which deemed to be the most effective compared to the other mentioned algorithms. In 2018, Dwivedi [17] attempted to add more precision to the prediction of heart diseases by accounting for additional parameters such as Resting blood pressure, Serum Cholesterol in mg/dl, and Maximum Heart Rate achieved. The used dataset was imported from the UCI ML laboratory; it was comprised with 120 samples that were heart disease positive, and 150 samples that were heart disease negative. Dwivedi attempted to evaluate the performance of Artificial Neural Networks (ANN), SVM, KNN, NB, LR and Classification Tree.

IV. METHODOLOGY

The analysis of ML models will be conducted on few diseases located at heart, kidney, breast, and brain. For the detection of the disease, numerous methodologies will be evaluated such as KNN, NB, DT, CNN, SVM, and LR. At the end of this literature, the best performing ML models in respect of each disease will be concluded.

1. Data collection: The first step is to collect relevant data that can be used to train the prediction model. This data typically includes patient information, such as demographics, medical history, lifestyle information, and diagnostic test results.

2. Data pre-processing: After collecting the data, it is important to clean and pre-process the data to remove any missing values, outliers, or irrelevant information. This step is crucial for ensuring the quality of the data and preparing it for modelling.

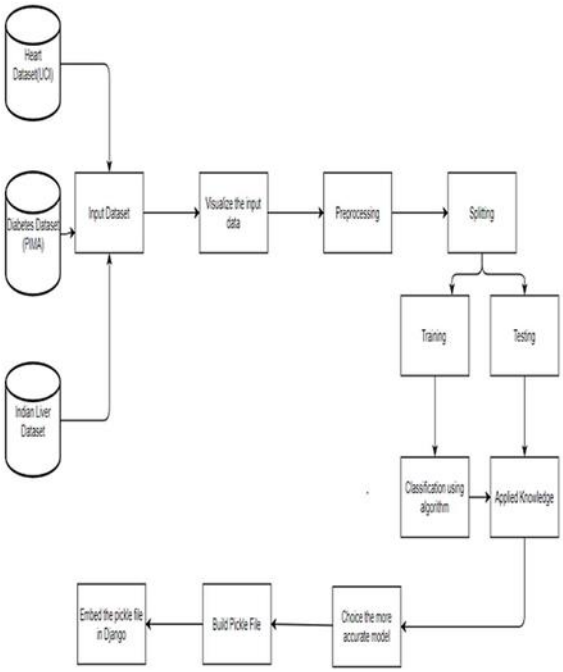
3. Feature engineering: In this step, the collected data is transformed into meaningful features that can be used as inputs to the prediction model. Feature engineering involves selecting the most relevant features, creating new features, and transforming existing features to improve the performance of the prediction model.

4. Model selection: There are several machine learning algorithms that can be used to predict diseases, including decision trees, random forests, support vector machines, and deep learning models. The choice of algorithm depends on the type of data and the problem being solved. In this step, the most appropriate algorithm is selected based on the data and the desired outcome. ANNs have been widely used in disease prediction models for their ability to handle large datasets and capture complex non- linear relationships between features. SVMs are a type of supervised machine learning algorithm that have also been used in disease prediction models. These models are useful in cases where the number of features is high compared to the number of samples. Deep learning models, such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), have been used in disease prediction models due to their ability to handle large amounts of data and capture complex relationships between features.

5. Model training: The selected machine learning algorithm is trained on the pre- processed and engineered data to learn the relationship between the features and the disease. This step is done using a training dataset, and the model is trained until it reaches an acceptable level of performance.

6. Model evaluation: After training the model, it is important to evaluate its performance on a separate dataset, known as the validation dataset. This is done to assess the model's ability to generalize to new data and to avoid overfitting, which occurs when the model is too closely fit to the training data.

7. Model deployment: Once the model has been trained and evaluated, it can be deployed for use in the real world. This can involve integrating the model into a healthcare system or using it to make predictions for individual patients.



V. RESULT

The use of different ML algorithms enabled the early detection of many diseases such as heart, kidney, breast, and brain diseases. As different types of disease prediction models are available, but individually and not properly scaled and merged into one specific interface. In this project, we will be creating the major health disease prediction models and deploy them into one single interface for the ease of medical industry as well as for the human race.

Throughout the project, SVM, RF and LR algorithms were the most widely used at

prediction, while accuracy was the most used performance metric. The CNN model proved to be the most adequate at predicting common diseases. Furthermore, SVM model showed superiority in accuracy at most times for kidney diseases and PD because of its reliability in handling high-dimensional, semi-structured and unstructured data. For Breast cancer prediction, RF showed more superiority in the probability of correct classification of the diseases because of its ability to scale well for large datasets and its susceptibility to avoid overfitting. Finally, the LR algorithm proved to be the most reliable in predicting heart diseases.

Overall, the results of multiple disease prediction systems using machine learning are very promising, and these systems have the potential to revolutionize healthcare by providing accurate and efficient predictions for multiple diseases.

VI. CONCLUSION

In conclusion, multiple disease prediction systems using machine learning can be an effective tool for healthcare providers to diagnose diseases early and improve patient outcomes. However, it is important to keep in mind the limitations of these systems, including the potential for biased data and the need for ongoing evaluation and improvement of the models.

VII. FUTURE SCOPE

- In the future we can add more diseases in the existing API.
- We can try to improve the accuracy of prediction in order to decrease the mortality rate.
- Try to make the system user-friendly and provide a chatbot for normal queries.
- Improved data integration
- Increased use of deep learning algorithms
- Personalized medicine
- Predictive maintenance
- Integration with wearable devices

Overall, the future of multiple disease prediction using machine learning is very exciting and holds great potential for improving patient outcomes and reducing the burden on the healthcare system.

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Implementation of Deep Learning approaches in bioinformatics for protein deficiency- a review

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Abstract— **Recent advances in medical technology have resulted in the collection of large amounts of data, particularly image data. In addition, image-processing techniques aid researchers and medical professionals in diagnosis and treatment. Bioinformatics solutions provide an efficient method for image data processing to obtain information of interest and combine several data sources for knowledge extraction. Deep learning-based algorithms have been effectively used to process data in this discipline. They have displayed cutting-edge performances on high-dimensional, nonstructural, and black-box biological data. A review of the most significant recent developments in deep-learning-based design methods is presented in this article, contrasting their innovative features with traditional knowledge-based methods and demonstrating their application to notable cases. Not only do we detail the latest advancements of deep learning in structure-based protein design and direct sequence design, but we also highlight the recent uses of deep reinforcement learning in protein design. The future prospects of design objectives, difficulties, and possibilities are also thoroughly examined.**

Keywords*— *bioinformatics, Deep learning, future perspectives

I. INTRODUCTION

In many applications, including computer vision and natural language processing, deep learning has provided significant benefits. Because of its superior ability to understand complicated data structure without human involvement, it ushers in a new age for data-driven science. As a result of its widespread applicability and growing popularity, genomic researchers are starting to consider applying deep learning. Complexity and nuance characterize genomic data and their relationships with resulting outcomes (e.g., disease outcomes). However, deep learning can learn complex characteristics from the genomic data, making it a powerful tool for analyzing nonlinear and interaction effects [2]. At the same time, classical methods (such as linear regression) have typically been employed in genomic data analysis to find simple linear effects. An overview of how deep learning has been applied to genomics is presented in this study.

In the same way that supervised and unsupervised learning are subsets of machine learning, so too are these two types of approaches to what is known as deep learning. Convolutional neural networks (CNNs) have seen extensive use in solving protein structure prediction issues. Due to the complexity and difficulty of the full prediction in three-dimensional space, some research has relied on more simplified methodologies, such as predicting proteins' secondary structure or torsion angle. [3]. For the purpose of predicting the secondary structure, torsion angle, and accessible surface area of proteins, SAE was used in Heffernan et al. where DBN was used to predict the secondary structure of proteins from amino acid sequences in conjunction with the Protein Secondary Structure Prediction PSSM and FAC characteristics. When it comes to extracting knowledge from massive datasets in bioinformatics, machine learning has been one of the most popular approaches [4]. DNN has shown promising capabilities in the study of gene expression regulation, and DBN has been used to great effect in the study of splice junction prediction, one of the major research problems in the study of gene expression. In order to forecast new data, machine learning algorithms first analyze existing data (called training data) to discover hidden patterns and construct a model. Support vector machine, hidden Markov model, Bayesian networks, and Gaussian networks are just a few of the well-known algorithms that have found use in genomics, proteomics, systems biology, and other fields. Because traditional machine learning algorithms struggle with the raw form of data, researchers exert a great deal of work into translating the raw form into suitable high abstraction level features, which often requires a deep understanding of the underlying subject. Yet, a new sort of machine learning algorithm called deep learning has arisen in recent years thanks to massive data, the strength of parallel and distributed computing, and advanced algorithms. Formerly limiting factors have been removed, allowing deep learning algorithms to make significant strides in many areas, including but not limited to image recognition, audio recognition, and natural language processing. Naturally, the use of deep learning has spread to other fields, including bioinformatics.

II. BIOINFORMATICS AND MEDICAL APPLICATIONS

The application of computational methods and state-of-the-art technologies in the context of big data analysis with Deep Learning Algorithms enhances the capability of capturing and interpreting biological data. This book provides the reader with various bioinformatics computational approaches used for early disease detection by compiling state-of-the-art resources into a single collection aimed at educating the reader on issues focused on computer science, mathematics, and biology. Bioinformatics serves as an indispensable tool for managing biological and medical data in the present day. Studying how bioinformaticians interpret biological data and further our understanding of the disease, this book details the total amounts of resources.

III. LITERATURE REVIEW

The design, which includes confirming clinical execution prediction patterns, is only the first step toward the usual acquisition of forecasts for real-time point-of-care. It is assumed that healthcare analytics can be initiated at various stages, including tracking and delaying healthcare failures, assimilating new knowledge, doing an immediate evaluation, and developing a customized model. Whereas promising developments and publicity have resulted from considering data science and thought, more research and experimentation are still needed [5]. Data Mining Methods generate practical

approaches to discovering desired patterns in large datasets and establishing correlations between them to apply knowledge commentary to problem-solving. When it comes to analytics and reporting needs, healthcare organizations are increasingly turning to Big Data.

Many methods exist for analyzing healthcare data for valuable insights, including data mining, predictive analytics, and prescriptive analytics [6]. The device would be able to obtain real-time relevant information that supports decision-making and medicinal tracking through novel approaches and therapeutic data mining. In healthcare, big data input technology improves the quality of life for patients who have suffered devastating losses [7]. The rate tag for future pharmaceutical judgment is a data recovery that is acceptable and beneficial in the current age of information technology. In light of this, the unexpected rise of data analytics tools has revealed the fruitful outcomes of locked-down pattern databases. The evolution of health information technology has opened the door to investigations that would have been impossible in the past, which could lead to novel insights into health and illness [8]. Whether or not novel approaches are favored depends on how they are implemented. The therapeutic evaluation calls for the implementation of new systems on real-world data. New avenues of inquiry into health and illness are becoming possible due to health informatics developments, which are causing a sea change in health research [9]. The extent to which novel methods are adopted depends on how useful they prove to be. It is essential to put forward-thinking methods through their paces utilizing actual data from medical studies. More attention should be paid to the practical aspects of analysis and presentation of findings. Scientific statisticians have presented cutting-edge data summarization techniques throughout the past few decades, inspired by the exponential growth in computing power and storage capabilities. Networks that combine machine learning and deep learning are one example. Multiple computational approaches persist at the intersection of mathematical, analytical, and computational constraints. It is common practice for statistical procedures to employ methods that aggregate potential from various, comprehensive data sets [10]. Complex computational algorithms can be developed to produce reliable forecasting models. Unfortunately, it is not apparent how pervasive these techniques are in various fields of medicine. Following data that is collected inconsistently, such as drugs, therapies, and lab trials might make it easier to divine a patient's condition. Regular deep-learning methods can be applied to ongoing data for analysis. They must be revised in order to accommodate ongoing datasets that are tested sporadically. The study of healthcare records has prompted the examination of several deep-learning strategies for the hierarchical distribution of documents. The taxonomy formation and even processes-based methods are examined [11]. These techniques are evaluated on publicly available, standardized ICD-9 and ICD-10 coding datasets.

IV. Clustering algorithms used in bioinformatics

Algorithms for clustering data into clusters can be either hierarchical or partitioned. In contrast to the partitioning algorithms, which decide all clusters simultaneously, the hierarchical algorithms find consecutive clusters by building on top of previously existing clusters. Algorithms in a hierarchy can either be agglomerative (from the bottom up) or divisive (top-down). Algorithms that "agglomerate" start with a collection of individual nodes, or "clusters," then combine them into ever-larger nodes. Divisive algorithms take the complete set as input and split it up into smaller and smaller subsets [12]. Metrics on Euclidean spaces are used to determine hierarchical clustering. The most popular is the Euclidean distance, calculated by squaring each variable difference, summing the squaring results, and then taking the square root. Bioinformatics benefits greatly from hierarchical clustering algorithms like BIRCH due to their almost linear time complexity when dealing with generally large datasets. In order to partition a set of objects into manageable parts, algorithms often iteratively reassign objects between groups until convergence is reached [13]. In most cases, this approach can find all clusters simultaneously. Two common heuristics are the k-means algorithm and k-medoids, and both are widely used in software. Affinity propagation is just one example of an algorithm that can function without an initial set of groups. This approach has been utilized in a genomic context for both the clustering of biosynthetic gene clusters inside gene cluster families (GCF) and the clustering of GCF itself.

V. Use of Bioinformatics and Integrated Knowledge Environments

Bioinformatics helps clinicians answer a fundamental question: what is the optimal medicine for a given patient given their disease profile, lab results, genomic, proteomic, and metabolomic information? Because it connects the many stages of discovery, including experimental design, study execution, and bioanalytic analysis [14], bioinformatics is crucial for the growth of biomarker discovery.

The rapid advancement of bioinformatics over the past decade has made it possible for oncologic procedures to build biomarker-related drugs using the vast amounts of relevant "-omics" data and information from the human genome. There are already over a million articles on cancer research available on PubMed. The National Cancer Institute's caBIG bioinformatics infrastructure provides easy access to data from several studies to support ground-breaking investigation. This infrastructure makes it simple to access, compare, and download data on experiments, techniques, samples, and results. This initiative was developed by the NCI's Early Detection Research Network (EDRN) to provide cancer centers with the bioinformatics data they require for their own independent research.

Today's EDRN is a result of bioinformatics-driven enhancements to the cancer research community over the previous decade [15]. The bioinformatic analysis of large-scale experimental datasets is of critical importance, and it has altered the way research are approached. Nonetheless, many experts in the field of cancer research are not yet acclimated to

employing bioinformatics, thus they are not yet taking advantage of these benefits in their studies. This is likely to change as scientists learn to appreciate the interplay between bioinformatics and other fields of cancer study when it comes to deciphering large amounts of data.

Bioinformatics has aided translational research by providing essential tools for converting data into medical practice, which in turn has led to advances in biomarker discovery and drug development. By using biomarkers that have been proven effective in clinical settings, researchers will be able to develop less expensive and less invasive diagnostic tools for doctors and their patients [16]. Nevertheless, without access to high-quality, curated patient clinical data, correlating the biomarker data will be impossible. Clinical data and patient history such as treatment, physician notes, pathology reports, and symptoms are essential for interpreting bioinformatic results [17]..

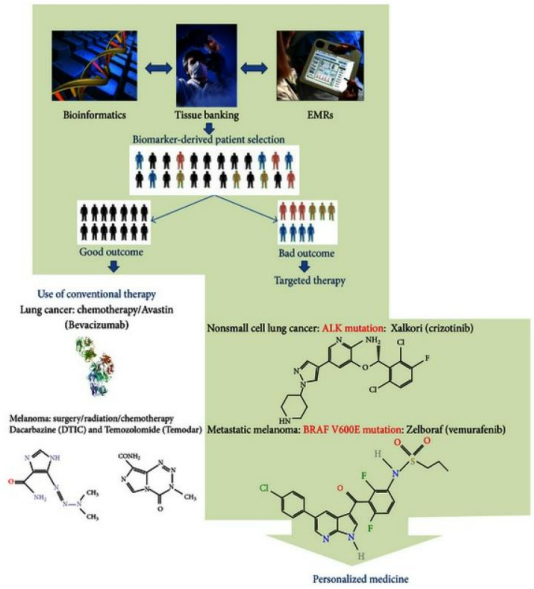

Fig. 1 data resulting from the combination of bioinformatics, tissue banking and EMRs

Many hospitals and clinics still utilize paper records despite the fact that the inability to adopt EMRs is a major factor delaying integration of patient data with experimental outcomes [18]. Clinicians and other hospital staff may not be aware of the benefits of bioinformatics, and they may not have the time or motivation to learn more about it. No one should be surprised by this, given doctors and nurses have much more pressing responsibilities than entering clinical data into a computer and have no financial incentive to do so. Clinical staff involvement in bioinformatics research is, nonetheless, crucial and should be actively developed.

Table 1: bioinformatics and medical data processing of Hypothetical protein and ligands

Author	Year	Description
Rabbi MF [19]	(2021)	This study investigated structural and functional aspects comprehensively. In order to predict the solubility, stability, and extracellular location of this hypothetical protein, physicochemical parameters and subcellular localization were used.
Imam N et al [20]	(2019)	Bush typhus, also known as scrub typhus, is a viral disease with symptoms similar to Chikungunya infection. Oriental tsutsugamushi, a gram-negative bacterium, causes this disease in vertebrates. In this investigation, we aimed to deduce the possible roles played by 344 of these putative proteins (HPs).
Umairah et al [21]	(2019)	The rise of bacterial infections that are resistant to antibiotics is a major cause for concern, as it threatens to usher in a new era of "antibiotic apocalypse." The rising death toll from these antibiotic-resistant superbugs emphasizes the pressing need for the development of novel treatments for these diseases.
Kiarash et al [22]	(2019)	The purpose of this study is to determine the functions of the proteins by using bioinformatics methods based on the traits we find in UCB-1 pistachio roots.
Khairiah Razali et al [23]	(2020)	The purpose of this study was to annotate the function and structure of these un-annotated proteins. The 39 proteins were initially screened for template availability and pathogenicity
Alariqi Reem et al [24]	(2021)	Proteomics research on Pseudomonas aeruginosa revealed that 25% of proteins are hypothetical proteins with unknown functions. This study attempts to understand the function of such a hypothetical protein, PA2373, as no experimental research has yet been conducted on it.
D. Prabhua et al [25]	(2020)	Rodlike serrations called marcescent One type of opportunistic pathogen is Gram-negative bacteria, which belongs to the Enterobacteriaceae family. As a result, humans can suffer from osteomyelitis, endocarditis, meningitis, septicemia, and infections of the urinary tract, respiratory system, ocular lens, and ear.
Muham mad	(2017)	Human adenoviruses are small DNA viruses that can cause various

Naveed et al [26]		illnesses in humans. The whole genome sequencing of human adenovirus reveals an abundance of putative proteins that are not yet assigned a cellular or metabolic function.
Cameron Bixby [27]	(2016)	Since the velocity of analysis is not able to keep up with the rate of discovery of hypothetical proteins, there are currently legions of hypothetical proteins waiting for accurate identification of their functions.
Kohda D [28]	(2018)	When it comes to many biological processes, promiscuous ligand recognition by proteins is just as important as strict recognition. Proteins in living cells contain numerous short, linear amino acid motifs that serve as targeting cues to determine the protein's final destination during transport.

VI. CONCLUSION

A bioinformatics and tissue banking education must be provided to clinicians, and electronic medical record systems must be set up to find biomarkers to guide personalized cancer treatment. Enhancing informed consent methods and delivering more information about the benefits of tissue sample contributions can provide richer data sources for determining patterns and personal differences. With these upgrades in place, researchers may focus on finding biomarkers that can forecast the course of a disease, provide more information about a specific illness, and point toward an appropriate treatment strategy. Clinicians will have the resources they need to develop designed medicine and improve patient treatment results from community-wide efforts to collect patient data, create well-controlled tissue banks, and develop novel genomic and proteomic technologies. Medical costs for patients will be lowered as a result of these initiatives. Deaths can be prevented through the integration and use of bioinformatics techniques in standard clinical practice.

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Feedback Control Of Bioelectronics Devices Using Machine Learning

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Abstract-**Bioelectronics devices have shown their unprecedented potential in a wide range of biomedical applications due to their vast functionality. To fully unleash their potential, bioelectronics devices should be able to precisely respond to real-time changes in the environment to drive biological systems' response towards the desired goals. However, controlling the biological systems' response with bioelectronics devices is challenging due to the presence of uncertainties, stochasticity, unmolded dynamics, and a complex nonlinearities. Here, we demonstrate the promise of leveraging tools in synthetic biology with an online machine learning (ML)-based feedback controller to achieve a precise spatiotemporal response of biological systems using bioelectronics driven by an adaptive external "sense and respond" learning algorithm. The proposed ML-based feedback controller leverages the learning capability and low computational complexity of a class of artificial neural networks called the Radial Basis Function (RBF) network. Lyapunov analysis is provided to prove stability of the proposed controller. The satisfactory performance of the proposed method is experimentally validated by maintaining media pH using bioelectronics proton pumps**

I. INTRODUCTION

BIOELECTRONICS integrates electronic devices and materials with biological systems. The field has produced a broad range of devices with unique operating methods and functionalities and shows tremendous promise for addressing a wide range of biomedical applications including but not limited to bio sensing, neural recording and stimulation, drug delivery, and tissue engineering. In particular, there has been considerable effort in developing devices for delivery of small molecules and ions that serve an important role in biomedical applications [3]–[6]. These devices, known as ion pumps, are beneficial in that they allow for precise control over the time, location, and magnitude of delivery. Among potential ions and small molecules, protons (H^+) play a central role to many biological processes. For example, regulation of the H^+ concentration (pH) maintains healthy neuronal functioning and excitability, enzymatic activity, gene expression, and is indicative of healthy cell function. Driving biological response with spatiotemporal precision using bioelectronics devices can help advance biomedical applications for customized therapeutics. Implementation of feedback control in these devices can help achieve this but has not been widely adopted, in part, due to a limited understanding of the complexities involved. Modeling, identification, prediction, and control, which are essential to this end, are challenging due to the presence of uncertainties, stochasticity, unmolded dynamics, and complex nonlinearities. For example, bioelectronics devices are generally fabricated in parallel and, ideally, they should be identical to each other both structurally and functionally. In practice, the devices have different characteristics due to inherent variabilities in the fabrication processes. Additionally, the mechanical/electrical properties of the bioelectronics devices may change over the course of an experiment (e.g., increased resistance across electrodes in proton pump). Moreover, in biological systems, cellular response can change in different environmental conditions such as changing flow characteristics and temperature. Thus, machine learning (ML)-based techniques, which can be applied to solve different modeling and control problems when system dynamics are fully or partially unknown, may prove suitable here. Such learning methods have not been applied to the control of bioelectronics devices to the best of our knowledge. Online learning methods have been used in other related applications. For example, in, a neural network and its mathematical inverse were utilized to model a continuous stirred-tank reactor (CSTR) and control the overall process, respectively. However, most examples leverage offline training such as in, where Ławrynczuk applied artificial neural networks for modeling ´ and temperature control of a yeast fermentation biochemical reactor. Here and in most of the state-of-the-art ML-base techniques, offline training and the availability of large datasets a priori are necessary to successfully tackle modeling, identification, prediction, and control problems. Otherwise, the methods will fail in conditions previously unobserved. To accurately drive the biological systems' response towards the desired goals, the bioelectronics device should be able to adapt its response to real-time changes in measured response. Here, a real-time adaptive ML-based feedback controller is designed, in a direct control scheme, for automatic control of pH level using a bioelectronics proton pump. In order to directly apply a ML-based method to a control problem, its parameters should directly be adjusted to reduce the system's error, unlike the indirect control problem, where identification/estimation is used to approximate the system's model and then, the parameters of the ML-based controller are adjusted accordingly. We propose an adaptive ML-based feedback controller that leverages a class of artificial neural networks called the Radial Basis Function (RBF) network to achieve real-time online control without a priori knowledge of the dynamical model of the system, no dependency on large-scale datasets, and low computational complexity.

II. EXISTING SYSTEM

In Existing System, to fully unleash these potential, bioelectronics devices should be able to precisely respond to real-time changes in the environment to drive biological systems' response towards the desired goals. However, controlling the biological systems' response with bioelectronics devices is challenging due to the presence of uncertainties, stochasticity, unmolded dynamics, and complex nonlinearities.

III. LITERATURE SURVEY

"Professional chat application based on natural language processing.

There has been an emerging trend of a vast number of chat applications which are present in the recent years to help people to connect with each other across different mediums, like Hike, WhatsApp, Telegram, etc. The proposed network-based android chat application used for chatting purpose with remote clients or users connected to the internet, and it will not let the user send inappropriate messages. This paper proposes the mechanism of creating professional chat application that will not permit the user to send inappropriate or improper messages to the participants by incorporating base level implementation of natural language processing (NLP). Before sending the messages to the user, the typed message evaluated to find any inappropriate terms in the message that may include vulgar words, etc., using natural language processing. The user can build an own dictionary which contains vulgar or irrelevant terms. After pre-processing steps of removal of punctuations, numbers, conversion of text to lower case and NLP concepts of removing stop words, stemming, tokenization, named entity recognition and parts of speech tagging, it gives keywords from the user typed message. These derived keywords compared with the terms in the dictionary to analyze the sentiment of the message. If the context of the message is negative, then the user not permitted to send the message

Real world smart chatbot for customer care using software as service (SaaS) architecture.

It's being very important to listen to social media streams whether it's Twitter, Facebook, Messenger, LinkedIn, email or even company own application. As many customers may be using this streams to reach out to company because they need help. The company have setup social marketing team to monitor this stream. But due to huge volumes of users it's very difficult to analyses each and every social message and take a relevant action to solve users' grievances, which lead to many unsatisfied customers or may even lose a customer. This papers proposes a system architecture which will try to overcome the above shortcoming by analyzing messages of each ejabberd users to check whether it's actionable or not. If it's actionable then an automated Chatbot will initiates conversation with that user and help the user to resolve the issue by providing a human way interactions using LUIS and cognitive services. To provide a highly robust, scalable and extensible architecture, this system is implemented on AWS public cloud.

An Overview of Artificial Intelligence Based Chabot's and an Example Chabot Application.

Chatbot can be described as software that can chat with people using artificial intelligence. These software are used to perform tasks such as quickly responding to users, informing them, helping to purchase products and providing better service to customers. In this paper, we present the general working principle and the basic concepts of artificial intelligence based chatbots and related concepts as well as their applications in various sectors such as telecommunication, banking, health, customer call centers and e-commerce. Additionally, the results of an example chatbot for donation service developed for telecommunication service provider are presented using the proposed architecture.

Intelligent travel chatbot for predictive recommendation in echo platform

Chatbot is a computer application that interacts with users using natural language in a similar way to imitate a human travel agent. A successful implementation of a chatbot system can analyze user preferences and predict collective intelligence. In most cases, it can provide better user-centric recommendations. Hence, the chatbot is becoming an integral part of the future consumer services. This paper is an implementation of an intelligent chatbot system in travel domain on Echo platform which would gather user preferences and model collective user knowledge base and recommend using the Restricted Boltzmann Machine (RBM) with Collaborative Filtering. With this chatbot based on DNN, we can improve human to machine interaction in the travel domain

Chatbot Using a Knowledge in Database Human-to-Machine Conversation Modeling

A chatterbot or chatbot aims to make a conversation between both human and machine. The machine has been embedded knowledge to identify the sentences and making a decision itself as response to answer a question. The response principle is matching the input sentence from user. From input sentence, it will be scored to get the similarity of sentences, the higher score obtained the more similar of reference sentences. The sentence similarity calculation in this paper using bigram which divides input sentence as two letters of input sentence. The knowledge of chatbot is stored in the database. The chatbot consists of core and interface that is accessing that core in relational database management systems (RDBMS). The database has been employed as knowledge storage and interpreter has been employed as stored programs of function and procedure sets for pattern-matching requirement. The interface is standalone which has been built using programing language of Pascal and Java.

IV. PROPOSED METHODOLOGY

In this chapter, various supervised machine learning approaches are used. This section provides a general description of these approaches. Abusive messages in social media is a complex phenomenon with a broad range of overlapping modes and goals [17]. Cyberbullying and hate speech are typical examples of

abusive languages that researchers have put more interest in the past few decades due to their negative impacts in our societies. Several research have been conducted to automatically detect these undesirable messages among other messages in social media. The contributions of this study are three-fold. First to equip the readers with the necessary information on the critical steps involved in hate speech detection using ML algorithms. Secondly, the weaknesses and strengths of each method is critically evaluated to guide researchers in the algorithm choice dilemma. Lastly, some research gaps and open challenges were identified. The different variants of ML techniques were reviewed which include classical ML, ensemble approach and deep learning methods. Researchers and professionals alike will benefit immensely from this study.

- Bioelectronics proton (H+) pump
- Sensing pH
- Machine Learning based Controller

- **Bioelectronics proton (H+) pump**

A proton (H+) pump is a bioelectronics device that can be used to repetitively control and maintain the pH level in biological processes. Here, the bioelectronics device consists of multiple columns of proton (H+) pumps, which are devices capable of modulating the Ph of solution, and work by transferring H+ between polymer membranes within the device and a target solution upon an applied voltage (i.e., Vb in Fig. 1–Top). We floated Va such that a positive value for Vb drives the release of H+ from the H+ cation exchange membrane into the solution (see black dotted arrow in Fig. 1–Top) thus increasing H+ of the solution and a negative value for Vb will drive H+ from the solution into the cation exchange membrane thus decreasing H+ of the solution. The proton pumps are positioned in an array and are individually accessible through a custom-designed expansion board using a microcontroller. Figure 1–Bottom, shows the top view of proton pumps distribution in the target demonstrating different columns, selected areas for measurements, and the corresponding dimensions. In this section, we highlight the methodology in three parts describing the plant, sensor, and controller. First, a brief description of the bioelectronics proton (H+) pump is provided. Second, we introduce the fluorescent dye used for imaging. Finally, the details of the proposed machine learning-based feedback controller are elaborated. Bioelectronics proton (H+) pump. Top: Schematic of the bioelectronics proton (H+) pump with applied voltages. Bottom: Top view of an array of targets for the proton pump device. Actuated columns and selected areas for measurements are indicated.

Sensing pH

Measurement of media pH on the surface of the ion pump is a challenging task due to the small volume and requires specialized instrumentation. In this work, we instead read out changes in pH using Carboxy SNARF-1 dye, a fluorescent pH indicator developed by Molecular Probes, useful for measuring pH changes between pH 7 and pH 8. Common applications of Carboxy SNARF-1 dye are in biology, where intracellular pH is generally between 6.8 and 7.4 in the cytosol. Additionally, pH inside a cell varies by only fractions of a pH unit, and such changes may be quite slow.

Since small changes in pH can have significant impact on cellular response, there is a need for tight control within this small range of pH for applications in synthetic biology. Roughly speaking, the relevant range of pH for cells corresponds to an overall 10% change in fluorescence. In this work, we demonstrate control with less than 5% error and active control over a 10% change in fluorescence.

The circuit test is carried out by means of testing the component voltage value at each connection. Based on the results of testing a series of innovative pH meter measuring devices concluded that each component is well connected.

The measured pH sensor input voltage value is 4.92 V. The measured sensor output voltage value is 2.43 V. The measurement results of the input voltage are then entered into the pH conversion formula. From the results of the analysis of correlation values that have been done it can be seen that the pH value of the test sensor output has a good correlation with standard pH measuring devices. Good correlation is an indicator of a tool capable of providing output that is close to the standard value. Linearity states the relationship between input and output where the units of the two are already in actual units, namely pH. Input is the pH value that is read by a standard pH meter and the output is the pH that is the pH read by the pH sensor. Linearity analysis aims to find out how linear the sensor readings are against the standard device. Linearity testing can provide information about the measurement point farthest by the test sensor against the linear line. Testing the pH value to determine the precision value is done by repeating the test data at least 3 times from each pH buffer used in the test. From the results of the analysis that has been done, the precision value possessed by the pH sensor in making measurements is 99.99%. This means that the pH sensor used has good repeatabilitySensor sensitivity value is measured to determine the value of the sensor's reading power. The sensitivity sought is in the form of the voltage in mV that is read for a 1pH increase (mVpH). Data collection is done by reading the output voltage and pH that is read on the sensor in each measured pH buffer solution.

Machine Learning based Controller

The architecture of the implemented online machine learning-based feedback controller designed for the bioelectronics proton (H+) pump. The system consists of the bioelectronics proton pump where “A” is a reservoir for H+ ions (e.g., water (H2O)) and “B” is a medium with appropriate dye (e.g., water with SNARF-1 dye).

The sensing system consists of the KEYENCE BZ-X710 microscope imaging system, which takes fluorescent images in real-time and sends them to a shared folder. The image analyzer reads images from the shared folder using MATLAB scripts and computes the

mean value of the selected area of the proton pumps distribution in the target.

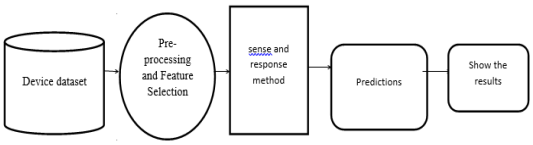
This value then is used as feedback of current states of the system to update the ML-based control output. Machine learning (ML) based controller consists of an ML-based control algorithm that is running on a PC.

The interfacing device consists of a Raspberry Pi and an expansion board which applies the commands received from the ML based controller to the bioelectronics proton pump. To design a feedback controller for the pH level control in a bioelectronics proton (H+) pump, we formulate the problem as a tracking control problem. In a tracking control problem, our interest is in a certain output variable rather than the states.

The accurate demand prediction with high efficiency and advanced demand-side controller are essential for the enhancement of energy flexibility provided by buildings, whereas the current literature fails to present the mechanism on modelling development and demand-side control. This paper aims to deal with the complexity of building demand prediction with supervised machine learning method, including the multiple linear regression, the support vector regression and the backpropagation neural network.

- The regularization, adding the sum of the weights to the learning function, is utilized to improve the training speed and to solve the overfitting by eliminating the unnecessary connections with small weights.
- The configuration of the artificial neural network was presented, and sensitivity analysis has been conducted on the learning performance regarding different training times.
- Energy flexibilities of sophisticated building energy systems (including renewable system, electric and thermal demands and building services systems) were quantitatively characterized with a series of quantifiable indicators.
- Moreover, several advanced controllers have been developed and contrasted, in regard to the flexibility utilization of building energy systems.
- Results showed that, the developed hybrid controller with short-term prediction through the cross-entropy function is more technically competitive than other controllers.
- With the implementation of the developed hybrid controller, the peak power of the grid importation can be reduced from 500.3 to 195 kW by 61%.
- This study formulates a data-driven model with an advanced machine learning algorithm for the accurate building demand prediction and a hybrid advanced controller with short-term prediction for the energy management, which are critical for the promotion of energy flexible buildings.

V. SYSTEM ARCHITECTURE



VI. RESULTS

Although we only use LSTM for developing the models in this paper, other types of models (e.g., CNN, deep neural networks, and SVM) can also be explored. It would be interesting to perform a comparative study of these models and also consider their robustness to adversarial attacks compared to our proposed fixing heuristic. Additionally, potential applications of our proposed heuristic can be explored in the speech, video, and medical domains, and in recommendation systems.

```
In [1]: runfile('D:/2021 - 2022/1 MAJOR Projects 2021 -2022/
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VTPML21_2021/Feedback Control of Bioelectronic Devices/data_analysis.py',
wdir='D:/2021 - 2022/1 MAJOR Projects 2021 -2022/PYTHON_2021_MAJOR_CODES/
PYTHON_2021_MAJOR_CODES_SHIVA/VTPML21/VTPML21_2021/Feedback Control of
Bioelectronic Devices')
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0.5739853954972305, min = 162, max = 166
front_right, average = 148.0, standard deviation = 0.0, min = 148, max =
148
back_left, average = 172.72185430463577, standard deviation =
0.7733897212221442, min = 171, max = 174
back_right, average = 163.50331125827816, standard deviation =
0.4999890354483940 7, min = 163, max = 164
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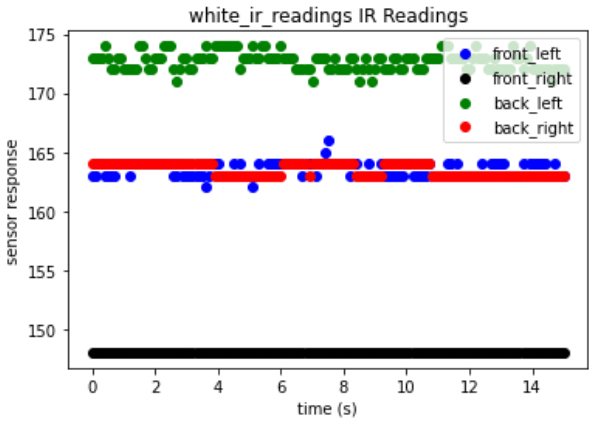
Default Responses



Typing Tab

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black_ir_readings
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0.7223705548091859, min = 2489, max = 2492
front_right, average = 1535.9139072847681, standard deviation =
0.28050090840460 1, min = 1535, max = 1536
back_left, average = 3442.271523178808, standard deviation =
1.6635308130657016, min = 3438, max = 3449
back_right, average = 3267.1456953642382, standard deviation =
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far_corner_black_ir_readings
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0.6281972734691751, min = 191, max = 194
front_right, average = 173.0, standard deviation = 0.0, min = 173, max =
173
back_left, average = 212.59602649006624, standard deviation =
0.9291369487308918, min = 210, max = 215
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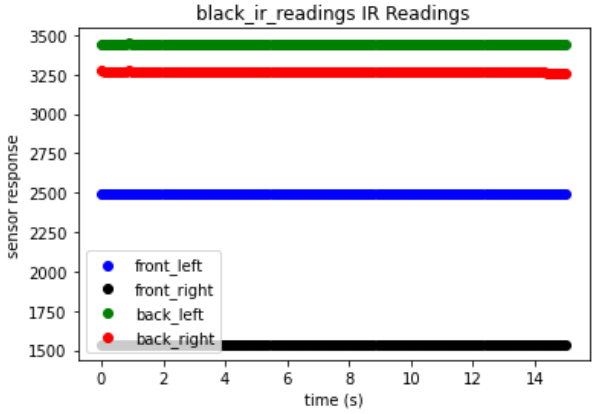
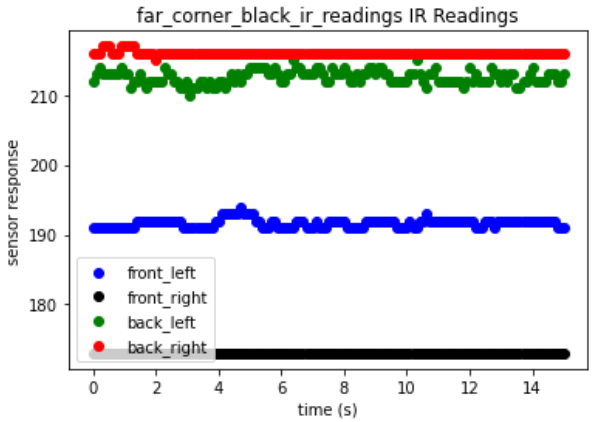
Conversational Query



Conversational Query Continuation



Registered Details for Queries

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153
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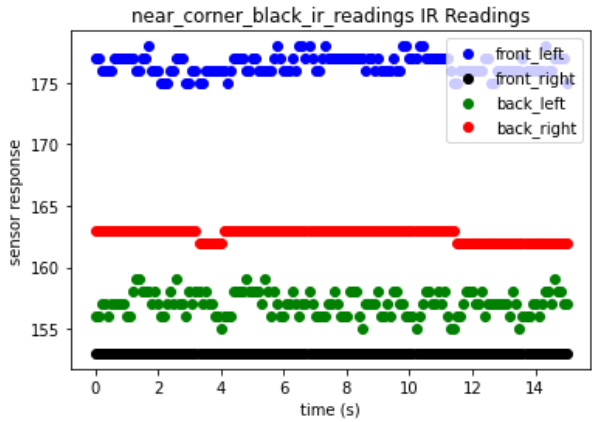

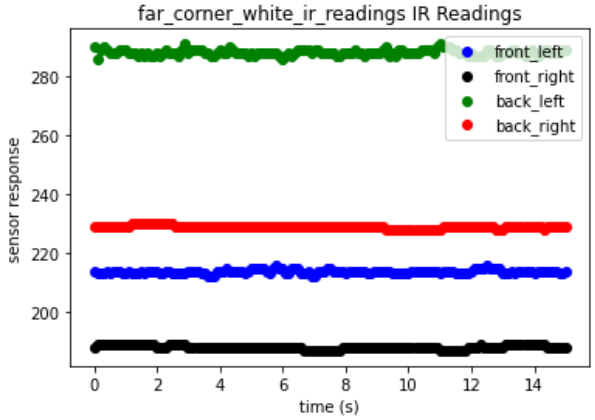


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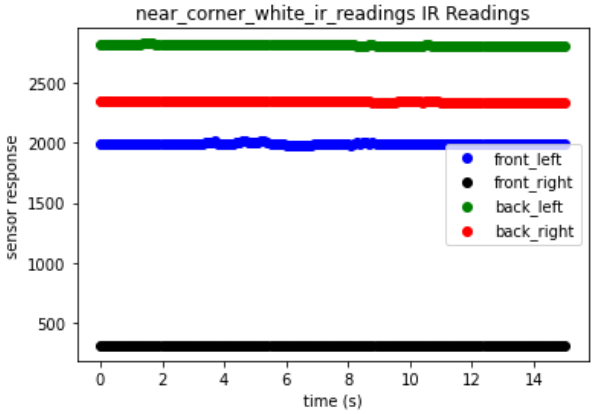

APPLICATION

- Retail and e-commerce.
- Travel and hospitality.
- Banking, finance, and fintech.
- Healthcare.
- Media and entertainment.
- Education.

VII. CONCLUSION

A real-time adaptive external "sense and respond" machine learning-based control technique is developed in this letter to automate pH level control using a bioelectronics proton pump with unknown dynamics and unknown coupling. We demonstrated the advantages of developing online adaptive ML-based feedback control strategies with no dependency on datasets, and with low computational complexity. Furthermore, this method can be extended to control cellular systems given similar dynamical properties (e.g. monotone input/output systems. Instead of reading out fluorescent images representing relative changes in pH, we can directly read out and control other processes such as gene expression, also quantified in the form of fluorescent images using tools in synthetic biology. Future work will consider improvements to the proposed algorithm by addressing constraints on the controller output due to the device limitations.

VIII. VII. FUTURE ENHANCEMENT

In the second examination, the online adaptive ML-based feedback control algorithm was tested for automatic spatiotemporal feedback control of the pH level using a bioelectronics proton pump with unknown dynamics and unknown coupling. In order to achieve spatiotemporal control, we aim towards designing a control scheme to reliably deliver ions in different spatial locations (e.g. we would like each point in space to follow a unique reference trajectory). Here, we specify two different fluorescence intensity signals for two individual columns. The fluorescence intensities of the two columns should be kept close to the target intensities with acceptable errors. Each controller only applies the voltage Vb to its associated proton pumps. Whenever the voltage is applied to a specific proton pump, the other proton pumps are floated. Positive voltages will result in releasing ions from the proton pumps, and negative voltages will result in absorbing ions by the proton pumps. The sampling time (Ts) is divided equally for each active proton pump to be controlled.

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Deep Learning Based Approach For Hate Speech Detection

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Abstract-**The quality of this paper is to review man-made information (ML) estimations and techniques for scorn talk exposure in virtual redirection (SM). Scorn talk issue is routinely model as a text portrayal task. In this survey, we isolated the central check portions of scorn talk gathering using ML evaluations. There are five crucial standard parts - data strategy and appraisal, coordinate extraction, dimensionality decline, classifier attestation and organizing, and model evaluation, were explored. There have been revives in ML estimations that were used for scorn talk certification for a long time. New datasets and different execution evaluations have been proposed in the creation. To keep the experts informed concerning these models in the changed confirmation of scorn talk, it requires a total and a revived high level. The commitments of this study are three-move past. First to furnish the peruses with the fundamental information on the chief drives related with scorn talk unquestionable evidence using ML estimations. Likewise, the weaknesses and properties of each and every framework is overall evaluated to work with experts in the appraisal choice issue. In light of everything, a couple of assessment openings and open challenges were seen. The different varieties of ML systems were explored which coordinate customary ML, pack approach and basic learning procedures. Researchers and specialists, a relative will benefit enormously from this over.**

I. INTRODUCTION

Online redirection affiliations (ORAs) are the speediest technique for correspondence as messages are sent and gotten quickly [1], [2]. ORAs are the basic media for executing disdain keeps an eye out for these days. According to this, cutting edge disdain shocking way to deal with acting has filled fundamentally over the most recent several distinct years [3]. More glances at are being worked with to control with the rising events of hatred talks in virtual entertainment (SM). Various calls have been made to SM suppliers to channel each remark going before permitting it into the public space [4], [5]. The effects of disdain horrible ways to deal with acting are right currently overpowering a brief consequence of wide social gathering of SM [6] and the secret respected by the electronic clients [7]. In this season of enormous information, the doorway has seemed consuming and testing to process and depict gigantic degrees of text information in actuality. Moreover, the accuracy of the social event of manual text can without an absolutely vital stretch be impacted by human parts, like depletion and cutoff. To accomplish more specific and less reasonable outcomes, it is irreplaceable for utilize man-made mental capacity (ML) ways of managing directing robotize the text depiction processes [6]. There have been titanic sorts of progress in ML framework from obsolete ML, gathering and huge learning (DL) methodologies for disdain talk area. Considering the striking progress similarly language making due (NLP), a couple of copied data methods have accomplished inescapable results [8]. To have the decision to besides invigorate depiction of SM texts as contempt talk or non-disdain talk, scientists and experts require a restored discernment of PC based data moves close, which is speedy advancing. Astounding exertion has been spent on making new strong regions for and that better catch disdain chat on SM [9]-[11]. Slangs and new vocabularies are other than endlessly making in the SM space. New and vivified datasets are furthermore open across various locale of the world. To overcome any countering, there is a need to zero in on the plan and keep arranged specialists, old and new specialists in the loop of the streams upgrades in this evaluation region. On this note, this survey becomes essential to be shaped. The additional pieces of this article are framed in the going with ways: Inspiration and Related Works are introduced in portion II. Area III covers the perspective. Disdain talk and hatred talk showing is requested in segment IV. Disdain talk depiction, responsibility and focuses of past works, open weights in disdain talk disclosure, limit of the audit and end are battled in section V, VI, VII, VIII and IX freely.

II. RELATED WORK

Professional chat application based on natural language processing. There has been an emerging trend of a vast number of chat applications which are present in the recent years to help people to connect with each other across different mediums, like Hike, WhatsApp, Telegram, etc. The proposed network-based android chat application used for chatting purpose with remote clients or users connected to the internet, and it will not let the user send inappropriate messages. This paper proposes the mechanism of creating professional chat application that will not permit the user to send inappropriate or improper messages to the participants by incorporating base level implementation of natural language processing (NLP). Before sending the messages to the user, the typed message evaluated to find any inappropriate terms in the message that may include vulgar words, etc., using natural language processing. The user can build an own dictionary which contains vulgar or irrelevant terms. After pre-processing steps of removal of punctuations, numbers, conversion of text to lower case and NLP concepts of removing stop words, stemming, tokenization, named entity recognition and parts of speech tagging, it gives keywords from the user typed message. These derived keywords compared with the terms in the dictionary to analyze the sentiment of the message. If the context of the message is negative, then the user not permitted to send the message

Real world smart chatbot for customer care using software as service (SaaS) architecture.

It's being very important to listen to social media streams whether it's Twitter, Facebook, Messenger, LinkedIn, email or even company own application. As many customers may be using this streams to reach out to company because they need help. The company have setup social marketing team to monitor this stream. But due to huge volumes of users it's very difficult to analyses each and every social message and take a relevant action to solve users' grievances, which lead to many unsatisfied customers or may even lose a customer. This papers proposes a system architecture which will try to overcome the above shortcoming by analyzing messages of each ejabberd users to check whether it's actionable or not. If it's actionable then an automated Chatbot will initiates conversation with that user and help the user to resolve the issue by providing a human way interactions using LUIS and cognitive services. To provide a highly robust, scalable and extensible architecture, this system is implemented on AWS public cloud.

An Overview of Artificial Intelligence Based Chabot's and an Example Chabot Application.Chatbot can be described as software that can chat with people using artificial intelligence. These software are used to perform tasks such as quickly responding to users, informing them, helping to purchase products and providing better service to customers. In this paper, we present the general working principle and the basic concepts of artificial intelligence based chatbots and related concepts as well as their applications in various sectors such as telecommunication, banking, health, customer call centers and e-commerce. Additionally, the results of an example chatbot for donation service developed for telecommunication service provider are presented using the proposed architecture.

Intelligent travel chatbot for predictive recommendation in echo platform

Chatbot is a computer application that interacts with users using natural language in a similar way to imitate a human travel agent. A successful implementation of a chatbot system can analyze user preferences and predict collective intelligence. In most cases, it can provide better user-centric recommendations. Hence, the chatbot is becoming an integral part of the future consumer services. This paper is an implementation of an intelligent chatbot system in travel domain on Echo platform which would gather user preferences and model collective user knowledge base and recommend using the Restricted Boltzmann Machine (RBM) with Collaborative Filtering. With this chatbot based on DNN, we can improve human to machine interaction in the travel domain

Chatbot Using a Knowledge in Database Human-to-Machine Conversation Modeling

A chatterbot or chatbot aims to make a conversation between both human and machine. The machine has been embedded knowledge to identify the sentences and making a decision itself as response to answer a question. The response principle is matching the input sentence from user. From input sentence, it will be scored to get the similarity of sentences, the higher score obtained the more similar of reference sentences. The sentence similarity calculation in this paper using bigram which divides input sentence as two letters of input sentence. The knowledge of chatbot is stored in the database. The chatbot consists of core and interface that is accessing that core in relational database management systems (RDBMS). The database has been employed as knowledge storage and interpreter has been employed as stored programs of function and procedure sets for pattern-matching requirement. The interface is standalone which has been built using programing language of Pascal and Java.

III. METHODOLOGIES

- **A. Dataset**
- **B. Pre-Processing**
- **C. Splitting**
- **D. Apply Algorithm**
- **E. Visualization**
- **F. Accuracy**

IV. MODULE DESCRIPTION

A. Data set

A data set is an assortment of data. On account of plain data, a data set relates to at least one database tables, where each segment of a table addresses a specific variable, and each line compares to a given record of the data set being referred to.

B. Pre-Handling

Data pre-handling is a course of setting up the crude data and making it reasonable for an AI model. It is the first and significant stage while making an AI model.

While making an AI project, it isn't generally a case that we confess all and organized data. And keeping in mind that doing any activity with data, cleaning it and put in an organized way is required.

C. Splitting

Data parting is the demonstration of apportioning accessible data into. two segments, typically for cross-validatory purposes. one piece of the data is utilized to foster a prescient model. also, the other to assess the model's exhibition.

• Preparing Data: Utilized for train the model or given as contribution to the to the learning model

• Testing Data: Utilized for test the model or given as contribution to the model for expectation.

D. Apply Calculation

In this we are utilizing support vector machine calculation to foresee accuracy. It is a non-probabilistic managed AI approaches utilized for characterization and relapse. It doles out another data part to one of two potential classes. It characterizes a hyper plane that isolates n-layered data into two classes.

E. Visualization

Representation is a strategy that utilizes a variety of static and intelligent visuals inside a particular setting to help individuals comprehend and figure out a lot of data. The data is many times shown in a story design that pictures examples, patterns and relationships that may somehow slip through the cracks.

F. Accuracy

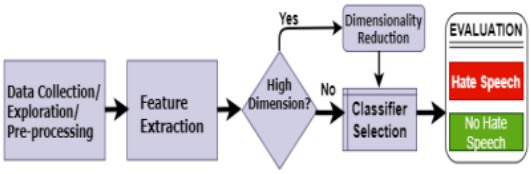
Accuracy is characterized as the level of right expectations for the test data. It very well may be determined effectively by separating the quantity of right forecasts by the quantity of all out predictionst

V. PROPOSED ALGORITHM

DEEP LEARNING TECHNIQUES, ENSEMBLE CLASSIFIER AND SUPPORT VECTOR MACHINE (SVM)

All ML calculations utilize numerical displaying as a basic piece of the calculation. Accordingly, the unstructured idea of the texts information should be changed over into organized highlight space. More scientists are currently keen on creating applications that influence text characterization techniques, particularly with late advances in NLP and text mining. By and large, disdain discourse order switch maturing ML can be gathered into five stages: Information assortment and investigation, include extraction, dimensionality decrease, classifiers determination and assessments.

VI. SYSTEM ARCHITECTURE

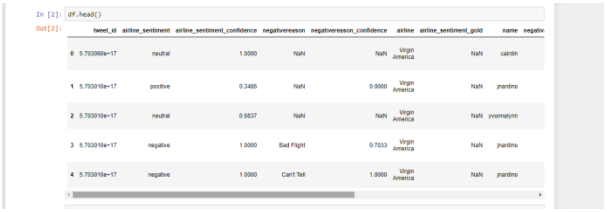


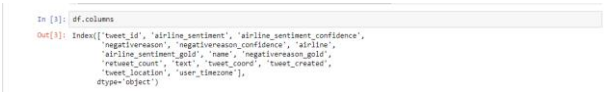
Over the past few decades, text classification has been researched extensively and used in many real life applications such as hate speech detection. More researchers are now interested in developing applications that leverage text classification methods, especially with recent advances in NLP and text mining. Generally, hate speech classification leveraging ML can be grouped into five phases: Data collection and exploration, feature extraction, dimensionality reduction, classifiers selection and evaluations as summarized in Figure.

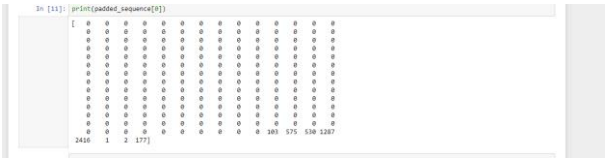
VII. RESULT

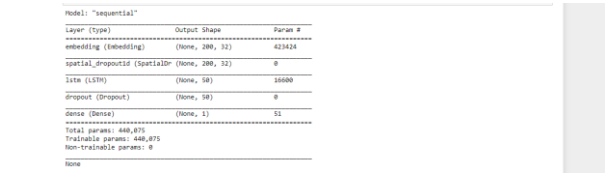
Regardless of what the way that we essentially use NN for empowering the models in this paper, different sorts of models (e.g., NN, RF, SVM and so on) can similarly be analyzed. It would be enchanting to play out a near assessment of these models and besides consider their capacity to not much of composed assaults stood isolated from our proposed fixing fitting and other problems. Additionally, potential purposes behind our proposed method can be bankrupt down in the discussion, video, and clinical areas, and in thought structures.

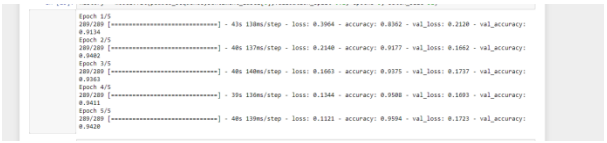
Screenshots

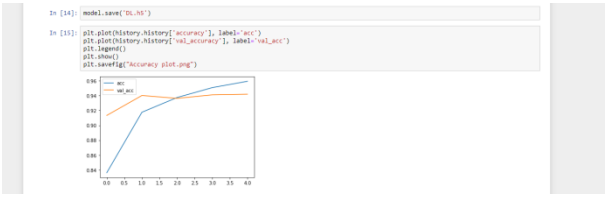


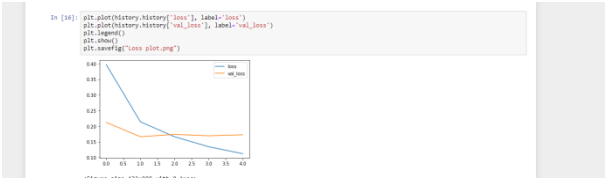


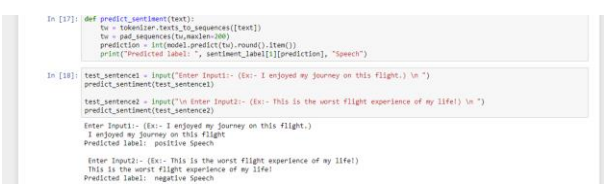


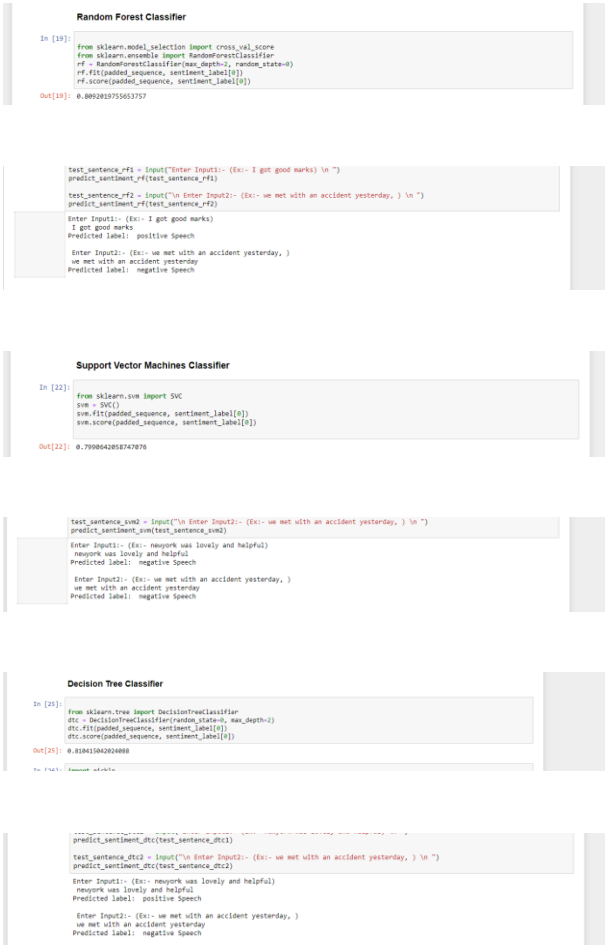












Default Responses

APPLICATION

- Retail and e-commerce.
- Travel and hospitality.
- Banking, finance, and fintech.
- Healthcare.
- Media and entertainment.
- Education.

VIII. CONCLUSION

This article hated pushes made such a long ways in changed disdain talk divulgence in electronic redirection. Disdain talk as a social issue is an old evaluation locale in creative verbalization and humanities, notwithstanding, it is as of now another appraisal region in the enrolling space. Subsequently, there is a need to constantly restore specialists with the advances or advances made to keep scientists informed. We dissected the strategies for thinking from normal ML, Affiliation and enormous learning approaches specifically scorn talk in virtual redirection. This review figured out that there is more unmistakable assessment work in disdain talk affirmation utilizing standard ML than pack and fundamental learning strategies. That derives specialists can separate more on disdain talk confirmation utilizing gathering and essential learning frameworks. This appraisal similarly isolated the lacks and qualities which can be of help in orchestrating the specialists' decision of one technique over the other. This article moreover evident a couple of open difficulties in disdain talk region which include: Social groupings, pandemic or hopeless event, information sparsity, and imbalance dataset challenge and dataset accessibility concern.

IX. FUTURE ENHANCEMENT

This evaluation has figured out that exceptional characters and numeral pictures commonly utilized in Nigeria for making HS remarks have not been would in everyday by present status of-threat. For instance, the utilization of "419" to mean an unwholesome way to deal with acting is typical in Nigeria. No appraisal manages this. The doled out bunch for this evaluation audit is by and large learners in the space of disdain talk (text) gathering in the SM. This study gives each of the typical advances expected to happen in organizing text gathering errands remembering ML and two or three open inconveniences for the space.

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Prediction Of Diabetic Disease By Using Machine Learning Algorithms

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Abstract-**This paper deals with the prediction of Diabetes Disease by performing an analysis of five supervised machine learning algorithms, i.e. K-Nearest Neighbours, Naive Bayes, Decision Tree Classifier, Random Forest and Support Vector Machine. Further, by incorporating all the present risk factors of the dataset, we have observed a stable accuracy after classifying and performing cross-validation. We managed to achieve a stable and highest accuracy of 76% with Random Forest classifier and remaining all other classifiers also give a stable accuracy of above 70%. We analyzed why specific Machine Learning classifiers do not yield stable and good accuracy by visualizing the training and testing accuracy and examining model over fitting and model under fitting. The main goal of this paper is to find the most optimal results in terms of accuracy and computational time for Diabetes disease prediction.**

I. INTRODUCTION

In this day and age, one of the most notorious diseases to have taken the world by storm is Diabetes, which is a disease which causes an increase in blood glucose levels as a result of the absence or low levels of insulin. Due to the many criterion to be taken into consideration for an individual to harbour this disease, it's detection and prediction might be tedious or sometimes inconclusive. Nevertheless, it isn't impossible to detect it, even at an early stage.

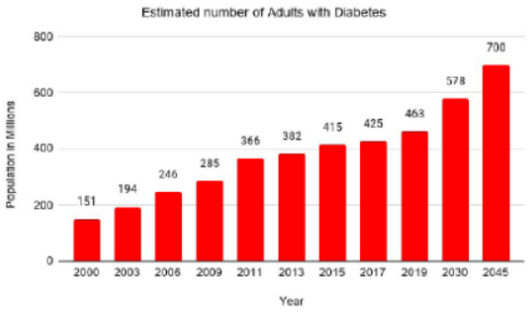


Fig. 1. Number of diabetic patients estimated with respect to year

In the year 2019, approx. 463 million adults between the age of 20-79 years had diabetes (International Diabetes Federation- IDF). 79% of the adult population were living in the countries with the low and middle-income groups. It is estimated that by the year 2045 approx. 700 million people will have diabetes (IDF). Diabetes is increasing day by day in the world because of environmental, genetic factors. The numbers are rising rapidly due to several factors which includes unhealthy foods, physical inactivity and many more. Diabetes is a hormonal disorder in which the inability of the body to produce insulin causes the metabolism of sugar in the body to be abnormal, thereby, raising the blood glucose levels in the body of a particular individual. Intense hunger, thirst and frequent urination are some of the observable characteristics. Certain risk factors such as age, BMI, Glucose Levels, Blood Pressure, etc., play an important role to the contribution of the disease.

In the Fig. 1 we can see that the number of cases is rising every year and there is not slowing down in the active cases. It is a very crucial thing to worry as diabetes has become one of the most dangerous and fastest diseases to take the lives of many individuals around the globe.

Machine Learning is very popular these days as it is used everywhere, where a large amount of data is present, and we need some knowledge from it. Generally, we can categorise the Machine Learning algorithms in two types but not limited to

- **Unsupervised Learning:** In unsupervised learning, the information is not labelled and also not trained. Here, we just put the data in action to find some patterns if possible.
- **Supervised Learning:** In supervised learning, we train the model based on the labels attached to the information and based on that we classify or test the new data with labels.

With the rise of Machine Learning and its relative algorithms, it has come to light that the significant problems and hindrances in its detection faced earlier, can now be eased with much simplicity, yet, giving a detailed and accurate outcome. As of the modern-day, it is comprehended that Machine Learning has become even more effective and helpful in collaboration with the domain of Medicine. Early determination of a disease can be made possible through machine learning by studying the characteristics of an individual. Such early tries canof permitting the disease to reach a critical degree. The work which will be described in this paper is to perform the diabetes disease prediction using machine learning algorithms for early care of an individual.

II. RELATED WORK

Saeedi, I. Petersohn, P. Salpea, B. Malanda, S. Karuranga, N. Unwin, S. Colagiuri, L. Guariguata, A. A. Motala, K. Ogurtsova, J. E. Shaw, D. Bright, and R.Williams, 2019.

Aims: To provide global estimates of diabetes prevalence for 2019 and projections for 2030 and 2045.

Methods: A total of 255 high-quality data sources, published between 1990 and 2018 and representing 138 countries were identified. For countries without high quality in-country data, estimates were extrapolated from similar countries matched by economy, ethnicity, geography and language. Logistic regression was used to generate smoothed age-specific diabetes prevalence estimates (including previously undiagnosed diabetes) in adults aged 20-79 years.

Results: The global diabetes prevalence in 2019 is estimated to be 9.3% (463 million people), rising to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045. The prevalence is higher in urban (10.8%) than rural (7.2%) areas, and in high-income (10.4%) than low-income countries (4.0%). One in two (50.1%) people living with diabetes do not know that they have diabetes. The global prevalence of impaired glucose tolerance is estimated to be 7.5% (374 million) in 2019 and projected to reach 8.0% (454 million) by 2030 and 8.6% (548 million) by 2045.
Conclusions: Just under half a billion people are living with diabetes worldwide and the number is projected to increase by 25% in 2030 and 51% in 2045.

C. R. Harris, K. J. Millman, S. J. van der Walt, R. Gommers, P. Virtanen, D. Cournapeau, E. Wieser, J. Taylor, S. Berg, N. J. Smith, R. Kern, M. Picus, S. Hoyer, M. H. van Kerkwijk, M. Brett, A. Haldane, J. F. del R'ıo, M. Wiebe, P. Peterson, P. G'erard-Marchant, K. Sheppard, T. Reddy, W. Weckesser, H. Abbasi, C. Gohlke, and T. E. Oliphant, 2020.Array programming provides a powerful, compact and expressive syntax for accessing, manipulating and operating on data in vectors, matrices and higher-dimensional arrays. NumPy is the primary array programming library for the Python language. It has an essential role in research analysis pipelines in fields as diverse as physics, chemistry, astronomy, geosciences, biology, psychology, materials science, engineering, finance and economics. For example, in astronomy, NumPy was an important part of the software stack used in the discovery of gravitational waves1 and in the first imaging of a black hole2. Here we review how a few fundamental array concepts lead to a simple and powerful programming paradigm for organizing, exploring and analyzing scientific data. NumPy is the foundation upon which the scientific Python ecosystem is constructed. It is so pervasive that several projects, targeting audiences with specialized needs, have developed their own NumPy-like interfaces and array objects. Owing to its central position in the ecosystem, NumPy increasingly acts as an interoperability layer between such array computation libraries and, together with its application programming interface (API), provides a flexible framework to support the next decade of scientific and industrial analysis.

A. Mir and S. N. Dhage, 2018. Healthcare domain is a very prominent research field with rapid technological advancement and increasing data day by day. In order to deal with large volume of healthcare data we need Big Data Analytics which is an emerging approach in Healthcare domain. Millions of patients seek treatments around the globe with various procedure. Analyzing the trends in treatment of patients for diagnosis of a particular disease will help in making informed and efficient decisions to improve the overall quality of healthcare. Machine Learning is a very promising approach which helps in early diagnosis of disease and might help the practitioners in decision making for diagnosis. This paper aims at building a classifier model using WEKA tool to predict diabetes disease by employing Naive Bayes, Support Vector Machine, Random Forest and Simple CART algorithm. The research hopes to recommend the best algorithm based on efficient performance result for the prediction of diabetes disease. Experimental results of each algorithm used on the dataset was evaluated. It is observed that Support Vector Machine performed best in prediction of the disease having maximum accuracy.

D. Sisodia and D. S. Sisodia, 2018. Diabetes is considered as one of the deadliest and chronic diseases which causes an increase in blood sugar. Many complications occur if diabetes remains untreated and unidentified. The tedious identifying process results in visiting of a patient to a diagnostic center and consulting doctor. But the rise in machine learning approaches solves this critical problem. The motive of this study is to design a model which can prognosticate the likelihood of diabetes in patients with maximum accuracy. Therefore, three machine learning classification algorithms namely Decision Tree, SVM and Naive Bayes are used in this experiment to detect diabetes at an early stage. Experiments are performed on Pima Indians Diabetes Database (PIDD) which is sourced from UCI machine learning repository. The performances of all the three algorithms are evaluated on various measures like Precision, Accuracy, F-Measure, and Recall. Accuracy is measured over correctly and incorrectly classified instances. Results obtained show Naive Bayes outperforms with the highest accuracy of 76.30% comparatively other algorithms. These results are verified using Receiver Operating Characteristic (ROC) curves in a proper and systematic manner.

P. S. Kohli and S. Arora, 2018. The application of machine learning in the field of medical diagnosis is increasing gradually. This can be contributed primarily to the improvement in the classification and recognition systems used in disease diagnosis which is able to provide data that aids medical experts in early detection of fatal diseases and therefore, increase the survival rate of patients significantly. In this paper, we apply different classification algorithms, each with its own advantage on three separate databases of disease (Heart, Breast cancer, Diabetes) available in UCI repository for disease prediction. The feature selection for each dataset was accomplished by backward modeling using the p-value test. The results of the study strengthen the idea of the application of machine learning in early detection of diseases.
The authors proposed the neural network-baseddiabetes disease prediction on Indians Pima DiabetesDataset. They have used several hidden layers to findpatterns in the data, and with the help of those patterns,they predicted the outcome. They name their proposedalgorithms as ADAP, which is a custom neural networkwith multiple partitions and with the set of associationweights and units. They managed to achieve a crossoverpoint for sensitivity, and specificity at 0.76 and are tryingto precise their result in future.

The authors in [5] used a diverse genera of machinelearning algorithms like support vector machine, randomforest, logistic regression, Decision tree and many moreand various types of disease dataset to show the applicabilityof Machine Learning in disease prediction

andanalysis. They also accompanied the traditional way ofconducting the analysis by using the data pre-processing,feature extraction and selection, classifiers training andtesting for producing the end results. They used featureselection for reducing the computational expenses. Also, toget the most optimal outcome, they divided every datasetinto 90% training set and remaining 10% testing set. Alongwith the accuracy measure, they did the cross-validationfor everyalgorithm and showed different results based ondifferent k values for k-fold cross-validation.

III. METHODOLOGIES

In this paper, we have shown the relation of different symptoms and diseases that cause diabetes so that we can help a person to diagnose diabetes at an early stage. Nowadays, machine learning classification approaches are well accepted by researchers for developing disease risk prediction models. Therefore eleven machine learning classification algorithms such as Logistic Regression (LR), Gaussian Process (GP), Adaptive Boosting (AdaBoost), Decision Tree (DT), K-Nearest Neighbors (KNN), Multilayer Perceptron (MLP), Support Vector Machine (SVM), Bernoulli Naive Bayes (BNB), Bagging Classifier (BC), Random Forest (RF), and Quadratic Discriminant Analysis (QDA) have been used in this study. Among all these machine learning classifiers, Random Forest (RF) classifier has showed the best accuracy of 98%. And its Area Under Curve (AUC) is also the highest.

The main goal of this paper is to find the most optimal results in terms of accuracy and computational time for Diabetes disease prediction. One of the significant impediments with the progression of technology and medicine is the early detection of a disease, which is in this case, diabetes. However, in this study, systematic efforts were made into designing a model which is accurate enough in determining the onset of the disease. With the experiments conducted on the Pima Indians Diabetes Database, we have readily predicted this disease. Moreover, the results achieved proved the adequacy of the system, with an accuracy of 76% using the K-Nearest Neighbours classifiers. With this being said, itis hopeful that we can implement this model into a system to predict other deadly diseases as well. There can be room for further improvement for the automation of the analysis of diabetes or any other disease in the future.

To perform our experiment, we have used a publiclyavailable dataset named as Pima Indians DiabetesDatabase [4]. This dataset includes a various diagnosticmeasure of diabetes disease. The dataset was originallyfrom the National Institute of Diabetes and Digestive andKidney Diseases. All the recorded instances are of thepatients whose age are above 21 years old. Our proposedmodel exists of 5 phases which are shown in the Fig. 2.

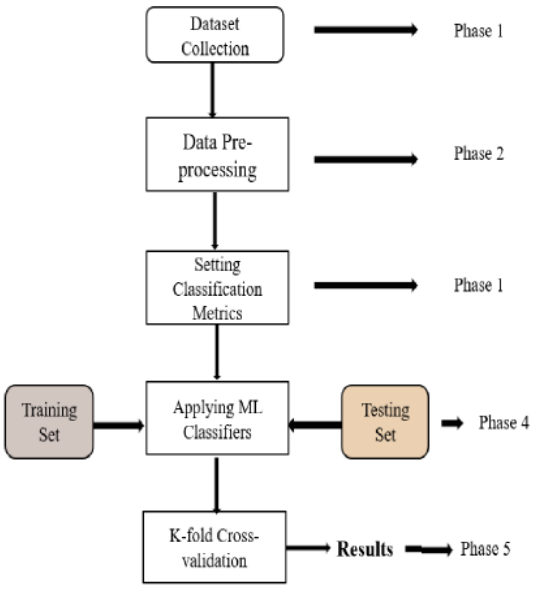


Fig. 2: Different phases of our experiment.

1. Proposed Algorithm

A. Data Collection

The dataset mentioned above [4] has eight features which are defined in Table I.

TABLE I
LIST OF FEATURES PRESENT IN THE DATASET

Features	Description
Pregnancies	Number of Pregnancies patients had earlier.
Glucose	Glucose level present in the patient.
Blood Pressure	Recorded blood pressure level at that particular time.
Skin Thickness	Skin thickness level of the patient.
Insulin	Amount of Insulin present in the body.
BMI	Body Mass Index of the individual.
Diabetes Pedigree Function	Family history of Diabetes disease.
Age	Age of an individual.

Along with the feature, the dataset also has 2 label(0- No and 1- Yes) which is the outcome of the diabetesdisease. The detailed information about each attribute orfeatures is discussed below.

- **Pregnancies**: Those who develop gestational diabetesare at higher risk of developing type 2 diabetes laterin life. The subjects with more number of pregnancieshave a higher risk of developing diabetes.
- **Glucose:** The subjects were given an oral glucosetest, whereby, they were administered glucose anda reading of their plasma glucose concentration wastaken after 2 hours. The subjects with higher levelsof glucose concentration after 2 hours have a higherrisk of developing diabetes.
- **Blood Pressure:** Having blood pressure over 140/90mmHg of Mercury are linked to having increasedrisk of developing diabetes. Although, certain subjectshaving diastolic blood pressure ¿70 mmHg maydevelop diabetes.
- **Skin Thickness:** Skin thickness is primarily determinedby collagen content and is increased in the

caseof insulin dependent diabetic patients. The subjects'tricep skin fold were measured and results showedthat having a skin thickness of 30mm of greater areat a higher risk.

• **Insulin:** Normal insulin levels after 2 hours of glucoseadministration is 16-166 mlU/L. Subjects havinglower or higher levels than said value are at a higherrisk.

• **Body Mass Index (BMI):** Subjects having a BMIover 25 have a relatively high risk in having diabetes.

• **Diabetes Pedigree Function:** The diabetes pedigreefunction provides "a synthesis of the diabetes mellitushistory in relatives and the genetic relationship ofthose relatives to the subject." The higher the DPF,the more likely it is for a subject to be diabetic.

• **Age:** Diabetes is prevalent in any age group, but iscommonly found in middle aged adults (45 onwards).Taking that into consideration, subjects with in thehigher age group have a higher expectancy of diabetes.

B. Data Pre-process

The dataset, which is quoted above, has lapsed and haveshed data. To make the dataset serviceable and obtainthe knowledge from it, we have performed data preprocessing.In order to handle erroneous data, we haveanalyzed the dataset for the unusual entries and fixed themmanually. Missing values are handled with the help ofcalculating the standard deviation of that particular featureand allotting it to the missing spaces. To make the datasetuseful, we have used Pandas [6] and NumPy [7] libraryfor handling the dataset efficiently and easy data handlingthroughout the experiment.

C. Setting Classification Metrics

To classify disease and get a prediction result, we needto set a few metrics which will help us in predicting theDiabetes disease. Since we are using scikit-learn (Sklearn)machine learning library [8] for our experiment, we haveused confusion matrix as the classification measure metrics.All the used metrics, i.e. Precision, Recall, F1-Scoreand Accuracy in our analysis, are listed below.

• **Precision (P)** is defined as the number of true positives(Tp) over the number of true positives plus thenumber of false positives (Fp). Mathematically,

$$P = \frac{T_p}{T_p + F_p} \qquad (1)$$

• **Recall (R)**is defined as the number of true positives(Tp) over the number of true positives plus thenumber of false negatives (Fn).

$$R = \frac{T_p}{T_p + F_n} \qquad (2)$$

• **F1-Score (F1)** is defined as the harmonic mean ofprecision and recall.

$$F1 = 2 * \frac{P * R}{P + R} \qquad (3)$$

• **Accuracy (A)** is defined as follows.

$$A = \frac{T_p + T_n}{T_p + T_n + F_p + F_n} \qquad (4)$$

D. Applying Machine Learning Algorithms

For our experiment, we will perform 5 supervisedmachine algorithms on the pre-processed dataset. Thealgorithms which we used are as follows-

1) K-Nearest Neighbor (KNN) with K=10
2) Naive Bayes (NB)
3) Decision Tree (DT)
4) Random Forest (RF)
5) Support Vector Machine (SVM)

E. K-Fold Cross Validation

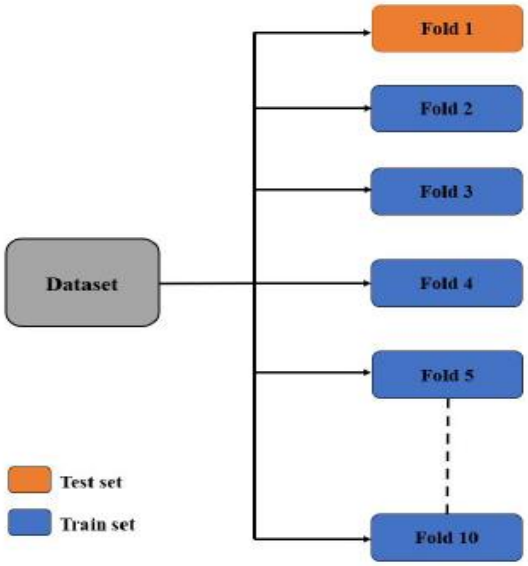
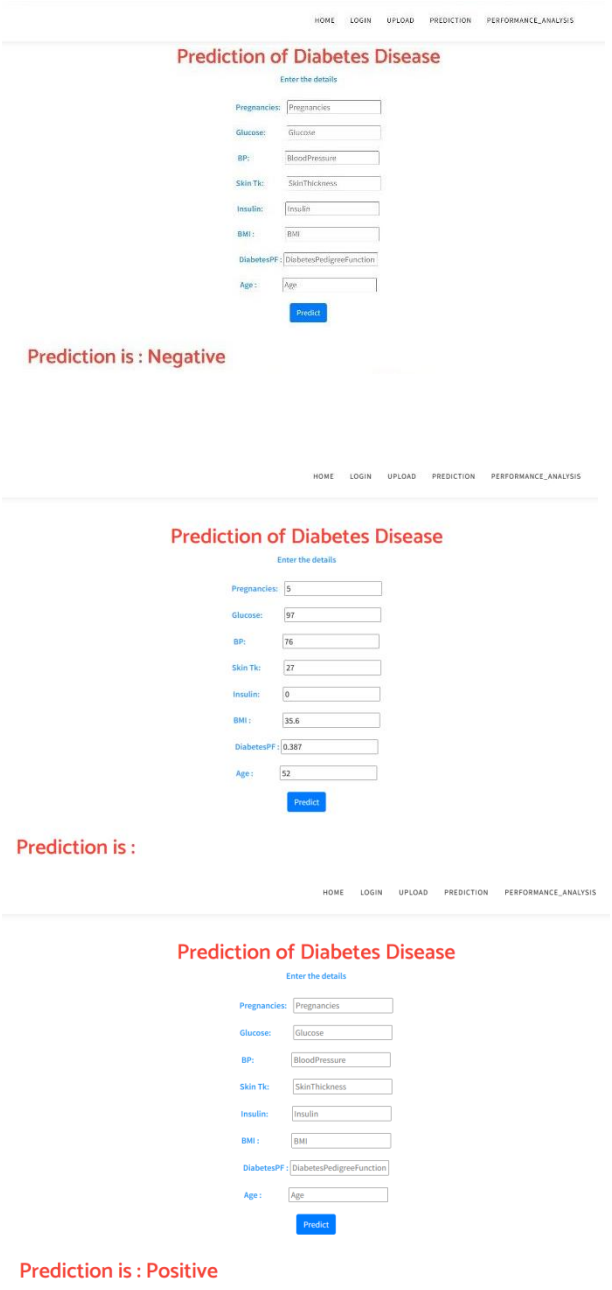


Fig. 3. 10- Fold Cross- Validation

Lastly, we have used another evaluation method, namelyK- Fold cross-validation for precise use of dataset and alsofor calculating most optimal accuracy results [9]. In Kfoldcross-validation the dataset is partitioned into K-differentfolds (in our case K= 10) and then in each cycle oneof the fold (say Fold-1) is examined with the remaining(k-1) folds. This process is going to recur continuously tillall the folds get examined. For a better understanding ofK- Fold Cross-validation, we have pictorial representationof this evaluation metrics in Fig. 3.

IV. RESULT



V. CONCLUSION AND FUTURE ENHANCEMENT

One of the significant impediments with the progressionof technology and medicine is the early detection of disease, which is in this case, diabetes. However, inthis study, systematic efforts were made into designing amodel which is accurate enough in determining the onsetof the disease. With the experiments conducted on thePima Indians Diabetes Database, we have readily predictedthis disease. Moreover, the results achieved proved theadequacy of the system, with an accuracy of 76% using theK-Nearest Neighbours classifiers. With this being said, itis hopeful that we can implement this model into a systemto predict other deadly diseases as well. There can be roomfor further improvement for the automation of the analysisof diabetes or any other disease in the future.

Future Work: In future, we will try to create a diabetes dataset incollaboration with a hospital or a medical institute and willtry to achieve better results. We will be incorporating moreMachine Learning and Deep learning models for achievingbetter results as well.

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Revealing Insidious Social Botting Over Twitter Through User Profile Attributes Using ML Techniques

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Abstract—**Due to the widespread use of social media, scammers attempt to deploy malicious social bots that produce fake tweets, attempt to build relationships with other users by pretending to be followers or attempt to create several fake accounts that engage in malicious actions. Additionally, they frequently post malicious URLs that direct real people to malicious web servers. Therefore, it is crucial to distinguish between legitimate accounts and bot accounts. It has been found that profile-based features and URL features, such as redirected URLs, spam data, frequency of URL sharing, etc., are better indicators of bots than social factors. In this study, we propose a novel method that exposes malicious bots on social networks by utilizing profile-based attributes and Deep Learning algorithms. We apply the aforementioned model to the Twitter data set and see that it performs better than other methods. We also made an effort to create a web application that might demonstrate that the aforementioned strategy performs better than other models that are already in use.**

Keywords—Learning automata (LA), malicious social bots, online social networks (OSNs), trust.

I. INTRODUCTION

Social media platforms have a large number of accounts where users can post and share material. Since there are millions of profiles, it is impossible to personally verify that an account is legitimate and not a fraudulent account because of this[1]. As a result, users may unknowingly share their personal information and it may be used for other illegal activities. Over time, many fake accounts have been created, acting like malevolent bots that may harm legitimate users by spamming, posting, and sharing URLs that direct users to malicious servers, etc. Therefore, it is absolutely necessary[3]. To monitor and, if necessary, remove all bot accounts, one must be able to determine whether a Twitter account is one or not. The majority of currently used strategies make use of social activity-related traits, but it has been noted that profile-based features and URL features play a significant part in identifying malicious bots[2]. Therefore, in this research, we develop a novel method that can recognize a bot utilizing features from a profile. We fed the proposed model, which was created using cutting-edge machine learning techniques, the Twitter data set, and saw that it performed better than the existing systems.

II. RESEARCH BACKGROUND

A. Problem Statement

Due to the widespread use of social media, there has been a significant increase in cybercrimes such as phishing, spamming, and other forms of abuse by nefarious social bots that attempt to post malicious content to users and direct them to websites where the user's personal information can be obtained and used inappropriatel[4]y. To prevent cybercrimes from happening, it is imperative that these malicious bots are found. In this project, we suggest a cutting-edge method for locating malicious bots based on the user's profile features[5]

B. Aim Of The Project

The primary goal of the project is to locate harmful bots in Twitter accounts using aspects of the user's profile. We have incorporated the Twitter data set into the proposed model, which was created utilizing cutting-edge machine-learning methodologies.

C. Scope Of The Project

The project's objectives are restricted to calculating the proposed model's accuracy and identifying harmful bots. The system administrator uses test data to test the proposed model and training data to train the model. The "results.csv" file contains the test data's results. The project does not include deactivating bots, monitoring user accounts, or maintaining user accounts. Although malicious bots can be exposed using URL-based features, this method has not been used in this study because the BOT Prediction algorithm has an accuracy of roughly 93% for the given dataset..

D. Technical Approach

The technological strategy to solve the issue is listed below:

1. Dataset identification
2. Exploratory data analysis
3. Dataset preparation and NLP approaches
4. Running the dataset through many algorithms to see which one best fits the situation.
5. Developing a final classifier model and training the final classifier
6. Validating the ultimate classifier and recording the outcomes.

III. SYSTEM ANALYSIS

A. Research Gap

Due to the widespread usage of social media sites like Facebook, Twitter, etc., malicious individuals attempt to utilize bots to create phony accounts, control users' attitudes, and send them to malicious websites by spamming. Because they rely on qualities that search bots employ to build relationships with real consumers, traditional techniques to identify search bots are ineffective. It is impossible to tell manually if the account is a bot or not. Numerous social feature-based

techniques have been developed, but they are not particularly useful.

B. Proposed System

The "BOT PREDICTION ALGORITHM" is a revolutionary technique used by the proposed system to recognize bots utilizing URL data and relationship features. The profile-based elements listed in the table below would assist in spotting malicious social bots and determining whether users were being forwarded to bogus websites where they may enter their personal information. The features listed below have made it possible to recognize bots with great accuracy.

Below are the features that are being used in the project:

Feature Name	Description
Id	Twitter Id of the twitter account
followers_count'	No. of followers for the user
friends_count	No. of friends for the user
verified	Boolean value which describes if a user is verified or not
name	Name of the user in the twitter account
description	Description of the user
screen_name	Displayed screen name on the twitter account
status	Latest status of the user
listed_count	No of users who really want to follow the user.

BOT Prediction algorithm

The Bot Prediction Algorithm's steps are as follows:

1. Download the dataset.
2. Applying feature engineering to the verified and id columns.
3. Changing id to an integer.
4. Changing verified to a vector.
5. Verify whether the screen name or name contains the character "b0t"
6. Verify if the user is authentic
7. See if the description includes BuzzFeed.
8. See if the listed count exceeds 16000

Advantages:

- High precision
- Extendable to real-time settings..

IV. PROJECT IMPLIMENTATION

Proposed Modular Implementation

Below is the proposed modular implementation of the project. It consists the below Admin modules:

Admin Module:

The admin of the system is responsible for the activities like:

1. Uploading the dataset
2. An examination of Twitter user data.
3. Evaluation of several machine learning methods using the Twitter bot dataset.
4. Create a model for detecting malicious bots.
5. Examine how well the algorithms performed on the provided dataset.
6. Using test data, check the model for harmful bot prediction.

A. SYSTEM DESIGN

1. Data Flow Diagram: Admin

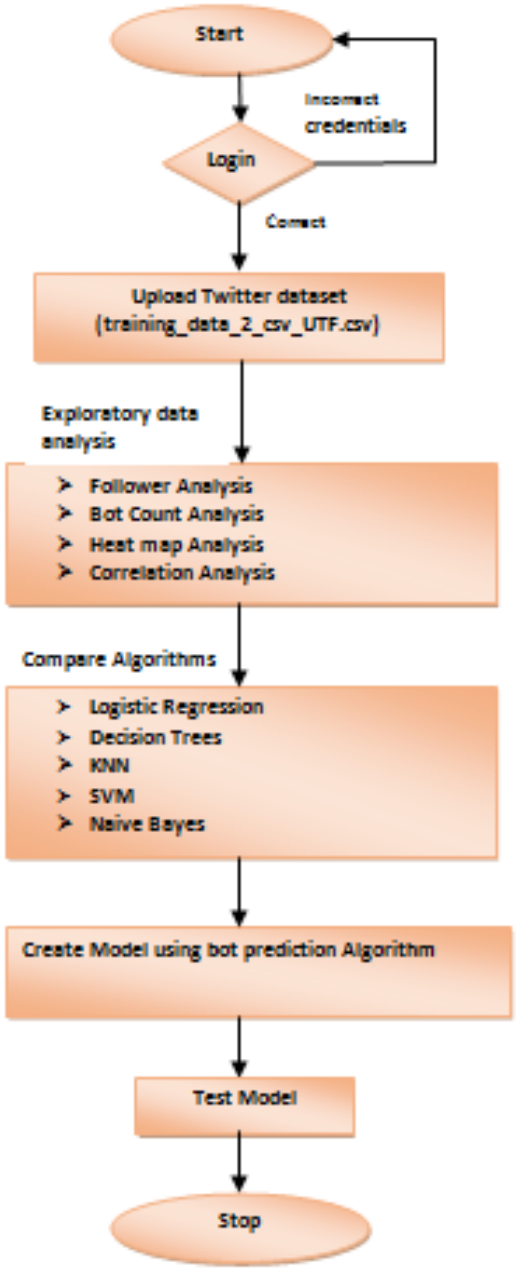

Figure 1: A Data Flow Diagram for Admin

V. IMPLEMENTATION AND RESULT ANALYSIS

A. Project execution process:

1. Upload Dataset

The system administrator can upload datasets that are used to train machine learning models on this page. To upload a file to a server, an administrator must first choose the file by clicking the Choose file button, then click the Upload button. A success message indicating that the file was successfully uploaded would be shown once the upload was finished. We are utilising the datasets test data 4 students and training data 2 csv UTF reviews for this project.

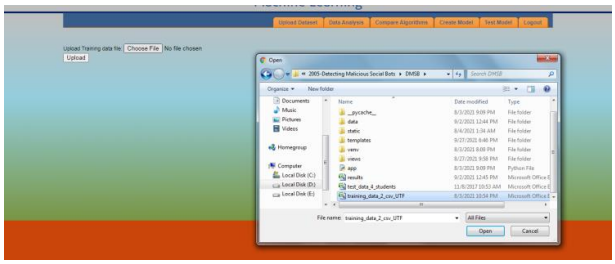

Figure 3: Upload Dataset

2. Data Analysis

Exploratory data analysis is done on the dataset to uncover patterns, find missing data, and establish links between different output characteristics using graphs, statistics, etc.

a) Follower Analysis:

The follower analysis is displayed in the graph below.

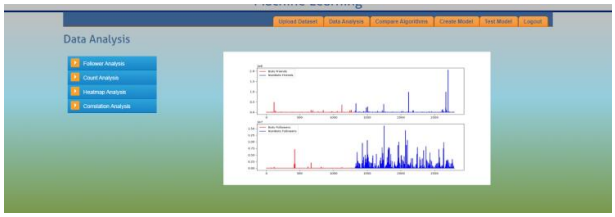

Figure 5: Follower Analysis

b) CountAnalysis:

The below graph shows the Count analysis.

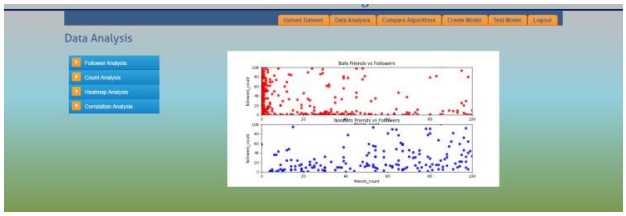

Figure 6: Count Analysis

3. Compare Algorithms

The administrator can use this page to train several algorithms on a dataset and determine each algorithm's test accuracy.

a) Logistic Regression

The test accuracy is 0.86 when the dataset is fed into the logistic regression algorithm, as we see.

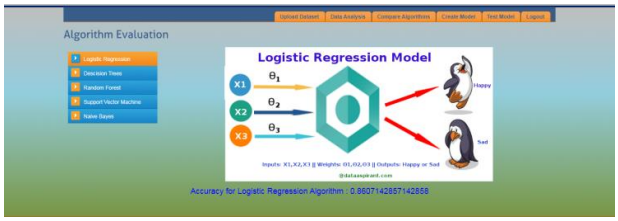

Figure 7: Logistic Regression

b) Decision Trees

The test accuracy is 0.8785714285714286 when the dataset is fed into the decision tree method, as we can see.

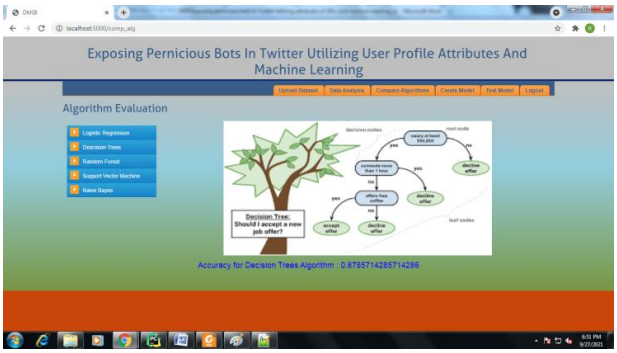

Figure 8: Decision Trees

c) Support Vector Machine

The test accuracy is 0.6178571428571429 when the dataset is fed to the Support Vector Machine method.

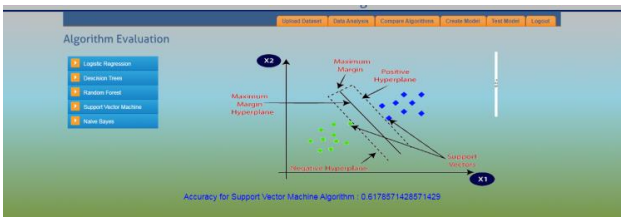

Figure 9: Support Vector Machine Algorithm

4. Create Model

The Create Model button can be used to create the Bot Prediction Model. After pressing the button, a success message is presented and the model is built. BOT Prediction is 96.94% accurate.

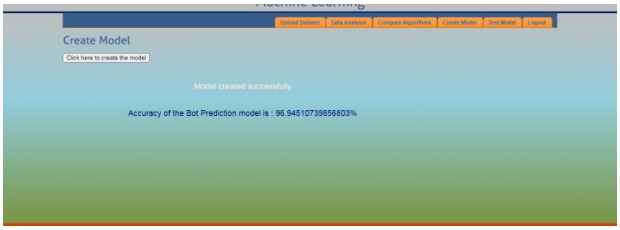

Figure 10: Create Model

5. Test Model:

The model can be tested using the below screen.

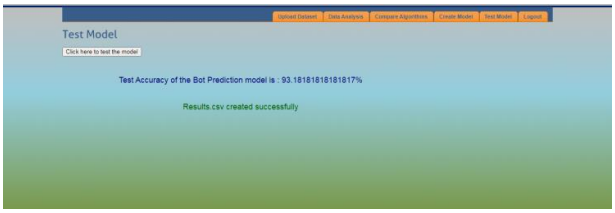

Figure 11: Test model

B. Metrics Evaluation :

Accuracy- One parameter for assessing classification models is accuracy. Informally, accuracy is the percentage of accurate predictions made by our model.

Macro avg - The macro average, also known as the precision, memory, and f1 score, is the arithmetic mean of each individual class. When all classes must be

treated equally, macro average scores are used to assess the classifier's overall performance in comparison to the most popular class labels.

Weighted avg- A calculation that accounts for the varied levels of significance of the numbers in a data set is known as a weighted average.

Metrics for Algorithms in CompAlg.py

Classification report contains the complete metric information of the evaluated algorithm. They are Precision, Recall, F1-Score, Support

Precision – What percent of your predictions were correct?

Precision is the capacity of a classifier to avoid classifying as positive anything that is in fact negative. It is described for each class as the proportion of true positives to the total of true and false positives.
TP – True Positives
FP – False Positives
Precision – Accuracy of positive predictions.
Precision = TP/(TP + FP)

1) Recall – What percent of the positive cases did you catch?

The capacity of a classifier to locate every successful instance is known as recall. It is described as the proportion of true positives to the total of true positives and false negatives for each class.

FN – False Negatives

Recall: Fraction of positives that were correctly identified.

Recall = TP/(TP+FN)

2) F1 score – What percent of positive predictions were correct?

The F1 score is a weighted harmonic mean of recall and precision, with 1.0 representing the best result and 0.0 the lowest. F1 scores typically perform worse than accuracy measures because they incorporate precision and recall into their computation. It is often recommended to compare classifier models using the weighted average of F1, rather than overall accuracy.

F1 Score = 2*(Recall * Precision) / (Recall + Precision)

The amount of real instances of the class in the given dataset is known as support. The requirement for stratified sampling or rebalancing may be indicated by unbalanced support in the training data, which may point to structural flaws in the classifier's reported scores.

1) Metrics using Decision Tree Algorithm:
   DT Accuracy Score: 0. 8785714285714286
   DT Precision Score: 0. 8785714285714286
   DT Recall Score: 0. 8785714285714286
   DT F1 Score: 0. 8785714285714286
   Decision Tree accuracy: 87.85714285714286
   Decision Tree Classification Report:

Precision	recall	f1-score	support
0	0.76	0.73	0.75	1507
1	0.899	0.895	0.893	1313
accuracy			0.88	4514
macro avg	0.81	0.81	0.88	4514
weighted avg	0.81	0.81	0.88	4514

2) Metrics using Random Forest Algorithm:
   RF Accuracy Score: 0.8646743464776252
   RF Precision Score: 0.8646743464776252
   RF Recall Score: 0.8646743464776252
   RF F1 Score: 0.8646743464776252
   Random Forest accuracy: 86.46743464776252
   Random Forest Classification Report:

Precision	recall	f1-score	support
0	0.88	0.73	0.80	1507
1	0.86	0.97	0.91	1313
accuracy			0.86	4514
macro avg	0.86	0.86	0.86	4514
weighted avg	0.86	0.85	0.86	4514

3) Metrics using Naive Bayes Algorithm:
   NB Accuracy Score: 0. 6976190476190476
   NB Precision Score: 0. 6976190476190476
   NB Recall Score: 0. 6976190476190476
   NB F1 Score: 0. 6976190476190476
   Naive Bayes accuracy: 69.76190476190476
   Naive Bayes Classification Report:

precision	recall	f1-score	support
0	0.76	0.71	0.74	1507
1	0.76	0.71	0.73	1313
accuracy			0.69	4514
macro avg	0.75	0.74	0.69	4514
weighted avg	0.75	0.75	0.70	4514

4) Metrics using Logistic Regression Algorithm:
   LR Accuracy Score: 0.8595480726628267

LR Precision Score: 0.8595480726628267

LR Recall Score: 0.8595480726628267

LR F1 Score: 0.8595480726628266

Logistic Regression accuracy: 85.95480726628267

Logistic Regression Classification Report:

	Precision	recall	f1-score	support
0	0.85	0.81	0.83	1507
1	0.84	0.94	0.89	1313
2	0.88	0.84	0.86	1694
accuracy			0.86	4514
macro avg	0.86	0.86	0.86	4514
weighted avg	0.86	0.86	0.86	4514

5) Metrics using Support Vector Machine Algorithm:

SVC Accuracy Score: 0. 6178571428571429

SVC Precision Score: 0. 6178571428571429

SVC Recall Score: 0. 6178571428571429

SVC F1 Score: 0. 6178571428571429

Support Vector Machine accuracy: 61.78571428571429%

Support Vector Machine Classification Report:

	Precision	recall	f1-score	support
0	0.78	0.73	0.75	1507
1	0.75	0.88	0.81	1313
accuracy			0.61	4514
macro avg	0.79	0.80	0. 61	4514
weighted avg	0.80	0.79	0.61	4514

VI. CONCLUSION

Conclusion : In this research, we attempt to put into practice a deep learning model that exposes harmful bots on the Twitter network by using profile-based features. One could determine whether or not the account is used to upload content is a bot based on the aforementioned characteristics. In this research, the profile-based features-based Bot Prediction model was built and trained using the Twitter data set. Additionally, we tried to produce test outputs by inputting test data and testing the accuracy of it. The results of the experiments demonstrate that the suggested method provides the maximum accuracy. This methodology, which employs profile-based characteristics to expose malicious bots and URL-based features to identify spammed content, will eventually be expanded to larger datasets and real-time situations

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Sophisticated Loan Endorsement System Based On Machine Learning Techniques

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Abstract— **Humankind's survival and standard of living have been enhanced through technology. The proposal aims to produce new and original content every day. In the banking sector, the candidate receives proofs/backup prior to the loan being approved, therefore technology supports our lives and helps in making them better. The system's use of the individual's or entity's historical data determines whether a loan would be sanctioned or not. Numerous individuals apply for loans in either banks or financial institutions each day, yet the banking sector or financial institution resources are constrained. Using a classes-function algorithm in this situation would be quite advantageous. Several instances include support vector machine (SVM) classification, logistic regression, and random forest classifiers. The quantity of loans a bank makes or loses depends on how much the client or candidate pays back the loan. The most crucial task for commercial banks is loan recovery. The process of improvement is crucial in the banking industry. Utilizing several categorization techniques, a computational model was developed with historical information about the candidates. The major goal of this study is to use models of machine learning trained on historical information to forecast whether a new application will be approved for a loan.**

Keywords—Machine learning, Data, Loan, Training, Testing, Prediction.

I. INTRODUCTION

The proposed system can determine whether a loan will be approved or not using the prediction of a modernized loan approval system that is based on a machine learning technique. Information is collected from the user for this system, such as his monthly salary, family status, moneylending, tenure, etc. The bank will then determine if the client will receive the loan based on its criteria. Therefore, there exists a classification scheme. In this framework, a training set is used to create the model, and the classifier is able to place the data objects into the correct class[2]. In order to train the data and provide the correct outcome, which is the client's potential and ability to repay the loan, a testing dataset is constructed. For banks and customers alike, the prediction of a modernized credit approval system is quite helpful[1]. This method evaluates each candidate based on their priority. The client can register his application form to the bank, in which case the bank will handle the entire procedure without interference from a third party or stockholder[3]. Finally, based on its priority system, the bank will determine if the applicant is deserving or not. This study paper's sole goal is to ensure that the worthy applicant receives straightforward answers right away

II. RESEARCH BACKGROUND

A. Problem Statement

A significant issue is that many individuals are unable to repay bank debts. Additionally, banks are losing money. Every day, banks receive many loan applications, but not all of them are approved. The majority of banks or financial institutions use their own risk estimation & assessment methods and credit scoring systems to determine whether to sanction the loan. In a matter of minutes, the predicament of why there is a loan difficulty will be answered. The primary purpose of acquiring a loan would be to meet a need[4]. A loan is necessary for a businessman if they want to grow their company or if they need to recover from a loss. People in the middle class want to meet their demands so people would like to apply for credit leading. Therefore, the fundamental goal of this is to satisfy someone's or something's wants. Once more, the issue of what issues are developing in credit provision is raised. The response to this inquiry is that not everyone qualifies for loans because if the borrower is unable to repay the loan, either they themselves or the business or bank that provided it would suffer a loss[5]. Therefore, the person granting the loan must first confirm or establish some criteria as to whether the person receiving it is capable of paying back it or not. Like with banks, we do have a Credit lending bank card option, but not everyone qualifies for one. To determine eligibility for just that, a credit history is available. To be eligible for a loan, a person needs to have a decent credit score. A source of earnings and other requirements should be present to obtain a credit card. Banks offer loans, but the borrower must submit documentation and undergo verification. For example, when a company is unable to offer loans, banks suffer losses, and they are referred to as NBFCs.

B. Aim Of The Project

In this project, I aim to come up with an effective and efficient machine-learning model that can predict whether an individual can repay a loan. This system will help banks or financial institutions to make appropriate decisions and help in the process of approving loans faster. As every individual applicant's information would contain multiple patterns, machine learning models are the best way to predict their eligibility and their capacity to repay loan amounts specific to their capacity and tenure. This would be of immense help as banks or other financial institutions can process loans faster and have a better percentage of the recovery.

C. Scope Of The Project

Background verification should be high so that we can expect a return of the loan at the perfect time. So, we

analyze several factors and these are called our input variables.

This proposed model will characterize the behavior of customers based on their records. These records are taken from the customers to create a data set. With the help of these data sets and training machine learning models, we predict whether the customer's loan will be approved or not. This Machine algorithms predict the possibility of whether a customer would be able to repay the loan or not

A. Technical Approach

The technological strategy to solve the issue is listed below:

1. Dataset identification
2. Analysis of Exploratory Data
3. Dataset preparation
4. Running the dataset through many algorithms to see which one best fits the situation.
5. Developing a final classifier model and training the final classifier
6. Validating the ultimate classifier and recording the outcomes.

III. SYSTEM ANALYSIS

A. Research Gap

In the banking industry, the candidate receives proofs/backup prior to acceptance of the loan amount. Folks utilize gadgets to assist our existence and make us more or less complete. The system's historical data about the candidate determines whether or not the application is granted. Numerous people ask for credit lending every day in the banking industry, yet the bank's resources are constrained. The people who truly deposit in a bank would be impacted if the credit lending's not retrieved, which could result in losses for the institutions. The current conventional processes are unable to determine whether or not the sanctioned credit lending may be properly retrieved.

B. Proposed System

The suggested model focuses on forecasting client repayment reliability for loans by examining their behavior. The client behavior that was gathered serves as the model's input. One can decide whether one should accept or decline the customer request based on the classifier's output. Loan prediction and severity can be predicted using various data analytics technologies. In order to anticipate the type of loan, it is essential to train this data using various algorithms before comparing it to user data. to identify commonalities in a dataset of often authorized loans, and then to create a predictive model focusing on these identified patterns. The test data is now sent to the machine learning model, and the model is built using this data set. Each new applicant's application form information serves as just a test data set.

The question of how we evaluate whether or not to grant the loan emerges. We supply the credit to our consumers based on two goal criteria. We must verify all the requirements, including evidence of income, address, and identification. The applicant is then given the loan, whether they are eligible to return it or not. The middle class has a significant need for loans because parents need them for their children's education as well as for their businesses. Some people have abrupt financial crises, while others attempt to defraud banks of their money. As a result, we must double-check everything just because lenders are not experiencing NPA loans. Higher possibilities of loan repayment are associated with better customers. Background checks should be thorough therefore that we can anticipate receiving the loan back at the ideal moment. We analyze data on a variety of bases, and these are referred to as our target variables.

This suggested approach will evaluate consumer behavior based on their past conduct. These client records are collected to form a data set. We make predictions about whether or not the customer's loan will be approved using these data sets and a machine learning model that has been trained. These computer algorithms forecast the likelihood that a consumer will be able to pay back the lending credit or not.

After testing, the model determines whether the new application is a good candidate for loan approval or not based on the inference it draws from the training sets of data to determine if a client would indeed be capable of repaying his loan or not

Advantages Of Proposed System

- High precision
- Extendable to real-time settings.

IV. ALGORITHMIC PROCESS

A. Creating Model

The algorithm used: Decision Tree algorithm

Below is the technical approach used for the Loan recommendation system using the Loan review dataset

1. Data cleaning and visualization
2. Feature Extraction
3. Data Preparation
4. Splitting the data set into test data and training data
5. Data modeling using Sequential and Decision Tree algorithm classifier
6. Data Evaluation and prediction
7. Building the prediction of a modernized loan approval system

1)Feature extraction:

Below are the features present in the dataset:

Feature Name	Type
Loan_ID	String
Gender	String
Married	String
Dependents	Int
Education	String
Self_Employed	String

ApplicantIncome	Int
CoapplicantIncome	Int
LoanAmount	Int
Loan_Amount_Term	Int
Credit_History	Int
Property_Area	String

Feature Extraction Details:

A. Imputing Missing Values

When no information is given for one or more elements, a whole unit, or both, this is known as missing data. Missing data is a major issue in real-world situations. In pandas, missing data can also refer to NA (Not Available) values. Many datasets in DataFrame occasionally arrive with missing data, either because the data was never collected or because it was present but was not captured. We can use the fillna(), replace(), and interpolate() functions to fill in any null values in a dataset by replacing NaN values with one of their own. Each of these functions aids in filling in null values in a data frame's datasets. Interpolate() function is basically used to fill NA values in the data frame but it uses various interpolation techniques to fill the missing values rather than hard-coding the value. Although it uses a variety of interpolation algorithms rather than hard-coding the value, the Interpolate() function is mostly used to fill NA values in data frames.

```
for the column in ['Gender', 'Dependents', 'Married', 'Education'
'Self_Employed', 'Loan_Amount_Term',
                'Credit_History']:
    dataset[column].fillna(dataset[column].mode()[0], inplace=True

dataset['LoanAmount']
dataset['LoanAmount'].fillna(np.nanmedian(dataset['LoanAmount'])
```

B. Label Encoding

In machine learning, we usually deal with datasets that contain multiple labels in one or more than one column. These labels can be in the form of words or numbers. To make the data understandable or in human-readable form, the training data is often labeled in words.

Label Encoding refers to converting the labels into a numeric form so as to convert them into a machine-readable form. Machine learning algorithms can then decide in a better way how those labels must be operated. It is an important pre-processing step for the structured dataset in supervised learning.

```
for column in ['Gender', 'Dependents', 'Married', 'Education',
'Self_Employed', 'Credit_History']:S
    encoder = LabelEncoder()
    dataset[column] = encoder.fit_transform(dataset[column])


encoder = LabelEncoder()
dataset['Loan_Status'] =
encoder.fit_transform(dataset['Loan_Status'])
```

C. One Hot Encoding

Most Machine Learning algorithms cannot work with categorical data and needs to be converted into numerical data. Sometimes in datasets, we encounter columns that contain categorical features (string values) for example parameter Gender will have categorical parameters like Male, Female. These labels have no specific order of preference and also since the data is string labels, machine learning models misinterpreted that there is some sort of hierarchy in them.

One approach to solve this problem can be label encoding where we will assign a numerical value to these labels for example Male and Female mapped to 0 and 1. But this can add bias in our model as it will start giving higher preference to the Female parameter as 1>0 and ideally both labels are equally important in the dataset. To deal with this issue we will use the One Hot Encoding technique.

One Hot Encoding:

In this technique, the categorical parameters will prepare separate columns for both Male and Female labels. So, wherever there is a Male, the value will be 1 in the Male column and 0 in the Female column, and vice-versa.

```
dummy_data = pd.get_dummies(dataset['Property_Area'])
dataset = pd.concat([dataset, dummy_data], axis=1)
dataset.drop(['Property_Area'], axis=1, inplace=True)
dataset.drop(['Loan_ID'], axis=1, inplace=True)

X = dataset.drop(['Loan_Status'], axis=1)
y = dataset['Loan_Status']
```

D. Defining features and Labels

```
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.2, random_state=300)
```

E. Generating Synthetic Samples

Imbalanced Data Distribution is a phrase used frequently in machine learning and data science and refers to situations where observations in one class are significantly greater or lower than those in the other classes. Machine learning algorithms do not take the class distribution into account since they prefer to improve accuracy by decreasing the error.

SMOTE (Synthetic Minority Oversampling Technique) – Oversampling

One of the most popular oversampling techniques to address the imbalance issue is SMOTE (synthetic minority oversampling technique).

By increasing minority class samples at random and duplicating them, it seeks to balance the distribution of classes.

SMOTE combines already existing minority instances to create new minority instances. For the minority class, it creates virtual training records using linear interpolation. For each example in the minority class, one or more of the k-nearest neighbours are randomly chosen to serve as these synthetic training records. Following the oversampling procedure, the data is rebuilt and can be subjected to several categorization models.

```
sm = SMOTE(random_state=300)
X_train, y_train = sm.fit_resample(X_train, y_t
```

F. Scaling the data

Data Scaling is a data preprocessing step for numerical features. Many machine learning algorithms like Gradient descent methods, KNN algorithm, linear and logistic regression, etc. require data scaling to produce good results.

MinMax Scaler shrinks the data within the given range, usually from 0 to 1. It transforms data by scaling features to a given range. It scales the values to a specific value range without changing the shape of the original distribution.

```
scaler = MinMaxScaler()
X_train = scaler.fit_transform(X_tra
X_test = scaler.transform(X_test)
```

V. PROJECT IMPLIMENTATION

A. *Proposed Modular Implementation*

Below is the proposed modular implementation of the project. It consists of modules:

1. Admin
2. User

1. Admin Module:

The admin of the system is responsible for the activities like:

a) Uploading the dataset
b) The dataset's data analysis
c) Divvying up the dataset into training and test halves
d) Developing the model with several algorithms
e) Examine how well the algorithms performed on the provided dataset.
f) Use the Decision Tree approach to create the model.

2. User Module:

The system's user may take advantage of the following available machine learning services: logging in and entering fresh applicant loan information to forecast future trends

.

B. *SYSTEM DESIGN*

1. Data Flow Diagram: Admin

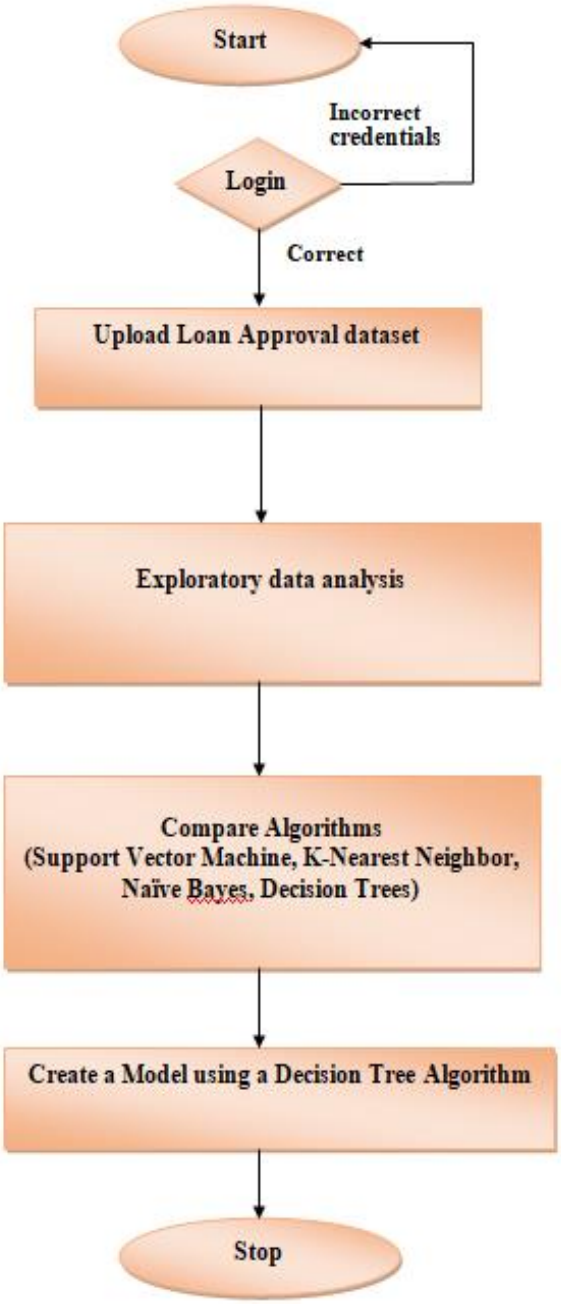

Figure 1: A Data Flow Diagram for Admin

2. Data Flow Diagram: User

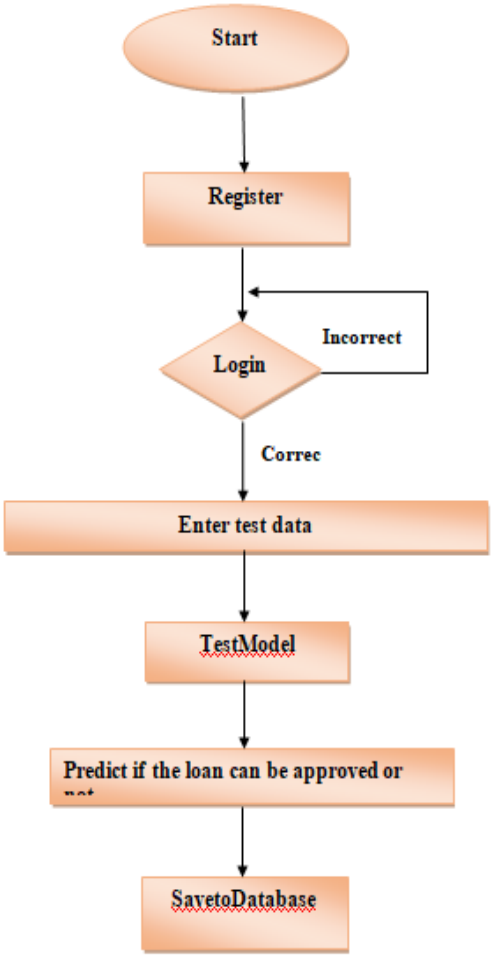

Figure 2: A Data Flow Diagram for Admin

VI. IMPLEMENTATION AND RESULT ANALYSIS

A. Project execution process:

1. Upload Dataset

On this page, the administrator of the system can upload datasets that are used for training the machine learning models. The admin has to select the file by clicking on the Choose file button and clicking on the upload button to upload the file to the server. Once the upload is complete, a success message would be displayed that the file is successfully uploaded. For this project, we are using Loan_Train.csv as a dataset.

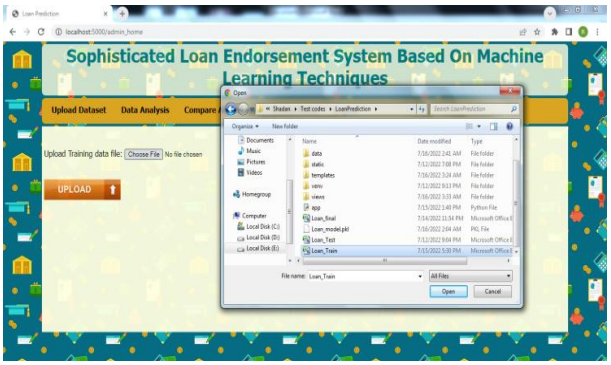

Figure 3: Upload Dataset

Figure 4: File uploaded

2. Data Analysis

Exploratory Data Analysis is performed on the dataset in order to clean the dataset for any missing data, identify patterns, and identify the relationships of various parameters of the outputs with the help of graphs, statistics, etc. so that Data Analysis can be performed.

a) Education Analysis:

The below graph shows the Education Analysis of an individual from the Training dataset Loan_Train.csv File.

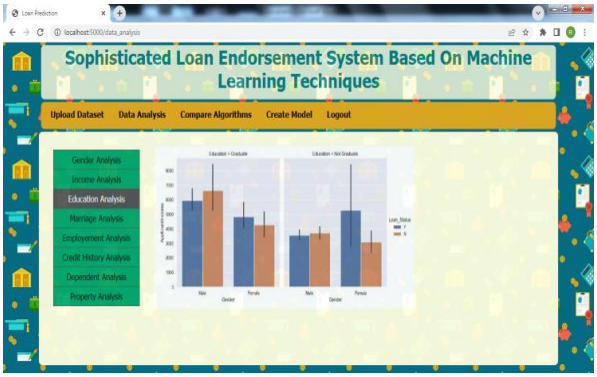

Figure 5: Education Analysis

3. Compare Algorithms

On this page, the admin can feed the dataset to various Algorithms to train them and get the test accuracy for each algorithm.

a) K-Nearest Neighbour:

When the dataset is fed to K-Nearest Neighbour algorithm we observe that the test accuracy is 85.36%

Figure 7: KNN

b) Decision Trees

The test accuracy is 86.99% when the dataset is fed to the decision tree method.

Figure 8: Comment Analysis

a) Support Vector Machine

The test accuracy is 86.99% when the dataset is fed into the support vector machine method, as we can see..

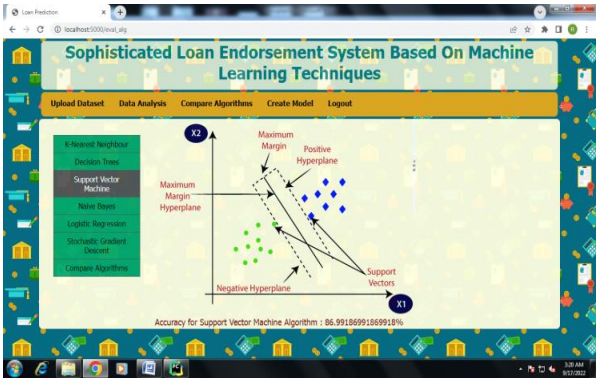

Figure 9: Support Vector Machine Algorithm

4. Create Model

The Generate Model button can be used to create the Model. After pressing the button, a success message is presented and the model is built. Our model's precision is 86.99%.

Figure 10: Create Model

5. Test Model:

This is in User Home Page for the user module. The user need to login into the system with his credentials in order to facilitate prediction over a of new applicant Loan data over dataset.

Figure 11: Test model

B. Metrics Evaluation :

Accuracy- One parameter for assessing classification models is accuracy. Informally, accuracy is the percentage of accurate predictions made by our model.

Macro avg - The macro average, also known as the precision, memory, and f1 score, is the arithmetic mean of each individual class. When all classes must be treated equally, macro average scores are used to assess the classifier's overall performance in comparison to the most popular class labels.

Weighted avg- A calculation that accounts for the varied levels of significance of the numbers in a data set is known as a weighted average.

Metrics for Algorithms in CompAlg.py

Classification report contains the complete metric information of the evaluated algorithm. They are Precision, Recall, F1-Score, Support

Precision – What percent of your predictions were correct?

Precision is the capacity of a classifier to avoid classifying as positive anything that is in fact negative. It is described for each class as the proportion of true positives to the total of true and false positives.

TP – True Positives
FP – False Positives

Precision – Accuracy of positive predictions.
Precision = TP/(TP + FP)

1) **Recall – What percent of the positive cases did you catch?**

The capacity of a classifier to locate every successful instance is known as recall. It is described as the proportion of true positives to the total of true positives and false negatives for each class.

FN – False Negatives

Recall: Fraction of positives that were correctly identified.

Recall = TP/(TP+FN)

2) **F1 score – What percent of positive predictions were correct?**

The F1 score is a weighted harmonic mean of recall and precision, with 1.0 representing the best result and 0.0 the lowest. F1 scores typically perform worse than accuracy measures because they incorporate precision and recall into their computation. It is often recommended to compare classifier models using the weighted average of F1, rather than overall accuracy.

F1 Score = 2*(Recall * Precision) / (Recall + Precision)

The amount of real instances of the class in the given dataset is known as support. The requirement for stratified sampling or rebalancing may be indicated by unbalanced support in the training data, which may point to structural flaws in the classifier's reported scores.

1) Metrics using Decision Tree Algorithm:
Decision Trees accuracy: 0.8699186991869918

Decision Trees Classification Report:

	precision	recall	f1-score	support
0	0.90	0.56	0.69	32
1	0.86	0.98	0.92	91
accuracy			0.87	123
macro avg	0.88	0.77	0.80	123
weighted avg	0.87	0.87	0.86	123

2) Metrics using K-Nearest Neighbour Algorithm:
KNN accuracy: 0.8536585365853658

KNN Classification Report:

	precision	recall	f1-score	support
0	0.89	0.50	0.64	32
1	0.85	0.98	0.91	91
accuracy			0.85	123
macro avg	0.87	0.74	0.77	123
weighted avg	0.86	0.85	0.84	123

3) Metrics using Logistic Regression Algorithm:
Logistic Regression accuracy: 0.8536585365853658

Logistic Regression Classification Report:

	precision	recall	f1-score	support
0	0.85	0.53	0.65	32
1	0.85	0.97	0.91	91
accuracy			0.85	123
macro avg	0.85	0.75	0.78	123
weighted avg	0.85	0.85	0.84	123

4) Metrics using Support Vector Machine Algorithm:
SVM accuracy: 0.8699186991869918

SVM Classification Report:

	precision	recall	f1-score	support
0	0.94	0.53	0.68	32
1	0.86	0.99	0.92	91
accuracy			0.87	123
macro avg	0.90	0.76	0.80	123
weighted avg	0.88	0.87	0.86	123

VII. CONCLUSION AND FUTURE SCOPE

B. Conclusion : This project can determine whether the customer is likely to return the loan, as well as the accuracy is decent. Age, income, loan length, and loan amount are the most crucial variables when determining (whether the applicant would have been). Zip code and credit history are the two most crucial variables in determining the loan applicant's category. The standard of living for humans has improved thanks to technology. We intend to provide something fresh and unique every day. In the banking industry, the candidate receives proofs/backup prior to acceptance of the loan amount. Humans need gadgets to support our life and to make us somewhat complete.The system's historical data about the candidate determines whether or not the application is granted. Numerous people ask for loans every day in the banking industry, yet the bank's resources are constrained. A classes-function algorithm would be very helpful in this situation if the proper prediction could be made. Examples include support vector machine, logistic regression, and random forest classifiers. The quantity of loans a bank makes or loses depends upon whether the customer or the client pays back the loan. The most crucial task for the financial system is loan recovery. The process of improvement is crucial in the banking industry.Utilizing several categorization techniques, a computational model was constructed using the available information of the candidates. The major goal of this study is to use machine learning algorithms trained on historical information to determine whether a new application will be approved for a loan or not.

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Detecting Self Destructive Intentions From Twitter Posts Using NLP Techniques

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Abstract— **Everyone is busy with their work, schedules, and hobbies in the quickly changing world. Relationships are no longer a priority. As a result, a lot of people are expressing their emotions on social media and yearning for emotional support. Self-destruction could be avoided if the tweets or posts could be examined and prompt assistance provided. Self-harm is a troubling general medical problem that kills more people every year all around the world. Through this investigation, inactive subjects were naturally removed from Twitter and online social networks that promoted self-destructive thoughts. Customers have welcomed these platforms as long-distance interpersonal connection sites have become more common, using them to discuss extremely intimate topics like their concerns about self-destruction. The tweets are important for research since calculations that process them must do so under extremely strict capacity and time constraints because information appears in them with a high frequency. In this project, we leverage Twitter's API to gather a variety of tweets for use as a dataset and train our machine-learning model to recognize tweets that have self-destructive intent. Once the dataset has been downloaded, it is analyzed using n-gram analysis before being fed into a variety of machine learning algorithms, including Logistic Regression, Support Vector Machine, Naive Bayes, Decision Trees, and Random Forest classifier, in order to assess the accuracy of each algorithm. To construct the ideal model for this issue, the top-performing algorithm is chosen and further optimized. After pre-processing with NLP methods, we see that the Random Forest algorithm performs well, with an accuracy of 93.3%. We also host a web program that analyses tweets to determine whether they contain suicidal intent.**

Keywords—Suicide, social media (SM), social networks (SNs), machine learning techniques, reviews, twitter posts.

I. INTRODUCTION

Suicide, which is the act of intentionally bringing about one's own death, is the tenth leading cause of death in the United States and is estimated to cost $44.6 billion annually[2]. This downplays how serious the problem is with each attempted suicide. Self-destructive ideation encompasses a wide range of thoughts, from passing thoughts to extensive planning or unsuccessful actions. Taking care of this emotional wellness issue is necessary for overall well-being due to its severity and effects[1]. Many people frequently refer to common manifestations when discussing their ideas: feeling helpless, feeling lonely, being too exhausted, being insecure, having the impression that one's brain is working overtime, or placing an excessive amount of focus on ineffective goals Understanding the common themes in self-destructive ideation will help us better comprehend the reasons behind such thoughts, which can eventually lead to treatment and remedial action[3]. Several danger factors have been identified in clinical studies aimed at understanding suicide. Mental illnesses including melancholy, schizophrenia, alcoholism and drug abuse all anticipate a contributing factor[6]. Additionally, the emotional stress[5] brought on by suffering, interpersonal ties, and other factors is also important. In any event, a therapeutic viewpoint is frequently captured in these representations of self-destructive ideation. People considering suicide have increasingly expressed their suicidal thoughts through online chats, tweets, and other social media due to the intricacy and recognition of online informal organizations[4]. The result is a fantastic synergistic portrayal of suicide-related thoughts and motivations.

The approaches to extract casual inert themes from this information are currently being demonstrated in this article. This model is an AI method for extracting information from a variety of data[9]. Using this research, one can find common themes like discouragement, drug use, or brutality that are evident in internet posts. Several words that are closely connected to "sadness," such as "torment," "emotions," "dread," "stress," and "languishing," may also be used to describe it[7]. The model used in this study is based on both online and offline tweets that were connected to suicidal ideation and were gathered using the tweeter API

II. RESEARCH BACKGROUND

A. Problem Statement

Suicide, which is the act of intentionally bringing about one's own death, is the tenth leading cause of death in the United States and is estimated to cost $44.6 billion annually[8].

This downplays how serious the problem is with each attempted suicide. Self-destructive ideation encompasses a wide range of thoughts, from passing thoughts to extensive planning or unsuccessful actions. Taking care of this emotional wellness issue is necessary for overall well-being due to its severity and effects. Many people frequently mention common manifestations when discussing their ideas, such as feeling helpless or alone, being too exhausted, having low self-esteem, having the impression that their brain is working overtime, or placing an excessive amount of focus on pointless goals[10]. Understanding the common themes in self-destructive ideation might help us better comprehend the motivations underlying such thoughts, leading to eventual treatment and retaliation.

B. Aim Of The Project

The primary goal of the research is to use Twitter data to predict suicide intentions from tweets. We made advantage of the open-source Twitter Suicide dataset from Kaggle. This corpus, which was created using sophisticated machine learning algorithms, is made up of tweets containing both suicidal and non-suicidal intentions.

C. Scope Of The Project

The project's scope is restricted to calculating the proposed model's accuracy and determining whether or not the tweet's goal is suicidal. The system administrator uses training data to develop the suggested model. To determine whether or not a tweet's aim is suicidal, test data can be provided to the algorithm. The project's scope does not include user account maintenance.

a. Technical Approach

The technological strategy to solve the issue is listed below:

1. Dataset identification
2. Analysis of Exploratory Data
3. Dataset preparation and NLP approaches
4. Running the dataset through many algorithms to see which one best fits the situation.
5. Developing a final classifier model and training the final classifier
6. Validating the ultimate classifier and recording the outcomes.

III. System Analysis

A. Research Gap

Existing methods for identifying self-destructive tweets on Twitter posts used machine learning techniques like SVM and decision trees, however they are insufficient. Many of the current systems do not make use of natural language processing.

B. Proposed System

In the suggested approach, we classify self-destructive ideation from tweets using a cutting-edge algorithm. the following process is described:

1. Preparing and processing data:
    a. the project's use of the Twitter Suicide Dataset after downloading it
    b. removal of tweets written in tongues other than English.
    c. Making all of the tweets in the collection lower case.
    d. Eliminate all strings that represent connections or hyperlinks introduced in the tweets; this includes URLs.
    e. Changing any username that is introduced in the tweets to @username, removing the username, and taking into account that these are not taken into account for estimates.
    f. Transforming the hash labels into common terms because hash marks might sometimes provide some helpful information, it's vital to replace them with the identical word without the hash. For instance, Happy instead of #Happy.
    g. Eliminating any unnecessary characters, extra spaces, etc
2. N-gram analysis
    a. Positive and negative bigrams and trigrams are utilised to assess the frequently used terms in both suicidal and non-suicidal circumstances.Comparison of algorithms:
    b. A variety of machine learning techniques, including SVM, Logistic Regression, Naive Bayes, decision trees, and random forest algorithm, among others, are applied to the dataset, and their accuracy results are compared.
3. Creation of model:

    The pre-processed data is taken and below NLP techniques are applied:
    a. Bag of words
    b. Added TFIDF feature
    c. Removed stop words
    d. Added n-grams

Advantages Of Proposed System

- High precision
- Extendable to real-time settings.

IV. Algorithmic Process

A. Creating Model

This project assists in identifying users' self-destructive intentions from their tweets and their emotional health through their posts. Early intervention can prevent suicides and save lives. Therefore, in this study, we eliminated inactive, sporadic participants from tweeters propagating self-destructive ideas. We evaluated the dormant subjects in an abstract manner first, and then we compared them to chance components.

The urgency of the posts is also predicted using the proposed models.

1. Dataset division
2. Text cleaning and preparation
3. Utilizing Tfidf to vectorize
4. Classification with Random Forest
5. Hyper parameter tweaking
6. Evaluation of the Test and Validation Set
7. The most important characteristics for prediction.

92.5% accuracy is what the results show for the Random Forest Classifier with TFIDF and N-gram Feature.

1)Feature extraction:

Below are the features present in the dataset:

Feature Name	Type
ID	String
Content	String
Sentiment	String

2)Loading the datase:

Datasets for training the machine learning models can be uploaded by the system administrator. To upload a file to a server, an administrator must first choose the file by clicking the Choose file button, then click the Upload button.

A success message indicating that the file was successfully uploaded would be shown once the upload was finished. We are utilising the dataset twitter-suicide-data.csv for this study..

```
data = pd.read_csv('Twitter_Suicide_Data_new.csv')

# we will use 80% of data as training, 20% as validation data
training_samples = int(303 * .8)
validation_samples = int(303 - training_samples)
# sanity1 check
print(len(texts) == (training_samples + validation_samples))
print("The number of training {0}, validation {1} ".format(training_samples
validation_samples))
```

3)Bag of words

Transform texts into a bag-of-words matrix (number of rows = total set, number of columns = number of unique words). Check out Bag-of-words model in computer vision for more information. The bag-of-words model is a condensing representation used in information retrieval and natural language processing (IR). This paradigm ignores syntax and even word order while maintaining multiplicity and represents a text (such as a sentence or document) as the bag (multiset) of its words. Computer vision has also made use of the bag-of-words approach. The bag-of-words model is frequently employed in document classification techniques in which the (frequency of) occurrence of each word is used as a feature for instructing a classifier.

```
# transform document into a matrix(the number
indicates the number of words showing up in the
document)
bag_of_words = vect.transform(toy_samples)
print("Transformed sparse matrix is: ")
print(bag_of_words.toarray())
```

4)GridSearchCV

```
grid = GridSearchCV(logreg, param_grid, cv=5)
logreg_train = grid.fit(X_train, y_train)
#remove stopwords
from sklearn.feature_extraction.text import ENGLISH_STOP_WORDS
print("Number of stop words is :", len(ENGLISH_STOP_WORDS), "\n")
print("Examples: ", list(ENGLISH_STOP_WORDS)[::10])
# logreg = LogisticRegression(C=0.1).fit(X_train, y_train)
pred_logreg = logreg_train.predict(texts_test)
print("accuracy is: ", grid.score(texts_test, y_test))
confusion = confusion_matrix(y_test, pred_logreg)
print("confusion matrix \n", confusion)
```

5)TFIDF vectorizer

Unlike a bag of words, tfidf assigns higher weights to terms that are used less frequently in a manuscript. In other words, it recognises such terms as being crucial when they appear in a particular paper (since these are the s features of the specific documents)

Here is a brief introduction to the TF-IDF vectorizer. The majority of machine learning algorithms rely on mathematical concepts from areas like statistics, algebra, calculus, and other areas. They anticipate the information to be numerical, perhaps in the form of a two-dimensional array with rows serving as instances and columns as features. Natural language presents a challenge because the data is in the form of raw text, which necessitates its transformation into a vector. Text vectorization is the term used to describe the process of turning text into a vector. It's a key step in natural language processing because no machine learning method, not even computers, can comprehend a text. Text can be converted into vectors with the aid of the text vectorization technique TF-IDF vectorizer, which is a well-liked method for conventional machine learning methods.

Text is converted into a vector form using the text vectorizer term frequency-inverse document frequency. Term Frequency (TF) and Document Frequency are two ideas that are combined (DF). The term frequency is the quantity of times a particular phrase appears in a document. The frequency of a term in a document reveals its importance.

Each text from the data is represented by term frequency as a matrix, where the rows correspond to the number of documents and the columns to the number of unique terms used in each document.

The quantity of documents that use a particular term is known as the document frequency. The frequency of documents reveals the term's usage frequency. The weight of a term is determined by its inverse document frequency (IDF), which attempts to lessen the weight of a term if its occurrences are dispersed over all the documents.

```
# Check which words are considered to be low tfidf (widely used words across many tweet
and high tfidf (used only in a few tweets)
vectorizer = grid.best_estimator_.named_steps["tfidfvectorizer"]
X_train = vectorizer.transform(texts_train)
max_value = X_train.max(axis=0).toarray().ravel()
sorted_by_tfidf = max_value.argsort()

feature_names = np.array(vectorizer.get_feature_names())

print("features with lowest tfidf")
print(feature_names[sorted_by_tfidf[:20]], "\n")

print("featues with hightest tfidf")
print(feature_names[sorted_by_tfidf[-20:]])
```

Text must be represented as a numerical feature in order to be processed as natural language. Text vectorization is the process of converting text into a numerical feature. One of the most widely used text vectorizers is TF-IDF; the computation is relatively straightforward and simple to comprehend. Both the usual word low weight and the uncommon term large weight are given.

6)Ngrams

Single words are frequently inaccurate predictors. Like and dislike, for instance, are the polar opposites. Only word counts matter in the Bag-of-words model, which represents documents with less order.

For instance, in the earlier illustration "John enjoys watching movies. Mary enjoys watching movies as well, but the depiction in a bag of words hides the fact that the verb "likes "always appears in this text after a person's name. The n-gram model can instead store this geographical information.

```
feature_names =
np.array(grid.best_estimator_.named_steps['tfidfvectorizer'].get_feature_names
coef = grid.best_estimator_.named_steps['logisticregression'].coef_
mglearn.tools.visualize_coefficients(coef,feature_names, n_top_features=40)
plt.title("tfidf-cofficient")
```

7)Hyper parameter tuning with gridsearchCV

In virtually every machine learning project, we train various models on the dataset and choose the one that performs the best. We cannot be certain that this specific model is the best one for the issue at hand, so there is potential for improvement. Therefore, our goal is to make the model better in whatever manner we can. These models' hyperparameters play a crucial role in how well they function; once the right values are chosen for these hyperparameters, a model's performance can advance considerably. In this post, we'll learn how to use GridSearchCV to identify a model's hyperparameters' ideal values.

```
logreg = LogisticRegression()
  pipe = make_pipeline(TfidfVectorizer(min_df=3, norm=None, stop_words='english'),
logreg)
  param_grid = {'logisticregression__C': [0.001, 0.01, 0.1, 1, 10]}
  grid = GridSearchCV(pipe, param_grid, cv=5)
  logreg_train = grid.fit(texts_train, y_train)
```

8)Pseudo Code Of Proposed System Model

1) Load the dataset first.
2) Divide the data into training and validation portions, respectively.
3) Use the bag of words technique to convert texts into bag of words matrices (number of rows = total set, number of columns = number of unique terms).
4) Use the TFIDF method. Unlike a bag of words, tfidf assigns higher weights to terms that are used less frequently in a manuscript. In other words, it recognises such terms as being crucial when they appear in a particular paper (since these are the s features of the specific documents)
5) Use Pipeline to generate the final model by feeding the Logistic Regression into GridSearchCV for hyperparameter tuning.

V. PROJECT IMPLIMENTATION

A. Proposed Modular Implementation

Below is the proposed modular implementation of the project. It consists of modules:

1. Admin
2. User

1. Admin Module:

The admin of the system is responsible for the activities like:

a. Submitting the data
b. N-gram analysis of a dataset of suicidal tweets
c. Evaluation of several machine learning techniques using the Tweets Dataset.
d. Examine how well the algorithms performed on the provided dataset.
e. Create a model to predict suicidal intent.
f. Using test data, test the model's ability to identify tweeting intentions.

2. User Module:

By inputting the tweet, the user can log in and test the model. The model receives the tweet as input and must determine whether the message's goal is suicidal or normal.

B. SYSTEM DESIGN

1. Data Flow Diagram: Admin

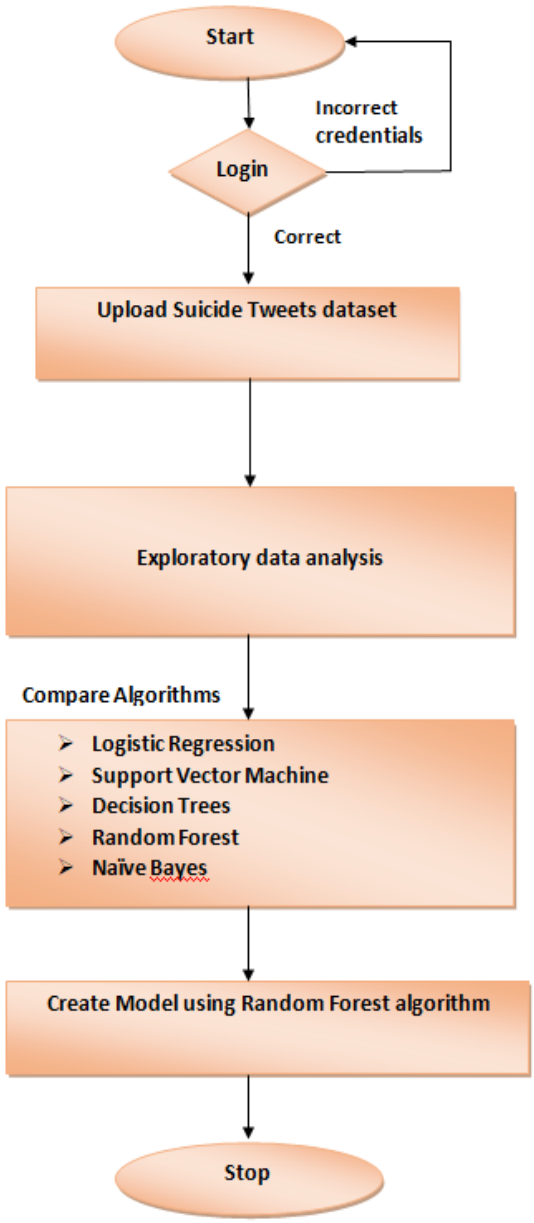

Figure 1: A Data Flow Diagram for Admin

2. Data Flow Diagram: User

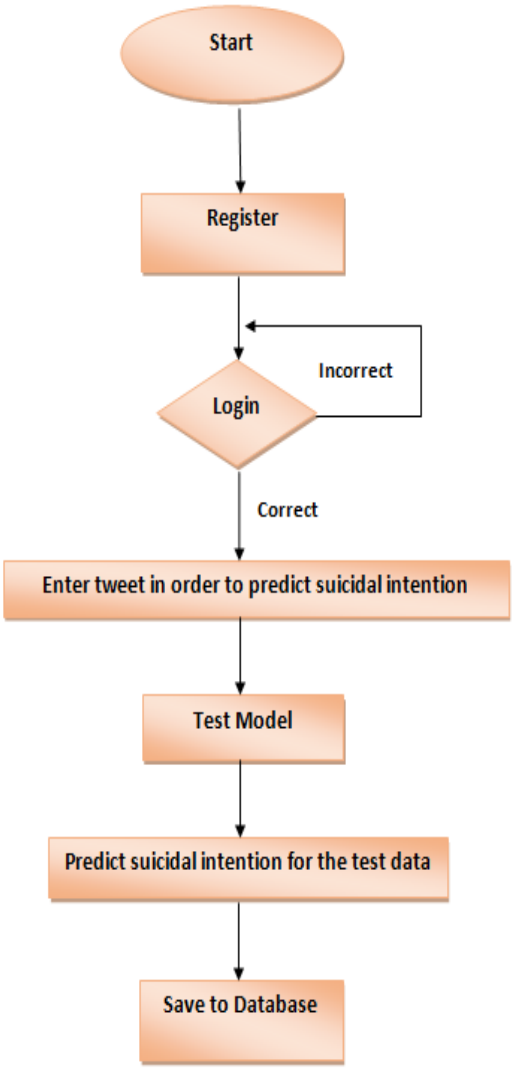

Figure 2: A Data Flow Diagram for Admin

VI. IMPLEMENTATION AND RESULT ANALYSIS

A. Project execution process:

1. Upload Dataset

The system administrator can upload datasets that are used to train machine learning models on this page. To upload a file to a server, an administrator must first choose the file by clicking the Choose file button, then click the Upload button. A success message indicating that the file was successfully uploaded would be shown once the upload was finished. We are utilising the dataset twitter-suicide-data.csv for this study.

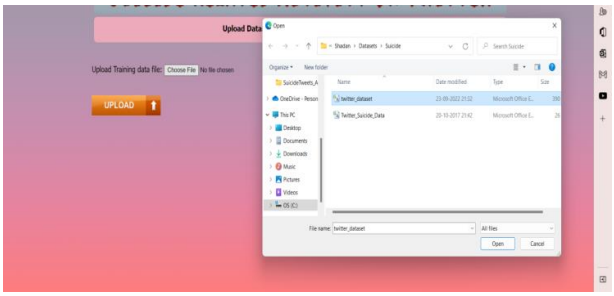

Figure 3: Upload Dataset

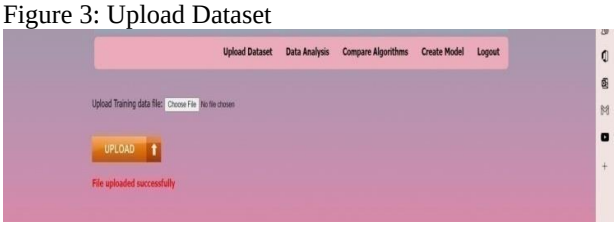

Figure 4: File uploaded

2. Data Analysis

Exploratory data analysis is used to examine the dataset for any missing data, spot trends, and establish connections between different output characteristics using graphs, statistics, and other visual aids.

a) Cause Analysis:

The below graph shows the distribution of causes of suicide for each gender.

Figure 5: Cause Analysis

3. Compare Algorithms

The administrator can use this page to train several algorithms on a dataset and determine each algorithm's test accuracy.

a) Logistic Regression

We see that the test accuracy is 79% when the dataset is fed to the logistic regression algorithm.

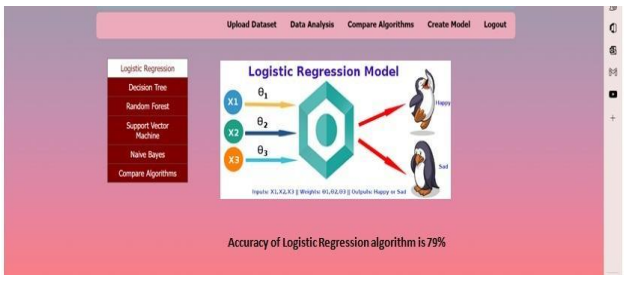

Figure 7: Logistic Regression

b) Decision Trees

The test accuracy is 70.5% when the dataset is fed to the decision tree method.

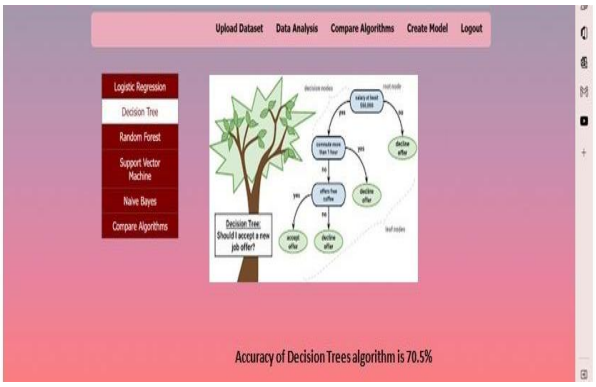

Figure 8: Comment Analysis

c) Support Vector Machine

The test accuracy is 87.5% when the dataset is fed into the support vector machine method, as we can see..

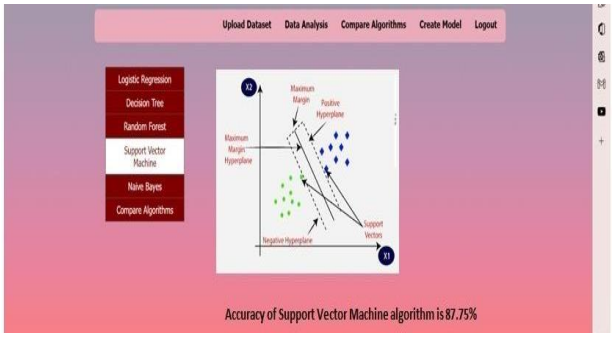

Figure 9: Support Vector Machine Algorithm

4. Create Model

The Generate Model button can be used to create the Model. After pressing the button, a success message is presented and the model is built. Our model's precision is 89.75%.

Figure 10: Create Model

5. Test Model:

The model can be tested using the below screen.

Figure 11: Test model

B. Metrics Evaluation :

Accuracy- One parameter for assessing classification models is accuracy. Informally, accuracy is the percentage of accurate predictions made by our model.

Macro avg - The macro average, also known as the precision, memory, and f1 score, is the arithmetic mean of each individual class. When all classes must be treated equally, macro average scores are used to assess the classifier's overall performance in comparison to the most popular class labels.

Weighted avg- A calculation that accounts for the varied levels of significance of the numbers in a data set is known as a weighted average.

Metrics for Algorithms in CompAlg.py

Classification report contains the complete metric information of the evaluated algorithm. They are Precision, Recall, F1-Score, Support

Precision – What percent of your predictions were correct?

Precision is the capacity of a classifier to avoid classifying as positive anything that is in fact negative. It is described for each class as the proportion of true positives to the total of true and false positives.
TP – True Positives
FP – False Positives

Precision – Accuracy of positive predictions.
Precision = TP/(TP + FP)

1) **Recall – What percent of the positive cases did you catch?**

The capacity of a classifier to locate every successful instance is known as recall. It is described as the proportion of true positives to the total of true positives and false negatives for each class.

FN – False Negatives

Recall: Fraction of positives that were correctly identified.

Recall = TP/(TP+FN)

2) **F1 score – What percent of positive predictions were correct?**

The F1 score is a weighted harmonic mean of recall and precision, with 1.0 representing the best result and 0.0 the lowest. F1 scores typically perform worse than accuracy measures because they incorporate precision and recall into their computation. It is often recommended to compare classifier models using the weighted average of F1, rather than overall accuracy.

F1 Score = 2*(Recall * Precision) / (Recall + Precision)

The amount of real instances of the class in the given dataset is known as support. The requirement for stratified sampling or rebalancing may be indicated by unbalanced support in the training data, which may point to structural flaws in the classifier's reported scores.

1) Metrics using Decision Tree Algorithm:

Decision Trees accuracy is: 0.8688524590163934

Decision Trees Classification Report:

	precision	recall	f1-score	support
0	0.81	1.00	0.89	34
1	1.00	0.70	0.83	27
accuracy				0.87 61
macro avg	0.90	0.85	0.86	61
weighted avg	0.89	0.87	0.86	61

2) Metrics using K-Nearest Neighbour Algorithm:

KNN accuracy is: 0.7049180327868853

K-Nearest Neighbour Classification Report:

	precision	recall	f1-score	support
0	0.65	1.00	0.79	34
1	1.00	0.33	0.50	27
accuracy			0.70	61
macro avg	0.83	0.67	0.65	61
weighted avg	0.81	0.70	0.66	61

3) Metrics using Logistic Regression Algorithm:

LR Accuracy Score: 0. 8688524590163934

Logistic Regression Classification Report:

	Precision	recall	f1-score	support
0	0.81	1.00	0.89	34
1	1.00	0.70	0.83	27
accuracy			0.87	61
macro avg	0.90	0.85	0.86	61
weighted avg	0.89	0.87	0.86	61

4) Metrics using Support Vector Machine Algorithm:

SVC Accuracy Score: 0. 819672131147541

Support Vector Machine Classification Report:

	Precision	recall	f1-score	support
0	0.79	0.91	0.85	34
1	0.86	0.70	0.78	27
accuracy			0.82	61
macro avg	0.83	0.81	0.81	61
weighted avg	0.83	0.82	0.82	61

VII. CONCLUSION AND FUTURE SCOPE

b. *Conclusion :* This project assists in identifying users' self-destructive intentions from their tweets and their emotional health through their posts. Early intervention can prevent suicides and save lives. In this work, inactive, non-essential subjects who were tweeting potentially damaging thoughts were deleted. We evaluated the dormant subjects in an abstract manner first, and then we compared them to chance components. The findings show that the Random Forest Classifier with TFIDF and N-gram Feature provides accuracy of 93.33%. The urgency of the posts is also predicted using the proposed models.

c. *Future Scope :* In the future, we will expand our research to include other mental wellness difficulties, such as post-horrific pressure problems and dejection. The suicide prediction system employs various machine learning algorithms to foretell posts expressing suicidal thoughts on social media and avoid such occurrences. Our model's results are quite accurate because we are applying many machine learning techniques. As a part of this work, we describe our approach for leveraging the social network Twitter as a preventive tool in the struggle against suicide, which may be based on various machine learning techniques.

d. In order to increase the precision of our process, we intend to continue to develop and improve our techniques. In order to understand more about the pattern of the user's posting time and how it ties with suicidal thoughts, it is intended to divide the day into various time intervals.

e. The ability to detect suicidal thoughts more accurately may be improved by adding more feature sets, such as timely information and word embedding. Future research in this field is expected to build on the findings of this study.

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Forecasting Polling Results Utilizing Social Media Posts

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Abstract—**Modern social media (SM), such as social networks like Facebook, Twitter, and Instagram, was introduced and has become widely used, changing how politicians communicate with the public and run political campaigns (SNs). A new field of research has emerged that focuses on using SM data to predict election results because of the inherent advantages of SM, particularly the large volume of data that can be accessed in real-time. Even though there has been a lot of research in the last ten years, the results are usually contested. In this regard, this paper makes an effort to analyze, describe, and lay out the state of the art and state of the practice in election prediction utilizing SM data from its beginnings, as well as to identify future research directions in this area. In terms of methodology, we carried out a methodical review of the literature, assessing the volume and quality of publications, the electoral context of studies, the key approaches and characteristics of successful studies, as well as their main advantages and disadvantages, and compared our findings with those of previous reviews.**

The project's primary goal is to forecast election outcomes using information from Twitter. The project's scope is restricted to determining who has an advantage over others and calculating the correctness of the suggested model. The system administrator uses training data to develop the suggested model. To determine whether a tweet has a favorable or negative sentiment, test data can be provided to the model. The project's scope does not include user account maintenance.

The most important findings are the poor performance of the most popular method, namely volume and sentiment analysis on Twitter, and the better outcomes with novel methods, including regression techniques trained with conventional polls. The implementation of cutting-edge machine learning techniques has to be properly researched, among other things, and is mentioned in a vision of future research on integrating advancements in process definitions, modeling, and evaluation.

Keywords—Regional Elections, social media (SM), social networks (SNs), machine learning techniques, reviews.

I. INTRODUCTION

This decade has seen a significant impact of social media (SM) on elections and politics[9]. Politicians today run ongoing campaigns that are not time or place-bound, and new information about them can be accessed not just by the press but also straight from their profiles on social networks (SNs) and by other users sharing and amplifying their views on SM[6]. A new age is being mediated through SM. In this new environment, electoral campaigns heavily utilize social media [1], and the success of an online campaign can even influence elections. Recent examples of SM engagement and electoral success include the 2016 U.S. presidential election, in which Donald Trump focused his campaign on free-media marketing [2], and the 2018 Brazilian presidential election, in which the candidate with more SM engagement but less emphasis on traditional media won [3].

Furthermore, it is possible to assess the manner in which a politician's message is being spread on social media and make an educated prediction as to how much interest or how many people are talking about a certain candidate[5]. As a result, a brand-new field of study has been established with the goal of forecasting election results using SM data. This area of research is made possible by the abundance of data that is accessible in real-time, the low cost of acquiring it, and the development of systems for analyzing it[4].

Even the same study may yield favorable results in one situation and negative results in another, as several studies showed overwhelmingly positive results while others cast doubt on the usefulness of SM as a predictor. As a result, there are currently no established methods, processes, or tools for forecasting election results using SM data. Furthermore, over time, even the SM context has changed[8]. For instance, Facebook currently surpasses Twitter in terms of active members, and new SN has emerged like Instagram.

The purpose of this paper is to present a thorough analysis and examination of the current state of the art and practice of predicting election results using SM data in this context, as well as to highlight the key research challenges and opportunities in this area[7]. After performing a rigorous examination of 83 investigations from 2008 to 2019, we thoroughly examined potential directions. We outlined the context of the studies, important models, the advantages and disadvantages of this new subject, as well as the essential characteristics of effective studies[10].

II. RESEARCH BACKGROUND

A. Problem Statement

It has been discovered that the current methods for predicting election outcomes based on the number and sentiment of tweets are worthless. Research is being done in 28 countries across six distinct continents, and the number of publications in this sector is on the rise. Yet, no renowned individuals, groups, or clusters have been found to be engaged in sustainable research in the area. Additionally, no specific well-known forum for publication on this topic was identified, so the results were dispersed throughout several forums. We discovered that, despite being the most popular strategy, volume/sentiment does not exhibit high success rates, which is consistent with the findings of other surveys,

by integrating the characteristics and success of the studies.

B. Aim Of The Project

The primary goal of the research is to forecast election outcomes using information from Twitter. We made advantage of the open-source US Presidential Election 2020 Tweets dataset from Kaggle. All of Donald Trump's and Joe Biden's tweets make up this corpus, which was used to build the suggested model using sophisticated machine learning methods.

C. Scope Of The Project

The project's scope is restricted to determining who has an advantage over others and calculating the correctness of the suggested model. The system administrator uses training data to develop the suggested model. To determine whether a tweet has a favorable or negative sentiment, test data can be provided to the model. The project's scope does not include user account maintenance.

D. Technical Approach

Below is the technical approach to address the problem:

1. Identification of dataset
2. Explorative Data Analysis
3. Cleaning the dataset and applying NLP techniques
4. Feeding the dataset to multiple algorithms and finding the best algorithm that suits the scenario
5. Training the final classifier and creating a model for the final classifier
6. Testing the final classifier and saving the results.

III. System Analysis

A. Research Gap

The introduction and widespread use of modern social media (SM), including social networks like Facebook, Twitter, and Instagram, has changed how politicians interact with the public and conduct political campaigns (SNs). Due to the inherent strengths of SM, namely the vast amount of data that can be accessed in real time, a new area of study has formed that focuses on using SM data to forecast election results. Despite the fact that numerous research have been done in the last ten years, the findings are frequently disputed.

B. Proposed System

This paper explores and reviews the development of research on election prediction using SM data since its inception, presents the state of the art and the state of the art in practise, and highlights future directions for this study. In terms of methodology, we conducted a methodical review of the literature, evaluating the quantity and calibre of publications, the electoral context of studies, the main approaches and traits of successful studies, as well as their main advantages and disadvantages, and compared our findings with those of previous reviews. We found and examined 83 pertinent studies, and problems with methodology, sample, modelling, performance assessment, and scientific rigour were found in numerous areas.The main conclusions include the least successful strategy, which is volume and sentiment analysis on Twitter, and the better outcomes using new methods, including regression techniques trained with conventional polls.

Technical process involved in proposed model:

1. Identification of Dataset
2. Data preprocessing
3. Tweet analysis
4. Feature extraction
5. Creation of Model
6. Testing the model.

Advantages Of Proposed System

- High accuracy
- Can be extended to real time environments.

IV. Algorithmic Process

A. Creating Model

We concentrated on the task of forecasting election outcomes using tweets and postings from social media. We suggest a novel algorithm that can determine the sentiment of the tweet after evaluating the tweets in the datasets. On the electoral tweets dataset, we used NLP techniques, performed the necessary exploratory data analysis, and then fed the processed information to various machine learning algorithms to test their performance. Finally, we developed a machine learning model with an accuracy of roughly 93% that can determine the sentiment of each tweet and compute the aggregate sentiment for Trump and Biden.

This includes the following:

1. Loading the dataset:
2. We will use 80% of data as training, 20% as validation data
3. Bag of words
4. Sanity check
5. Removing duplicates
6. Cleaning tweets
7. Removing punctuatuons
8. Cleaning tweets
9. Removing punctuatuons
10. Transforming the vectorizer
11. Converting to DataFrame
12. Final Classifier Creation

As from the results, Random Forest Classifier with TFIDF and N-gram Feature gives 92.5% accuracy

1)Loading the dataset:

Datasets for training the machine learning models can be uploaded by the system administrator. To upload a file to a server, an administrator must first choose the file by clicking the Choose file button, then click the Upload button. A success message indicating that the file was successfully uploaded would be shown once the upload was finished. We are utilising the dataset Biden No Retweet Full Text.csv for this study.

```
df =
pd.read_csv("../Biden_No_Retweet_Full_Text.csv")

# We will use 80% of data as training, 20% as validation data

training_samples = int(303 * .8)
validation_samples = int(303 - training_samples
```

2)Bag of words

Transform texts into a bag-of-words matrix (number of rows = total set, number of columns = number of unique words). Check out Bag-of-words model in computer vision for more information. The bag-of-words model is a condensing representation used in information retrieval and natural language processing (IR). This paradigm ignores syntax and even word order while maintaining multiplicity and represents a text (such as a sentence or document) as the bag (multiset) of its words. Computer vision has also made use of the bag-of-words approach. The bag-of-words model is frequently employed in document classification techniques in which the (frequency of) occurrence of each word is used as a feature for instructing a classifier.

```
# transform document into a matrix(the number
indicates the number of words showing up in the
document)
bag_of_words = vect.transform(toy_samples)
print("Transformed sparse matrix is: ")
print(bag_of_words.toarray())
```

3)Sanity check

```
print(len(texts) == (training_samples +
validation_samples))
print("The number of training {0}, validation
".format(training_samples, validation_samples)
```

4)Removing duplicates

Eliminate Duplicate record in order to contribute accuracte prediction system

```
df.drop_duplicates(subset="Tweet", keep="first"
inplace=True, ignore_index=True)
```

5)Cleaning tweets

Removes URLs, Hashtags, Mentions, Reserved Words (RT,FAV) Emojis, Smileys and appending to a list

```
tweet_list = [re.sub('[^a-zA-Z]', ' ', i) for i
in tweet_list]
```

6)Removing punctuatuons

```
clean_tweets = []
for tweet in tweet_list:
    for word in set(stopwords.words("english")):
        token = " " + word + " "
        tweet = tweet.replace(token, " ")
    clean_tweets.append(tweet)
```

7)Transforming the vectorizer

```
df_vect = pd.DataFrame(trans.toarray(),
columns=vector.get_feature_names())
```

8)Converting to DataFrame

```
pol = []

for tweet in df["Processed"]:
    blob = TextBlob(tweet)
    pol.append(blob.sentiment.polarity)
df['Polarity'] = pol


# One hot encoding for training set
    integer_encoded_train =
train_labels.reshape(len(train_labels), 1)
    onehot_encoded_train =
onehot_encoder.fit_transform(integer_encoded_train)

    # One hot encoding for validation set
    integer_encoded_val =
validation_labels.reshape(len(validation_labels), 1)
    onehot_encoded_val =
onehot_encoder.fit_transform(integer_encoded_val)
```

9)Final Classifier Creation

Using machine learning and deep learning approaches, we were able to create a machine learning model that can finally determine the sentiment of each tweet. We also computed the total sentiment for Trump and Biden, and its accuracy was created using bidirectional long-short term memory (bi-lstm)

```
model = tf.keras.Sequential([

        Embedding(vocab_size, embedding_dim,
input_length=max_length),
        Bidirectional(LSTM(256)),
```

V. PROJECT IMPLIMENTATION

A. Proposed Modular Implementation

Below is the proposed modular implementation of the project. It consists of modules:

1. Admin
2. User

1. Admin Module:

The admin of the system is responsible for the activities like:

1. Submitting the data
2. Examining the dataset of electoral tweets.
3. Evaluation of several machine learning techniques using the Tweets Dataset.
4. Examine how well the algorithms performed on the provided dataset.
5. Create a model to forecast election outcomes.
6. Use test data to assess the model's ability to identify tweet sentiment and compute total sentiment using the complete dataset.

2. User Module:

By inputting the tweet, the user can log in and test the model. The model receives the tweet as input and is tasked with determining whether the review will be favorable or unfavorable.

B. SYSTEM DESIGN

1. Data Flow Diagram: Admin

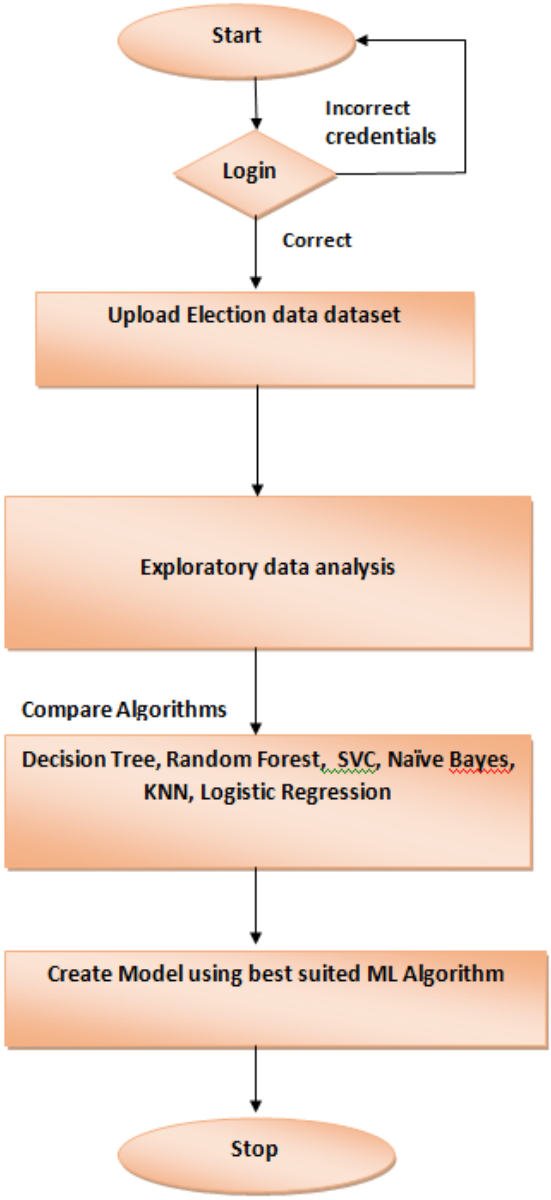

Figure 1: A Data Flow Diagram for Admin

2. Data Flow Diagram: User

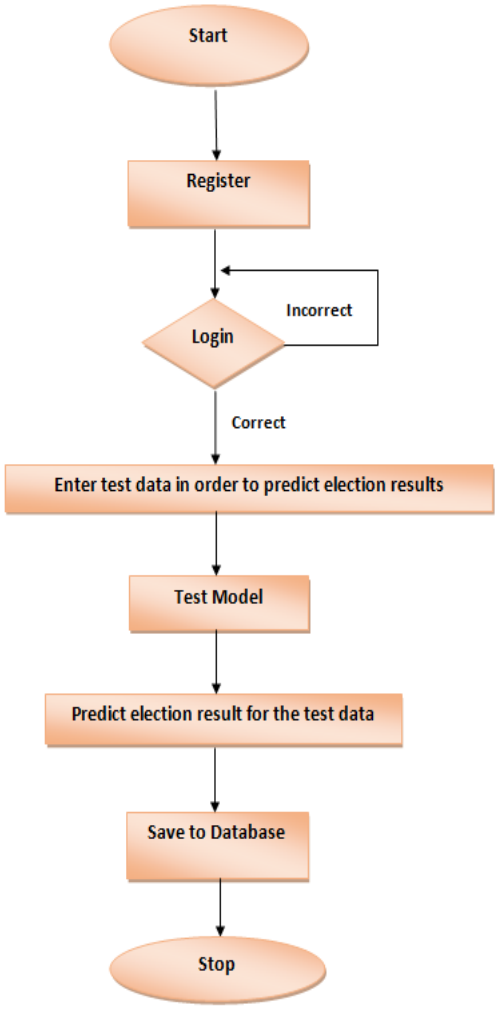

Figure 2: A Data Flow Diagram for Admin

VI. IMPLEMENTATION AND RESULT ANALYSIS

A. Project execution process:

1. Upload Dataset

The system administrator can upload datasets that are used to train machine learning models on this page. To upload a file to a server, an administrator must first choose the file by clicking the Choose file button, then click the Upload button. A success message indicating that the file was successfully uploaded would be shown once the upload was finished. We are using the datasets biden.csv and trump.csv for this research.

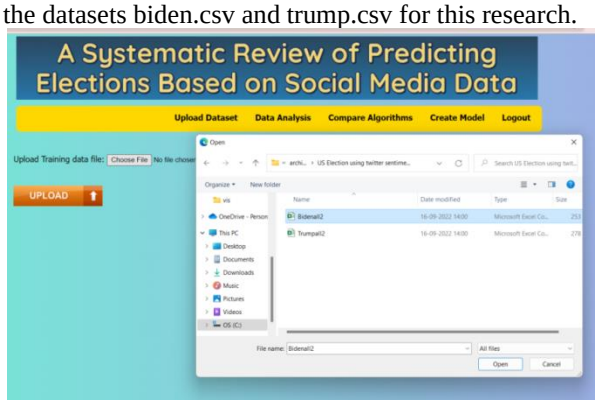

Figure 3: Upload Dataset

Figure 4: File uploaded

2. Data Analysis

Exploratory data analysis is done on the dataset to uncover patterns, find missing data, and establish links between different output characteristics using graphs, statistics, etc.

a) Trump Polarity Analysis:

The sentiment polarity of tweets made in support of Trump is depicted in the graph below.

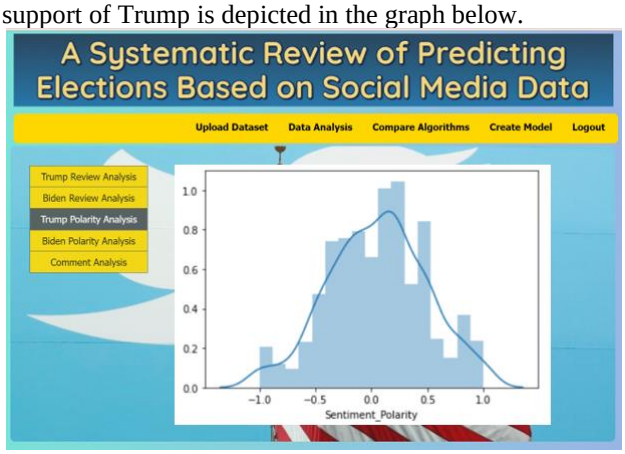

Figure 5: Trump Polarity Analysis

b) Biden PolarityAnalysis:

The sentiment polarity of tweets received for Biden is depicted in the graph below.

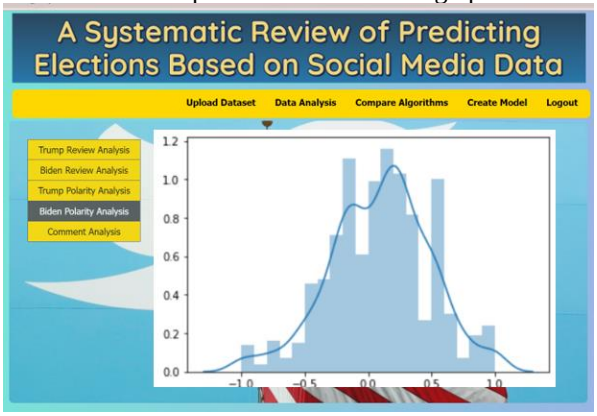

Figure 6: Biden Polarity Analysis

3. Compare Algorithms

The administrator can use this page to train several algorithms on a dataset and determine each algorithm's test accuracy.

a) Logistic Regression

The test accuracy is 86% when the dataset is fed into the logistic regression algorithm, as we can see.

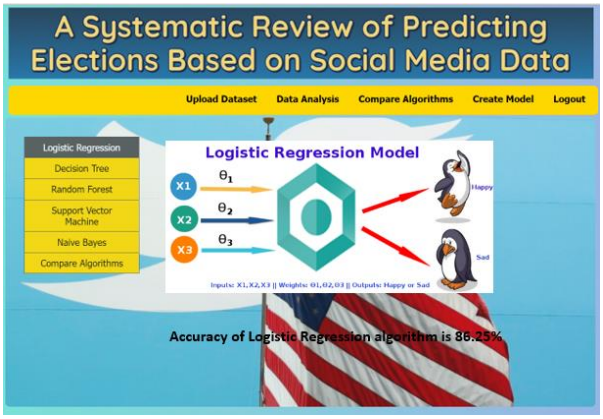

Figure 7: Logistic Regression

b) Decision Trees

The test accuracy is 66.5% when the dataset is fed into the decision tree method, as we can see.

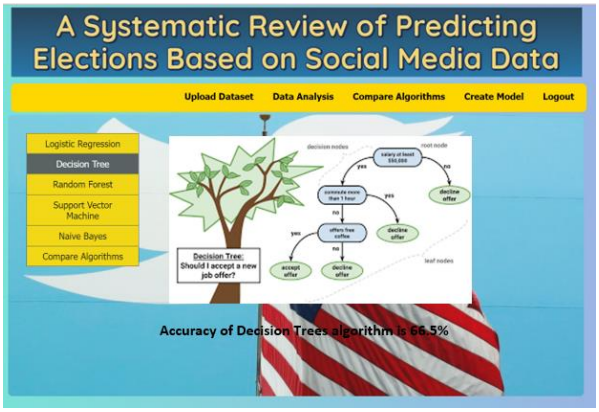

Figure 8: Comment Analysis

c) Support Vector Machine

The test accuracy is 84.75% when the dataset is fed to the Support Vector Machine method.

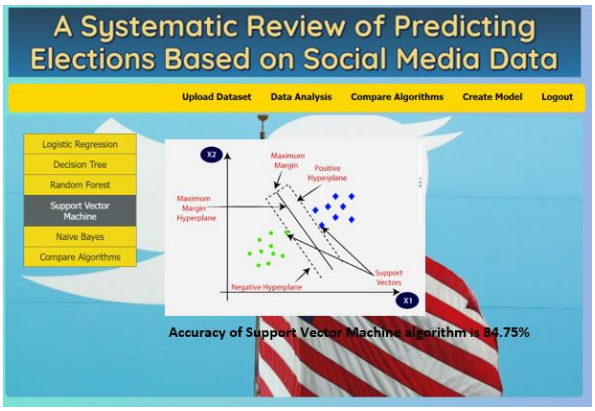

Figure 9: Support Vector Machine Algorithm

4. Create Model

The Generate Model button can be used to create the Model. After pressing the button, a success message is presented and the model is built. Our model's precision is 93.75%.

Figure 10: Create Model

5. Test Model:

The model can be tested using the below screen.

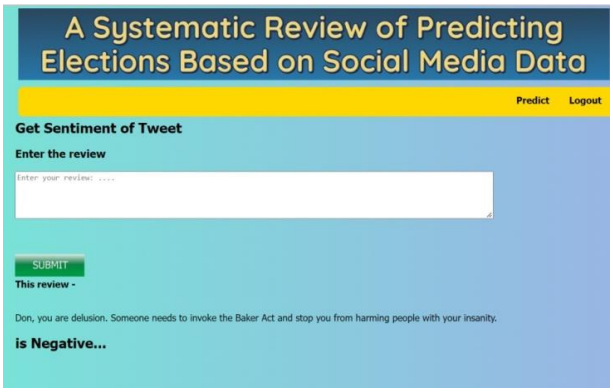

Figure 11: Test model

B. Metrics Evaluation :

Accuracy- One parameter for assessing classification models is accuracy. Informally, accuracy is the percentage of accurate predictions made by our model.

Macro avg - The macro average, also known as the precision, memory, and f1 score, is the arithmetic mean of each individual class. When all classes must be treated equally, macro average scores are used to assess the classifier's overall performance in comparison to the most popular class labels.

Weighted avg- A calculation that accounts for the varied levels of significance of the numbers in a data set is known as a weighted average.

Metrics for Algorithms in CompAlg.py

Classification report contains the complete metric information of the evaluated algorithm. They are Precision, Recall, F1-Score, Support

Precision – What percent of your predictions were correct?

Precision is the capacity of a classifier to avoid classifying as positive anything that is in fact negative. It is described for each class as the proportion of true positives to the total of true and false positives.
TP – True Positives
FP – False Positives

Precision – Accuracy of positive predictions.
Precision = TP/(TP + FP)

1) Recall – What percent of the positive cases did you catch?

The capacity of a classifier to locate every successful instance is known as recall. It is described as the proportion of true positives to the total of true positives and false negatives for each class.

FN – False Negatives

Recall: Fraction of positives that were correctly identified.

Recall = TP/(TP+FN)

2) F1 score – What percent of positive predictions were correct?

The F1 score is a weighted harmonic mean of recall and precision, with 1.0 representing the best result and 0.0 the lowest. F1 scores typically perform worse than accuracy measures because they incorporate precision and recall into their computation. It is often recommended to compare classifier models using the weighted average of F1, rather than overall accuracy.

F1 Score = 2*(Recall * Precision) / (Recall + Precision)

The amount of real instances of the class in the given dataset is known as support. The requirement for stratified sampling or rebalancing may be indicated by unbalanced support in the training data, which may point to structural flaws in the classifier's reported scores.

1) Metrics using Decision Tree Algorithm:

DT Accuracy Score: 0.8072662826761188

DT Precision Score: 0.8072662826761188

DT Recall Score: 0.8072662826761188

DT F1 Score: 0.8072662826761188

Decision Tree accuracy: 80.72662826761187

Decision Tree Classification Report:

	Precision	recall	f1-score	support
0	0.76	0.73	0.75	1507
1	0.899	0.895	0.893	1313

2	0.78	0.81	0.80	1694
accuracy			0.81	4514
macro avg	0.81	0.81	0.81	4514
weighted avg	0.81	0.81	0.81	4514

2) Metrics using Random Forest Algorithm:

RF Accuracy Score: 0.8546743464776252

RF Precision Score: 0.8546743464776252

RF Recall Score: 0.8546743464776252

RF F1 Score: 0.8546743464776252

Random Forest accuracy: 85.46743464776252

Random Forest Classification Report:

	Precision	recall	f1-score	support
0	0.88	0.73	0.80	1507
1	0.86	0.97	0.91	1313
2	0.83	0.88	0.85	1694
accuracy			0.85	4514
macro avg	0.86	0.86	0.85	4514
weighted avg	0.86	0.85	0.85	4514

3) Metrics using Naive Bayes Algorithm:

NB Accuracy Score: 0.745680106335844

NB Precision Score: 0.745680106335844

NB Recall Score: 0.745680106335844

NB F1 Score: 0.745680106335844

Naive Bayes accuracy: 74.56801063358441

Naive Bayes Classification Report:

	precision	recall	f1-score	support
0	0.76	0.71	0.74	1507
1	0.76	0.71	0.73	1313
2	0.72	0.80	0.76	1694
accuracy			0.75	4514
macro avg	0.75	0.74	0.74	4514
weighted avg	0.75	0.75	0.75	4514

4) Metrics using Logistic Regression Algorithm:

LR Accuracy Score: 0.8595480726628267

LR Precision Score: 0.8595480726628267

LR Recall Score: 0.8595480726628267

LR F1 Score: 0.8595480726628266

Logistic Regression accuracy: 85.95480726628267

Logistic Regression Classification Report:

	Precision	recall	f1-score	support
0	0.85	0.81	0.83	1507
1	0.84	0.94	0.89	1313
2	0.88	0.84	0.86	1694
accuracy			0.86	4514
macro avg	0.86	0.86	0.86	4514
weighted avg	0.86	0.86	0.86	4514

5) Metrics using Support Vector Machine Algorithm:

SVC Accuracy Score: 0.7933097031457688

SVC Precision Score: 0.7933097031457688

SVC Recall Score: 0.7933097031457688

SVC F1 Score: 0.7933097031457688

Support Vector Machine accuracy: 79.33097031457687

Support Vector Machine Classification Report:

	Precision	recall	f1-score	support
0	0.78	0.73	0.75	1507
1	0.75	0.88	0.81	1313
2	0.85	0.79	0.82	1694
accuracy			0.79	4514
macro avg	0.79	0.80	0.79	4514
weighted avg	0.80	0.79	0.79	4514

Metrics of Final Classifier:

Model: "sequential"

Layer (type)	Output Shape	Param #
embedding (Embedding)	(None, 200, 150)	2399250
bidirectional (Bidirectional)	(None, 512)	833536
dropout (Dropout)	(None, 512)	0
batch_normalization (BatchNormalization)	(None, 512)	2048
dropout_1 (Dropout)	(None, 512)	0
flatten (Flatten)	(None, 512)	0
dense (Dense)	(None, 64)	32832
dropout_2 (Dropout)	(None, 64)	0
dense_1 (Dense)	(None, 3)	195

Total params: 3,267,861

Trainable params: 3,266,837

Non-trainable params: 1,024

VII. CONCLUSION AND FUTURE SCOPE

Conclusion : In this work, we concentrated on the task of forecasting election outcomes based on tweets and posts on social media. We suggest a novel algorithm that can determine the sentiment of the tweet after evaluating the tweets in the datasets. On the electoral tweets dataset, we used NLP techniques, performed the necessary exploratory data analysis, and then fed the processed information to various machine learning algorithms to test their performance. Finally, we developed a machine learning model with an accuracy of roughly 94% that can determine the sentiment of each tweet and compute the aggregate sentiment for Trump and Biden.

Future Scope : In our study, we predicted the outcome of the election using Twitter data. In the future, we plan to look at data from Facebook as well as data from other social media platforms and integrate them to forecast election outcomes broadly. We could also have dialogues using images, sounds, and video.

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Edl-Covid: Ensemble Deep Learning For Covid-19 Case Detection From Chest X-Ray Images

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Abstract-**Persuading screening as for Corona virus cases has been turning out to be crucial for dial down and stop the quick spread of the disease during the steady time of Corona virus pandemic beginning with one side of the world then onto the following. In this article, we consider radiology assessment of utilizing chest X-bar pictures, which is among the steady examining up approaches for Corona virus case affirmation. Given basic learning is a persuading gadget and development for picture assessment, there have been piles of assessments for Corona virus case region through preparing huge learning models with X-shaft pictures. In any case, some of them report astounding measure results, their proposed key getting models could experience the shaky effects of overfitting, high change, and speculation messes up accomplished by commotion and a destined number of datasets. Taking into account gathering learning can beat the nonappearances of titanic advancing by making figures with different models instead of a solitary model, we propose EDL-Coronavirus, a party essential learning model utilizing significant learning and outfit learning. The EDL-Coronavirus model is made by joining different depiction models of Coronavirus Net, which has driven in a uninhibitedly conveyed Coronavirus case certification strategy with enormous frontal cortex network controlled chest X-shaft pictures, by utilizing a proposed weighted averaging gathering structure that has an immense information on various responsive qualities of basic learning models on various classes' sorts. Key results show that EDL-Coronavirus offers promising outcomes for Coronavirus case irrefutable interest with a precision of 95%, better than Coronavirus Net of 93.3%.**

I. INTRODUCTION

THE first Coronavirus Disease 2019 (Covid), as a remarkable compelling and hazardous disorder all around the planet, is achieved by SARS-CoV-2, a serious extreme respiratory condition Coronavirus 2, which has not been anytime found in individuals before Dec 2019 [1]. There is a speedy individual to individual transmission between two people in close contact through sprayers or little drops made by talking, hacking, and wheezing. Once polluted, people will for the most part have the going with typical incidental effects following a couple of days, including fever, hack, taste/little mishap, and shortness of breath. As of 10th January 2020, there are even more than 90 million powerful debased cases, and 1.94 million people have passed on around the world. To stop the speedy spread of Covid, a huge task is to sort out debased people through convincing screening so much that they can be disconnected and sought brief treatment. Up until this point, the most by and large included assessing approach for Covid case ID is to take a contrary record polymerase chain reaction (RT-PCR) test over an illustration of nasopharyngeal exudate accumulated from suspectable people for the emotional acknowledgment of nucleic destructive from SARS-CoV-2 credits to its advantages as a fundamental anyway unambiguous abstract measure [6], [30]. Despite the way that RT-PCR testing has been seen as a "greatest level" for spoiled case disclosure of the disorder, there are at this point a couple of issues about it. In any case, the responsiveness of its recognizable proof outcomes is significantly factor, which can deliver misdirecting negative and fake positive results according to another report by Tahamtan et al. [34]. Second, in light of the fast spread of Covid, there are not sufficient PCR reagent packs to satisfy the stunning screening demand especially in poor and energetically affected locales [35]. Despite RT-PCR, radiography evaluation is a choice fruitful assessing method for fast area of Covid, where the chest X-bar (CXR) and CT pictures are performed and taken apart by radiologists to choose whether or not a suspect competent individual has been spoiled by SARS-CoV-2 [3], [36]. Continuous assessments have seen the surprising features in radiography pictures of Covid cases and it has been comprehensively used in China at the past period of the overall eruption [15], [16], [38]. Regardless of the way that CT check has a higher repugnance for pneumonic sicknesses, there are a couple of limitations for its conventional purposes in Covid case ID at a greater extension, including nonprobability, long haul looking at, and the bet of uncovering the clinical facility staff. Conversely, with CT looks at, CXR imaging is helpful, faster, more immediately open, and can be performed inside a separated room while offering a good accuracy in Covid case revelation [29]. In light of these benefits, various new assessments [7], [18], [29], [36] have now revolved around CXR picture examination for COVID19 case area. Particularly, there are a couple of examinations [25] proposing to take helpful CXR imaging as a reliance system for Covid case acknowledgment with the quick spread of the pandemic. While CXR imaging is especially speedy, it needs ace radiologists to make judgment for Covid case disclosure genuinely, which requires capable data and is a dreary cycle. Meanwhile, the amount of radiologists is a lot not exactly that of people under revelation. An electronic thinking (man-made knowledge)- upheld suggestive structure is in this way expected to assist radiologists with making screening of Covid cases in an all the more fast and precise way, regardless it is leaned to happen that polluted people can't be perceived and confined immediately and subsequently can't seek treatment helpful.

II. EXISTING SYSTEM

In Existing System, to fully unleash these potential, bioelectronics devices should be able to precisely respond to real-time changes in the environment to drive biological systems' response towards the desired goals. However, controlling the biological systems' response with bioelectronics devices is challenging due to the presence of uncertainties, stochasticity, unmolded dynamics, and complex nonlinearities.

III. LITERATURE SURVEY

"Professional chat application based on natural language processing.

There has been an emerging trend of a vast number of chat applications which are present in the recent years to help people to connect with each other across different mediums, like Hike, WhatsApp, Telegram, etc. The proposed network-based android chat application used for chatting purpose with remote clients or users connected to the internet, and it will not let the user send inappropriate messages. This paper proposes the mechanism of creating professional chat application that will not permit the user to send inappropriate or improper messages to the participants by incorporating base level implementation of natural language processing (NLP). Before sending the messages to the user, the typed message evaluated to find any inappropriate terms in the message that may include vulgar words, etc., using natural language processing. The user can build an own dictionary which contains vulgar or irrelevant terms. After pre-processing steps of removal of punctuations, numbers, conversion of text to lower case and NLP concepts of removing stop words, stemming, tokenization, named entity recognition and parts of speech tagging, it gives keywords from the user typed message. These derived keywords compared with the terms in the dictionary to analyze the sentiment of the message. If the context of the message is negative, then the user not permitted to send the message

Real world smart chatbot for customer care using software as service (SaaS) architecture.

It's being very important to listen to social media streams whether it's Twitter, Facebook, Messenger, LinkedIn, email or even company own application. As many customers may be using this streams to reach out to company because they need help. The company have setup social marketing team to monitor this stream. But due to huge volumes of users it's very difficult to analyses each and every social message and take a relevant action to solve users' grievances, which lead to many unsatisfied customers or may even lose a customer. This papers proposes a system architecture which will try to overcome the above shortcoming by analyzing messages of each ejabberd users to check whether it's actionable or not. If it's actionable then an automated Chatbot will initiates conversation with that user and help the user to resolve the issue by providing a human way interactions using LUIS and cognitive services. To provide a highly robust, scalable and extensible architecture, this system is implemented on AWS public cloud.

An Overview of Artificial Intelligence Based Chabot's and an Example Chabot Application.

Chatbot can be described as software that can chat with people using artificial intelligence. These software are used to perform tasks such as quickly responding to users, informing them, helping to purchase products and providing better service to customers. In this paper, we present the general working principle and the basic concepts of artificial intelligence based chatbots and related concepts as well as their applications in various sectors such as telecommunication, banking, health, customer call centers and e-commerce. Additionally, the results of an example chatbot for donation service developed for telecommunication service provider are presented using the proposed architecture.

Intelligent travel chatbot for predictive recommendation in echo platform

Chatbot is a computer application that interacts with users using natural language in a similar way to imitate a human travel agent. A successful implementation of a chatbot system can analyze user preferences and predict collective intelligence. In most cases, it can provide better user-centric recommendations. Hence, the chatbot is becoming an integral part of the future consumer services. This paper is an implementation of an intelligent chatbot system in travel domain on Echo platform which would gather user preferences and model collective user knowledge base and recommend using the Restricted Boltzmann Machine (RBM) with Collaborative Filtering. With this chatbot based on DNN, we can improve human to machine interaction in the travel domain

Chatbot Using a Knowledge in Database Human-to-Machine Conversation Modeling

A chatterbot or chatbot aims to make a conversation between both human and machine. The machine has been embedded knowledge to identify the sentences and making a decision itself as response to answer a question. The response principle is matching the input sentence from user. From input sentence, it will be scored to get the similarity of sentences, the higher score obtained the more similar of reference sentences. The sentence similarity calculation in this paper using bigram which divides input sentence as two letters of input sentence. The knowledge of chatbotis stored in the database. The chatbot consists of core and interface that is accessing that core in relational database management systems (RDBMS). The database has been employed as knowledge storage and interpreter has been employed as stored programs of function and procedure sets for pattern-matching requirement. The interface is standalone which has been built using programing language of Pascal and Java.

IV. PROPOSED METHODOLOGY

In this chapter, various supervised machine learning approaches are used. This section provides a general description of these approaches. Abusive messages in

social media is a complex phenomenon with a broad range of overlapping modes and goals [17]. Cyberbullying and hate speech are typical examples of abusive languages that researchers have put more interest in the past few decades due to their negative impacts in our societies. Several research have been conducted to automatically detect these undesirable messages among other messages in social media. The contributions of this study are three-fold. First to equip the readers with the necessary information on the critical steps involved in hate speech detection using ML algorithms. Secondly, the weaknesses and strengths of each method is critically evaluated to guide researchers in the algorithm choice dilemma. Lastly, some research gaps and open challenges were identified. The different variants of ML techniques were reviewed which include classical ML, ensemble approach and deep learning methods. Researchers and professionals alike will benefit immensely from this study.

- Snapshot Model Training
- Model Ensembling
- EDL-COVID Evaluation Results

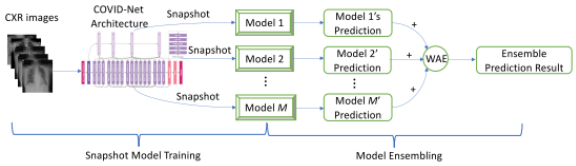
Snapshot Model Training

After generating multiple model snapshots in the first phase, we now come to the model ensembling phase for building EDLCOVID by combining these models as illustrated in Fig. 3. As we discussed in Section II-A, there are many ensembling strategies for model ensemble. For snapshot ensemble learning, averaging is a popular ensembling strategy [17]. For an input sample, it simply averages the class probabilities for each class from all models, respectively. Let be the number of classifiers (i.e., deep learning models). Let(di) be the class probability of the kth class output by the mth classifier with respect to the input sample di. Then the average class probability is M m=1 pm, (di) M, fork∈ [1, K] of the input sample di, with K denoting the number of classes. The traditional averaging ensembling strategy is implicitly based on the assumption that all models have the same weights. However, there are two key observations as follows. 1) For a deep learning model, the testing accuracies for different classes are generally different. 2) Different deep learning models tend to have different accuracies for each class. It indicates that we cannot simply treat each model equally during the model ensembling. Based on the two observations above, we instead propose a WAE approach for snapshot model ensemble as depicted in Algorithm 1. Let ai, j be the test accuracy of the it model for the jth class over the test data of the CXR images dataset. Let w, jdenote the normalized weight of the ith model for the jth class. Then we have WI, j= ai, M m=1 am, j (Line 7). For each input sample di, we first get the output of every class probability pm, k (di) from the mth model for ∀m ∈ M (Line 10–12). Then we can estimate the class probability of EDL-COVID by summing up the weighted class probabilities of all models (Line 13–14) for ∀k ∈ K. Finally, we can get the predicted class by returning the class index with the maximum class probability for each input sample**.**

EDL-COVID Evaluation Results

In this section, we evaluate the EDL-COVID model from the following perspectives. Weights Estimation forWAE. Recall in Section IV-B that we proposed a model ensembling strategy called WAE to combine multiple deep learning models with the awareness of different accuracies on different class types for different models. We first need to obtain weights for all deep learning models on each class type for WAE. Fig. 6 illustrates the estimated class-level weights for all deep learning models, which is based on the estimated sensitivity result on each class type as shown inTable I. We can see that different classes tend to have different weights for different deep learning models. For example, for COVIDNet-M6, it has the largest weight for the COVID-19 class but relatively low weight for the Pneumonia class. Predicted Results. The confusion matrix for the proposed EDL-COVID is presented as in Fig. 7, which analyzes the COVIDx dataset, including CXR images of 100 COVID-19 cases, 594 pneumonia cases, and 885 normal cases. For COVID19 testing, only four out of 100 CXR images of COVID-19 are not screened out, and six out of 1579 CXR images are mistakenly.

V. SYSTEM ARCHITECTURE

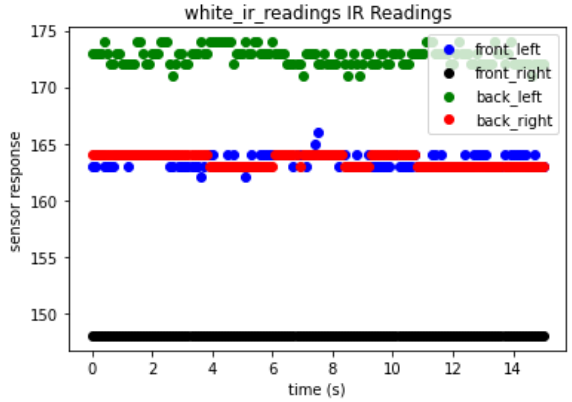


VI. RESULTS

Although we only use LSTM for developing the models in this paper, other types of models (e.g., CNN, deep neural networks, and SVM) can also be explored. It would be interesting to perform a comparative study of these models and also consider their robustness to adversarial attacks compared to our proposed fixing heuristic. Additionally, potential applications of our proposed heuristic can be explored in the speech, video, and medical domains, and in recommendation systems.

```
In [1]: runfile('D:/2021 - 2022/1 MAJOR Projects 2021 -2022/
PYTHON_2021_MAJOR_CODES/PYTHON_2021_MAJOR_CODES_SHIVA/VTPML21/
VTPML21_2021/Feedback Control of Bioelectronic Devices/data_analysis.py',
wdir='D:/2021 - 2022/1 MAJOR Projects 2021 -2022/PYTHON_2021_MAJOR_CODES/
PYTHON_2021_MAJOR_CODES_SHIVA/VTPML21/VTPML21_2021/Feedback Control of
Bioelectronic Devices')
white_ir_readings
front_left, average = 163.49668874172184, standard deviation =
0.5739853954972305, min = 162, max = 166
front_right, average = 148.0, standard deviation = 0.0, min = 148, max =
148
back_left, average = 172.72185430463577, standard deviation =
0.7733897212221442, min = 171, max = 174
back_right, average = 163.50331125827816, standard deviation =
0.49998903544839407, min = 163, max = 164
```

Default Responses

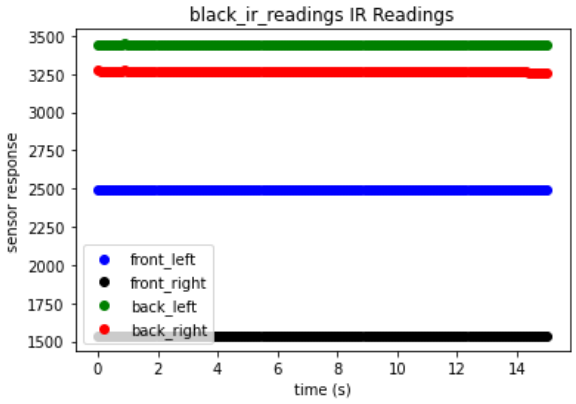


Typing Tab

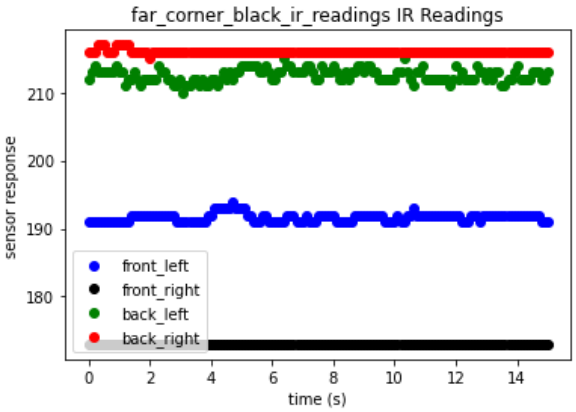
```
black_ir_readings
front_left, average = 2490.8543046357618, standard deviation =
0.7223705548091859, min = 2489, max = 2492
front_right, average = 1535.9139072847681, standard deviation =
0.280500908404601, min = 1535, max = 1536
back_left, average = 3442.271523178808, standard deviation =
1.6635308130657016, min = 3438, max = 3449
back_right, average = 3267.1456953642382, standard deviation =
2.376477862936002, min = 3261, max = 3273

far_corner_black_ir_readings
front_left, average = 191.7019867549669, standard deviation =
0.6281972734691751, min = 191, max = 194
front_right, average = 173.0, standard deviation = 0.0, min = 173, max =
173
back_left, average = 212.59602649006624, standard deviation =
0.9291369487308918, min = 210, max = 215
back_right, average = 216.04635761589404, standard deviation =
0.2396948486205809, min = 215, max = 217
```

Conversational Query



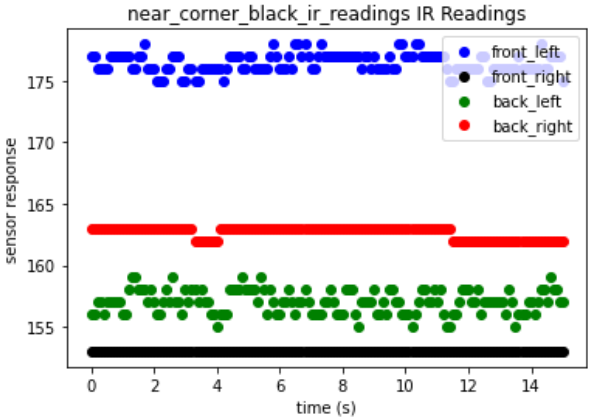
Conversational Query Continuation

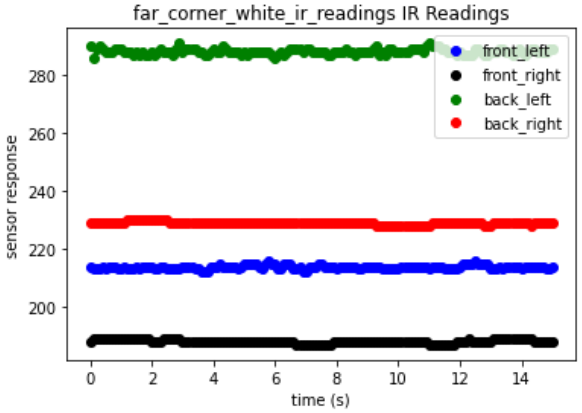


Registered Details for Queries

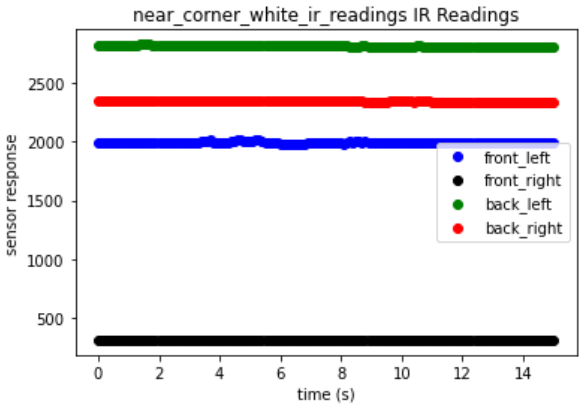
```
near_corner_black_ir_readings
front_left, average = 176.4569536423841, standard deviation =
0.7523481945203244, min = 175, max = 178
front_right, average = 153.0, standard deviation = 0.0, min = 153, max =
153
back_left, average = 157.0066225165563, standard deviation =
0.931399920092671, min = 155, max = 159
back_right, average = 162.7086092715232, standard deviation =
0.45440309399757467, min = 162, max = 163

far_corner_white_ir_readings
front_left, average = 213.79470198675497, standard deviation =
0.7747495283754015, min = 212, max = 216
front_right, average = 188.11920529801324, standard deviation =
0.6189839176449231, min = 187, max = 189
back_left, average = 288.1920529801325, standard deviation =
0.8818646093625062, min = 286, max = 291
back_right, average = 228.94701986754967, standard deviation =
0.4853902570015475, min = 228, max = 230
```






```
near_corner_white_ir_readings
front_left, average = 1994.6688741721855, standard deviation =
6.015126467052121, min = 1975, max = 2014
front_right, average = 312.36423841059604, standard deviation =
1.2736943383966572, min = 311, max = 315
back_left, average = 2814.6026490066224, standard deviation =
4.759207834075906, min = 2808, max = 2828
back_right, average = 2342.5562913907283, standard deviation =
3.4403830096138694, min = 2338, max = 2352
```



APPLICATION

- Retail and e-commerce.
- Travel and hospitality.
- Banking, finance, and fintech.
- Healthcare.
- Media and entertainment.
- Education.

VII. CONCLUSION

In this article, to beat a couple of issues of overfitting, high variance, and hypothesis missteps of a particular significant learning model for additional created execution on Covid case ID, we proposed EDL-Covid, a social event significant acquiring model called for Covid case acknowledgment from CXR pictures in light of the openly delivered network designing called Covid Net. We initially made different model reviews through setting up the Covid Net association on top of COVIDx CXR datasets, followed by ensembling these models with a proposed WAE ensembling approach that is familiar with different responsive characteristics for different significant learning models on different classes' types. Tests a COVIDx test data of 1579 CXR pictures exhibit the way that EDL-Covid can recognize Covid cases with extraordinary promising results of 96% responsiveness and 94.1% PPVs, beating each individual significant learning model. We trust our reenacted knowledge based screening approach can assist radiologists with accelerating the screening of Covid cases while guaranteeing a high accuracy in the continuous Covid pandemic all around the planet.

VIII. VII. FUTURE ENHANCEMENT

However, current work is vigorously subject to work by Wang et al. [36] on Coronavirus Net organization engineering and COVIDx dataset. There are a few future work that should be possible to upgrade EDL-Coronavirus for commonsense use. In the first place, the quantity of Coronavirus CXR pictures is still somewhat little contrasted with CXR pictures of different classes for the COVIDx dataset, demonstrating that we can't just make a judgment that the as of now prepared model previews from Coronavirus Net engineering keep on functioning admirably with a high exactness for concealed Coronavirus CXR pictures. To further develop EDL-Coronavirus, we want to retrain model previews of Coronavirus Net at whatever point new CXR pictures are accessible. Other than depiction models, we can likewise integrate some other openly accessible great profound learning models into EDL-Coronavirus for better execution. Second, we would want to expand EDL-Coronavirus for other Coronavirus applications, for example, risk definition for Coronavirus cases endurance investigation, risk status examination of Coronavirus cases, which are significant for patient hospitalization and care arranging.

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Sales Prediction Analysis In Stop Store Based On Machine Learning Algorithms

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Abstract— **Large supermarket run-centers, also known as Big Marts, now keep track of the sales volume and revenue figures for each individual product in order to estimate potential domestic demand and update inventory management. Inconsistencies and wide trends are frequently discovered by examining the data warehouse's database server. Businesses like Big Mart may use analytics to anticipate possible product sales using several machine learning techniques. To predict the sales of the products in the Big Mart, we used a variety of machine learning algorithms in this project, including Linear Regression, Ridge Regression, Lasso Regression, Decision Tree Regression, Random Forest Regression, Support Vector Regressor, Adaboost Regressor, and XGBoost Regression. We find that, of the methods described, XGBoost Regression performs the best in forecasting sales volume. In order to further increase the accuracy, we built a model using XGBoost Regression and fine-tuned it. This model is available on a flask application, where users may log in, enter the details of a product, and receive accurate forecasts of its sales.**

Keywords—Linear Regression, Polynomial Regression, Ridge Regression, Xgboost Regression.

I. INTRODUCTION

The competition between various retail stores and huge supermarkets is growing more ferocious and fierce on a daily basis as a result of the quick expansion of international retailers and online purchases[1]. In order to manage inventory, shipping, and operational tasks for the business, it must be able to pull in a sizable number of clients in a brief period of time and predict the amount of income for each product. In order to outperform low-cost methods used for prediction, the current machine learning technology is highly advanced and offers approaches for estimating or forecasting sales patterns for just about any type of firm[3]. Always more precise forecasting is helpful for developing and improving the business plan, which is also very advantageous.

There has been a lot of work done up to this point that was specifically intended for the field of transaction forecasting[2]. The substantial research on big-mart agreements that has been done is briefly summarised in this section. Several other Measurable approaches, including regression, auto-regressive integrated moving average (ARIMA), and auto-regressive moving average (ARMA), have been used to build a few deals prediction standards. A. S. Weigend et al. [6]suggested combining the occasional quantum relapse strategy with the (ARIMA) Auto-Regressive Integrated Moving Average method to manage daily food deals anticipating. Predicting transactions is a difficult problem that is affected by both internal and external factors.

II. RESEARCH BACKGROUND

A. Problem Statement

Individuals' purchasing power has been rapidly increasing in both offline and online settings in recent years[4]. Large supermarkets occasionally offer a variety of deals during holidays like Christmas and the New Year. Since it is clear that sales will be quite strong during this time, it is crucial for management to accurately forecast product sales and maintain proper inventory management[5]. The superstore should purchase sufficient product inventory and sell it off within the time. If it fails to do so and its projections prove to be inaccurate, the mart will incur significant losses. There are currently no methods available that can correctly forecast product sales based on historical data. It is only carried out by managers, who carefully examine historical data and attempt to gauge sales volume in light of several events and other pertinent facts[7]. This activity cannot be completed by an automated system; instead, human assistance is required.

B. Aim Of The Project

This project's main goal is to forecast how many things will be sold at a superstore. For this, we used the Big Mart sales data set from Kaggle. The R2 score of this data set is compared after preprocessing, analysis, and feeding it to many regression algorithms. Stock booking and inventory maintenance are outside the purview of this project.

Technical Approach

The technological strategy to solve the issue is listed below:

1. Dataset identification
2. Exploratory Analysis of Data
3. Dataset preparation
4. Running the dataset through many algorithms to see which one best fits the situation.
5. Developing a final classifier model and training the final classifier
6. Validating the ultimate classifier and recording the outcomes.

III. SYSTEM ANALYSIS

A. Research Gap

It goes without saying that sales would be quite strong during special days of the year like new year's, Christmas, etc. Therefore, it is crucial for management to accurately anticipate product sales and manage their inventory without any problems. The superstore should purchase sufficient product inventory and sell it off within the time. If it fails to do so and its projections prove to be inaccurate, the mart will incur significant

losses. There are currently no methods available that can correctly forecast product sales based on historical data. It is solely carried out by managers who carefully examine historical data and attempt to anticipate the sales volume based on several events and other pertinent information. Predictions require human effort.

B. Proposed System

In this project, we suggest using a variety of machine learning algorithms, such as Linear Regression, Ridge Regression, Lasso Regression, Decision Tree Regression, Random Forest Regression, Support Vector Regressor, Adaboost Regressor, and XGBoost Regression, to predict the sales of the products in the Big Mart. We then use the algorithm that performs best to build a model to predict sales volume. We want to host this model on a flask application where users can log in, enter the details of the product, and receive the pertinent forecasts regarding the product's sales.

This suggested approach will evaluate consumer behavior based on their past conduct. These client records are collected to form a data set. We make predictions about whether or not the customer's loan will be approved using these data sets and a machine learning model that has been trained. These computer algorithms forecast the likelihood that a consumer will be able to pay back the lending credit or not.

After testing, the model determines whether the new application is a good candidate for loan approval or not based on the inference it draws from the training sets of data to determine if a client would indeed be capable of repaying his loan or not

Advantages of Proposed System:

- High precision
- Extendable to real-time settings.

IV. ALGORITHMIC PROCESS

A. Creating Model

The algorithm used: XGBoost Regressor

Below is the technical approach used for the Loan recommendation system using the Loan review dataset

1. Data cleaning and visualization
2. Feature Extraction
3. Data Preparation
4. Splitting the data set into test data and training data
5. Data modeling using Sequential and Decision Tree algorithm classifier
6. Data Evaluation and prediction
7. Prediction of a sales in big marts systems

1)Feature extraction:

Below are the features present in the dataset:

Feature Name	**Type**
Item_Identifier	String
Item_Weight	String
Item_Fat_Content	String
Item_Visibility	String
Item_Type	String
Item_MRP	String
Outlet_Identifier	String
Outlet_Establishment_Year	String
Outlet_Size	String
Outlet_Location_Type	String
Outlet_Type	String
Item_Outlet_Sales	String

Feature Extraction Details:

A. Imputing Missing Values

When no information is given for one or more elements, a whole unit, or both, this is known as missing data. Missing data is a major issue in real-world situations. In pandas, missing data can also refer to NA (Not Available) values. Many datasets in DataFrame occasionally arrive with missing data, either because the data was never collected or because it was present but was not captured. We can use the fillna(), replace(), and interpolate() functions to fill in any null values in a dataset by replacing NaN values with one of their own. Each of these functions aids in filling in null values in a data frame's datasets. Interpolate() function is basically used to fill NA values in the data frame but it uses various interpolation techniques to fill the missing values rather than hard-coding the value. Although it uses a variety of interpolation algorithms rather than hard-coding the value, the Interpolate() function is mostly used to fill NA values in data frames.

```
# Read files:
    train = pd.read_csv("train.csv")
    test = pd.read_csv("test.csv")

    data = pd.concat([train, test])

# imputing missing values

    data['Item_Weight'] =
data['Item_Weight'].replace(0, np.NaN)

data['Item_Weight'].fillna(data['Item_Weight'].mean()
, inplace=True)


data['Outlet_Size'].fillna(data['Outlet_Size'].mode()
[0], inplace=True)

    data['Item_Outlet_Sales'] =
data['Item_Outlet_Sales'].replace(0, np.NaN)

data['Item_Outlet_Sales'].fillna(data['Item_Outlet_Sa
les'].mode()[0], inplace=True)
```

B. Label Encoding

In machine learning, we usually deal with datasets that contain multiple labels in one or more than one column. These labels can be in the form of words or numbers. To make the data understandable or in human-readable form, the training data is often labeled in words. Label Encoding refers to converting the labels into a numeric form so as to convert them into a machine-readable form. Machine learning algorithms can then decide in a better way how those labels must be operated. It is an important pre-processing step for the structured dataset in supervised learning.

```
# label encoding

    data.apply(LabelEncoder().fit_transform)
```

C. One Hot Encoding

Most Machine Learning algorithms cannot work with categorical data and needs to be converted into numerical data. Sometimes in datasets, we encounter columns that contain categorical features (string values) for example parameter Gender will have categorical parameters like Male, Female. These labels have no specific order of preference and also since the data is string labels, machine learning models misinterpreted that there is some sort of hierarchy in them.

One approach to solve this problem can be label encoding where we will assign a numerical value to these labels for example Male and Female mapped to 0 and 1. But this can add bias in our model as it will start giving higher preference to the Female parameter as 1>0 and ideally both labels are equally important in the dataset. To deal with this issue we will use the One Hot Encoding technique.

One Hot Encoding:
In this technique, the categorical parameters will prepare separate columns for both Male and Female labels. So, wherever there is a Male, the value will be 1 in the Male column and 0 in the Female column, and vice-versa.

```
# one hot encoding
    data = pd.get_dummies(data)
```

D. Defining features and Labels

```
X_train, X_test, y_train, y_test =
train_test_split(X, y, test_size=0.2
random_state=300)
```

E. Generating Synthetic Samples

Imbalanced Data Distribution is a phrase used frequently in machine learning and data science and refers to situations where observations in one class are significantly greater or lower than those in the other classes. Machine learning algorithms do not take the class distribution into account since they prefer to improve accuracy by decreasing the error.

SMOTE (Synthetic Minority Oversampling Technique) – Oversampling

One of the most popular oversampling techniques to address the imbalance issue is SMOTE (synthetic minority oversampling technique).
By increasing minority class samples at random and duplicating them, it seeks to balance the distribution of classes.

SMOTE combines already existing minority instances to create new minority instances. For the minority class, it creates virtual training records using linear interpolation. For each example in the minority class, one or more of the k-nearest neighbours are randomly chosen to serve as these synthetic training records. Following the oversampling procedure, the data is rebuilt and can be subjected to several categorization models.

```
sm = SMOTE(random_state=300)
X_train, y_train = sm.fit_resample(X_train, y_train)
```

F. Scaling the data

A data preparation technique for numerical features is called data scaling. Data scaling is necessary for the success of many machine learning techniques, including the KNN algorithm, linear and logistic regression, and gradient descent approaches.

The MinMax Scaler reduces the data inside the specified range, often between 0 and 1. By scaling features to a predetermined range, it changes data. It scales the values to a particular value range while preserving the original distribution's shape.

V. PROJECT IMPLIMENTATION

A. Proposed Modular Implementation

Below is the proposed modular implementation of the project. It consists of modules:

1. Admin
2. User

1. Admin Module:

The admin of the system is responsible for the activities like:

1. Uploading the dataset
2. The dataset's data analysis
3. Data Preparation
4. Divvying up the dataset into training and test portions
5. Conditioning the model for various regression techniques
6. Examine how well the algorithms performed on the provided dataset.
7. Use the XGBoost regressor algorithm to build the model.

2. User Module:

The system's user may take advantage of the following available machine learning services:
logging in and entering item/product information to forecast future sales

.

B. SYSTEM DESIGN

1. Data Flow Diagram: Admin

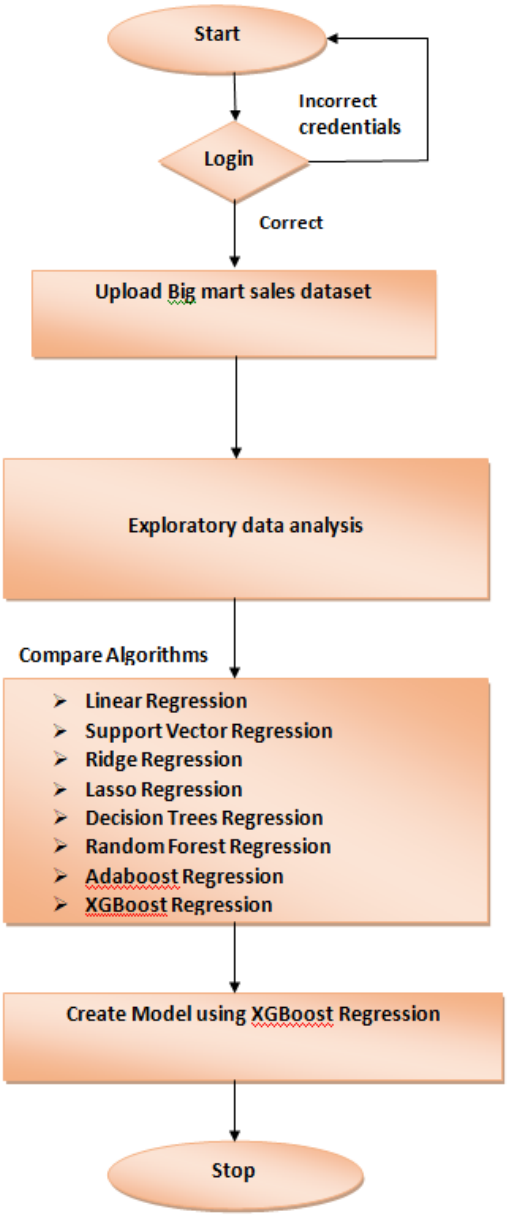

Figure 1: A Data Flow Diagram for Admin

2. Data Flow Diagram: User

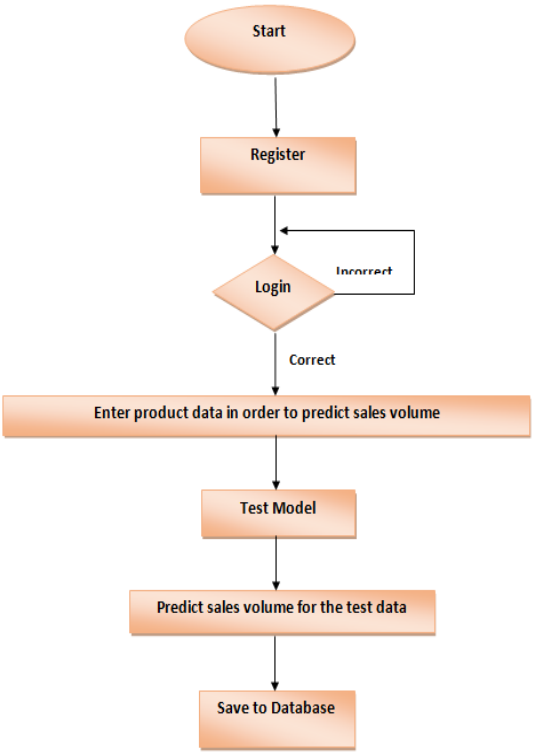

Figure 2: A Data Flow Diagram for Admin

VI. IMPLEMENTATION AND RESULT ANALYSIS

A. Project execution process:

1. Upload Dataset

The system administrator can upload datasets that are used to train machine learning models on this page. To upload a file to a server, an administrator must first choose the file by clicking the Choose file button, then click the Upload button. A success message indicating that the file was successfully uploaded would be shown once the upload was finished. We are utilising the dataset train.csv for this project.

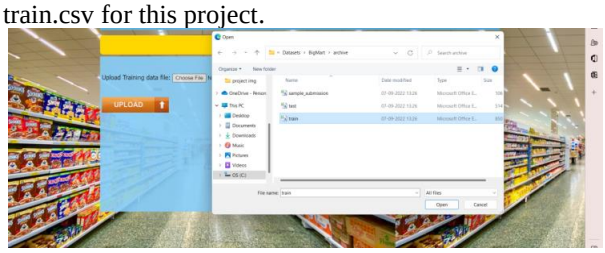

Figure 3: Upload Dataset

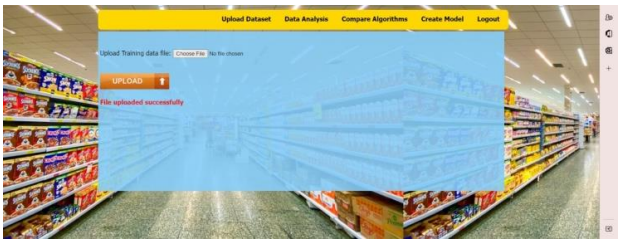

Figure 4: File uploaded

2. Data Analysis

Exploratory Data Analysis is performed on the dataset in order to clean the dataset for any missing data, identify patterns, and identify the relationships of various parameters of the outputs with the help of graphs, statistics, etc. so that Data Analysis can be performed.

a) Item Type Analysis:

The below graph shows the Education Analysis of an individual from the Training dataset Loan_Train.csv File.

Figure 5: Item Type Analysis

3. Compare Algorithms

On this page, the admin can feed the dataset to various Algorithms to train them and get the test accuracy for each algorithm.

a) Linear Regression:

When the dataset is fed to Linear Regression algorithm we observe that the variance is 0.27

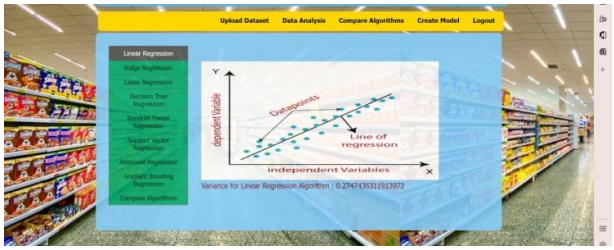

Figure 7: Linear Regression

b) Decision Trees Regression

We see that the variance is -0.4 when the dataset is fed into the Decision Trees Regression algorithm.

Figure 8: DT Regressor

c) XGBoost Regressor

We see that the dataset's XGBoost Regression algorithm's variance is 0.29.

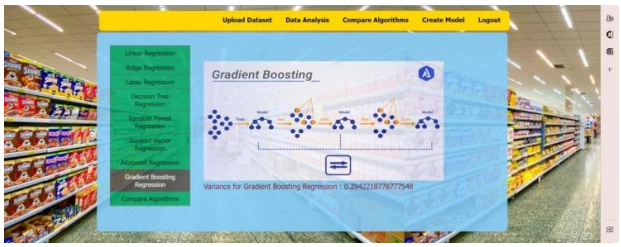

Figure 9: XGBoost Regression Algorithm

4. Create Model

The Generate Model button can be used to create the Model. After pressing the button, a success message is presented and the model is built. Our model's precision is 98.85%.

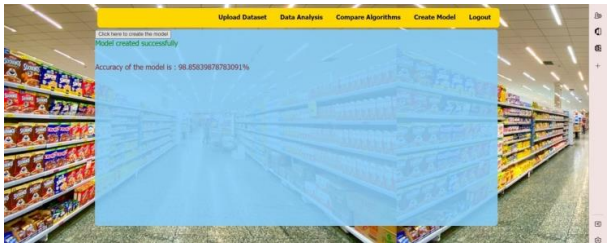

Figure 10: Create Model

5. Test Model:

This is in User Home Page for the user module. The user need to login into the system with his credentials in order to facilitate prediction over a of new applicant Loan data over dataset.

Figure 11: Test model

B. Metrics Evaluation :

Mean Squared Error (MSE):

The term Mean Squared Error (MSE) refers to the square of the difference between actual and estimated values in statistics. You may determine how closely a regression line resembles a set of points using the mean squared error (MSE). This is accomplished by squaring the distances between the points and the regression line (also known as the "errors"). The squaring is required to eliminate any unfavourable indications. Additionally, it emphasises bigger discrepancies. Since you're averaging

a collection of errors, this error type is known as the mean squared error. The forecast is more accurate the lower the MSE. A crucial component of the estimation of the statistics is the mean-squared error. Through the use of a special method to determine the square of the mistakes and their average, it aids in calculating the differences between the estimated value and the actual value and provides insight. The value of the MSE is determined by the square and the average. The difference between the value being estimated and the estimated value is the basis for calculating mistakes. It is a risk function because it predicts the amount of the loss. This quantification aids in determining the loss's cause, which might also be the estimator. MSE is largely favourable. There are several methods for determining MSE. For instance, the variance and mean-squared error will be equal if the estimator is not biassed. The unit changes depending on how the quantity is primarily measured.

What is variance?

In terms of linear regression, variance is a measure of how much the mean of the predicted values and the observed values vary from one another. The objective is to have a low value. The r2 score measures what low implies (explained below).

****

Linear Regression variance score: 0.2898929014039604

Linear Regression accuracy score: 0.2898929014039604

Model Accuracy: 28.989

The mean squared error (MSE) on test set: 1527402.9605

****

Ridge variance score: 0.2897475632976064

Model Accuracy: 28.975

The mean squared error (MSE) on test set: 1527715.5751

****

Lasso variance score: 0.29025278613992467

Model Accuracy: 29.025

The mean squared error (MSE) on test set: 1526628.8674

****

Decision Tree variance score: -0.4477602327585175

Model Accuracy: -44.776

The mean squared error (MSE) on test set: 3114055.9924

****

Random Forest variance score: 0.2201021623422761

Model Accuracy: 22.010

The mean squared error (MSE) on test set: 1677519.1636

****

Support Vector variance score: -0.25841716778740387

Model Accuracy: -25.842

The mean squared error (MSE) on test set: 2706789.0342

****

Adaboost variance score: 0.19297485037034323

Model Accuracy: 19.297

The mean squared error (MSE) on test set: 1735868.5826

****

XGBoost variance score: 0.30810725637279024

Model Accuracy: 30.811

The mean squared error (MSE) on test set: 1488224.8425

****

VII. CONCLUSION

We were successful in creating and implementing a machine learning model for this project that forecasts sales of various products in a superstore. We have used the Big Mart sales data set from kaggle.com, an open source data set, in order to accomplish this. The data has been cleaned and preprocessed, divided into training and test data, and fed to a variety of regression algorithms, including Linear regression, Support vector regression, Ridge regression, Lasso regression, Decision Trees regression, Random Forest regression, Adaboost regression, and Xgboost regression. That transaction, which we have seen, provides the highest level of accuracy. As a result, we improved the xG boost regressor, which now provides an accuracy of roughly 98%. For this data set, our model performs better than any other machine learning models we have used. Future plans call for expanding this research to include time series analysis using ARIMA.

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Text Summarization Using Zero-Shot Model

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Abstract-**Automatic text summarization comprises a set of techniques that use algorithms to condense a large body of text, while at the same time preserving the important information included in the text. It is an area of computer automation that has seen steady development and improvement, although it does not get as much press as other machine learning approach. This is not to say that text summarization is of little importance, quite the contrary. A large amount of the information we create and exchange is in written form. Therefore, systems that can extract the core ideas from text and preserve the overall meaning stand to revolutionize entire industries, from health care to law, to finance, by allowing you to share information faster and more efficiently. Automatic summarization as a field is not limited to text. In fact, you can "summarize" images and videos as well as text. Automatic summarization as "the process of shortening a set of data computationally, to create a subset (a summary) that represents the most important or relevant information within the original content". The end goal, whether we summarize text, images or videos, is to reduce the amount of resources required to transmit and process data.**

I. INTRODUCTION

In recent years, this area has become a particular point of interest due to the explosion of written content available online. Everything from tweets, to news articles, to blog posts includes text. This text may contain vital information for businesses, brands, financial asset traders, etc. but the amount of text generated far outpaces our ability to process it. The positive side of the explosion of written content available online is that we now have more training data we can use to create advanced summarization models. In fact, while early summarization algorithms were never really very good, newer models based on deep-learning techniques and trained on vast amounts of data can produce impressive results.

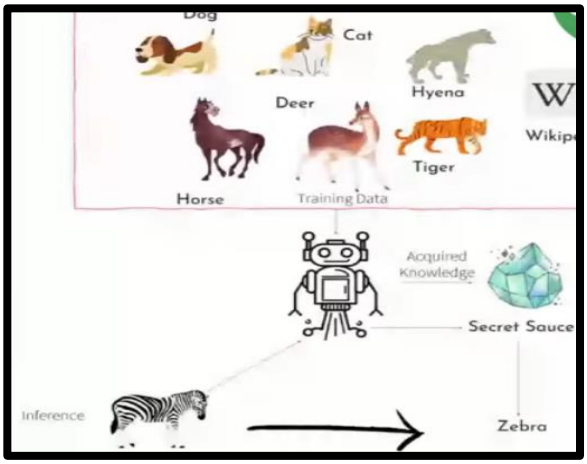


Figure1: Generalized Model of text Summarization [1]

Fine-tune Model:

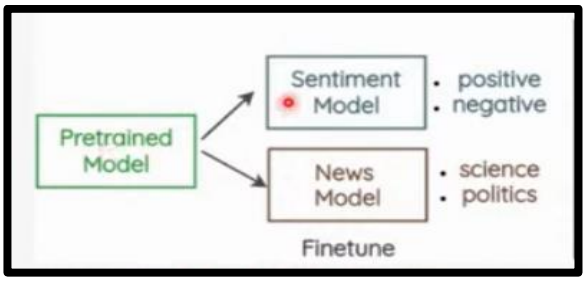


Figure2: Fine-tune Model [2]

Types of Text Summarization

There are two main types of Text Summarization:

II. EXTRACTIVE:

Extractive summarization methods work just like that. It takes the text, ranks all the sentences according to the understanding and relevance of the text, and presents you with the most important sentences.This method does not create new words or phrases; it just takes the already existing words and phrases and presents only that. You can imagine this as taking a page of text and marking the most important sentences using a highlighter.

III. ABSTRACTIVE:

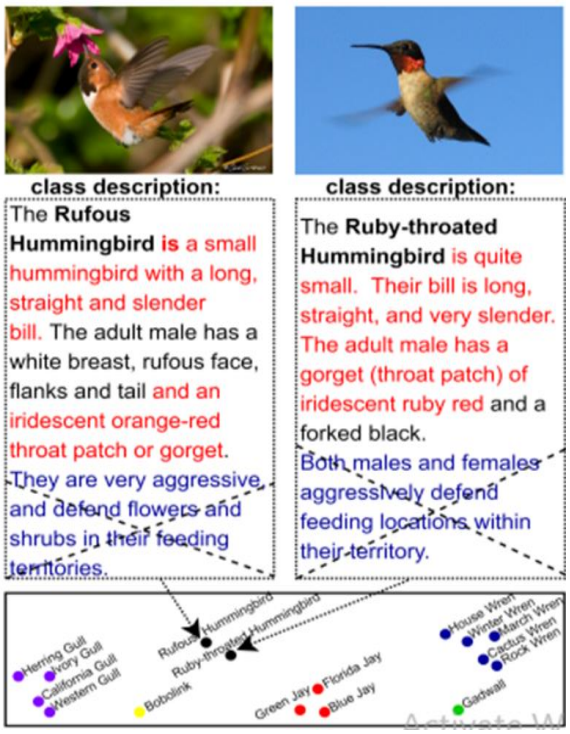
Abstractive summarization, on the other hand, tries to guess the meaning of the whole text and presents the meaning to human.It creates words and phrases, puts them together in a meaningful way, and along with that, adds the most important facts found in the text. This way, abstractive summarization techniques are more complex than extractive summarization techniques and are also computationally more expensive.

Summarization using Two Approaches

1. On the basis of Textual Similarity & Visual Description

   In computer vision, zero shot-learning (ZSL) for image classification is the problem of classifying images given auxiliary information. An image classification model is trained to classify images from a pre-defined set of classes. At test time, images from new classes are given, and the task is to transfer knowledge learned from seen classes during training to unseen test classes.

   Fiqure 3: Summarization of Wikipedia articles [3]

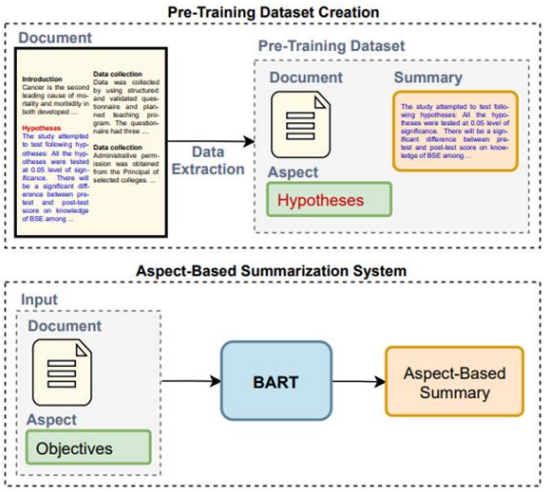


2. Scientific Document Summarization

Scientific document summarization aims to summarize research papers, and it is usually considered as generating paper abstracts Compared to the news summarization datasets like CNN/Daily Mail, scientific papers are significantly longer, follow a standard structure, and contain more technical terms and complex concepts. Recently, there have been remarkable improvements in the area of scientific document summarization due to the availability of large-scale datasets such as arXiv and PubMed and pre-trained sequence to sequence models such as BART and PEGASUS. However, little research has been conducted on aspect-based scientific document summarization.

Aspect-based summarization is the task of summarizing a document with respect to a specificpoint of interest. Aspect-based scientific document summarization has several advantages for readers to explore retrieved articles quickly and facilitates document assistance systems. It can be particularly helpful to assist readers in critical reviewing of articles.

Collecting a largescale dataset for this task is extremely costly. Meng et al. (2021) introduce FacetSum, an aspect-based document summarization dataset. They employ structured abstracts from the Emerald database to create summaries from four perspectives (purpose, method, findings, and value). However, in real applications, readers may be interested in new aspects that go beyond proposed annotations.



Fiqure 4: Summarization of Scientific Unlabeled Documents

Scientific document summarization falls under the problem of long document summarization. Different approaches have been proposed to alleviate models struggle with long inputs, such as applying a hierarchical encoder together with a decoder attending to discourse-level information or summarizing papers sections separately.

IV. Experimental Results

a) ZEST with Other Methods

methods	CUB		NAB	
	SCS	SCE	SCS	SCE
MCZSL Akata et al. (2016)	34.7	-	-	-
WAC-Linear Elhoseiny et al. (2013)	27.0	5.0	-	-
WAC-Kernel Elhoseiny et al. (2016)	33.5	7.7	11.4	6.0
ESZSL Romera-Paredes and Torr (2015)	28.5	7.4	24.3	6.3
SJE Akata et al. (2015)	29.9	-	-	-
ZSLNS Qiao et al. (2016)	29.1	7.3	24.5	6.8
SynC$_{fast}$ Changpinyo et al. (2016)	28.0	8.6	18.4	3.8
SynC$_{OVO}$ Changpinyo et al. (2016)	12.5	5.9	-	-
ZSLPP Elhoseiny et al. (2017)	37.2	9.7	30.3	8.1
GAZSL Zhu et al. (2018)	43.7	10.3	35.6	8.6
Nearest Neighbor Similarity (NNS)	40.402	5.551	37.002	5.517
ZEST$_{vanilla}$	39.16	11.77	27.61	10.18
ZEST$_{similarity}$	**47.48**	**11.77**	**38.2**	**10.18**
ZEST$_{similarity}$+VRS	**48.57**	**15.26**	**38.51**	**10.23**

b) Visual Summarization with ZEST

methods	CUB		NAB	
	SCS	SCE	SCS	SCE
GAZSL	43.74	10.3	35.6	8.6
GAZSL+parts summarization	19.54	9.557	23.32	7.2
GAZSL+parts summarization+*similarity*	38.25	9.557	33.05	7.2
GAZSL+our VRS	43.72	**16.44**	37.28	9.237
GAZSL+HUMAN	35.98	21.81	-	-
GAZSL+HUMAN+*similarity*	47.32	21.81	-	-
ZEST$_{vanilla}$	39.16	11.77	27.61	10.18
ZEST$_{vanilla}$+our VRS	42.58	15.26	32.24	10.23
ZEST$_{similarity}$	47.48	11.77	38.2	10.18
ZEST$_{similarity}$+parts summarization	42.27	10.93	37.02	8.055
ZEST$_{similarity}$+our VRS	**48.57**	15.26	**38.51**	**10.23**
ZEST$_{similarity}$+HUMAN	48.99	17.2	-	-

c) Zero Shot learning Curves

methods	CUB	NAB
	SCS	SCS
$ZEST_{vanilla}$	39.16	27.61
$ZEST_{vanilla}$+bird category	43.71	36.73
$Zest_{similarity}$ only 1 cluster	46.55	35.94
$Zest_{similarity}$ full (2 cluster)	**47.48**	**38.2**

d) Quality Analysis of Human VS ZEST

	Sentence	HUMAN	VRS Model
1	After nesting, north american birds move in flocks further north along the coasts, returning to warmer waters for winter.	✗	✗
2	Red foxes and coyotes readily predate colonies that they can access, the later being the only known species to hunt adult pelicans (which are too large for most bird predators to subdue).	✗	✗
3	when foraging, they dive bill-first like a kingfisher often submerging completely below the surface momentarily as they snap up prey.	✗	✗
4	It is one of only three pelican species found in the western hemisphere.	✗	✓
5	Due to their small size, they are vulnerable to insect-eating birds and animals.	✗	✓
6	Hummingbirds show a slight preference for red, tubular flowers as a nectar source.	✗	✓
7	The head is white but often gets a yellowish wash in adult birds.	✓	✓

e) Results of Scientific Data Summarization

		PubMed			FacetSum		
Pre-Train	Paraphrased Aspect	R-1	R-2	R-L	R-1	R-2	R-L
✗	Introduction	40.66	22.12	36.18	-	-	-
✗	Introduction -> Background	27.98	9.34	23.62	-	-	-
✗	Introduction -> Context	30.37	11.92	25.95	-	-	-
✓	Introduction -> Background	41.47	22.48	36.79	-	-	-
✓	Introduction -> Context	40.28	21.58	35.64	-	-	-
✗	Objectives	51.45	31.79	46.09	48.83	29.10	43.46
✗	Objectives -> Objective	51.37	31.66	46.03	48.91	29.17	43.52
✗	Objectives -> Purpose	36.03	15.93	29.84	46.70	26.11	41.11
✗	Objectives -> Aims	28.89	9.29	23.02	30.95	9.64	25.34
✓	Objectives -> Objective	51.10	31.39	45.60	48.51	28.81	43.14
✓	Objectives -> Purpose	49.77	29.92	44.09	48.28	28.46	42.88
✓	Objectives -> Aims	42.67	22.99	36.72	45.19	24.82	39.55
✗	Methods	40.78	19.08	35.84	32.79	11.71	27.64
✗	Methods -> Method	40.67	18.75	35.753	32.94	11.82	27.73
✗	Methods -> Materials and Methods	40.84	19.16	35.82	32.98	11.75	27.82
✗	Methods -> Research Design	34.82	14.23	29.74	32.68	11.34	27.41
✗	Methods -> Methodology	40.88	19.13	35.90	32.92	11.82	27.81
✓	Methods -> Method	41.13	19.24	36.07	32.85	11.88	27.69
✓	Methods -> Materials and Methods	40.58	19.05	35.58	32.77	11.80	27.69
✓	Methods -> Research Design	38.22	17.18	33.12	32.84	11.81	27.62
✓	Methods -> Methodology	40.82	19.24	35.75	32.77	11.82	27.62
✗	Results	34.73	12.91	30.69	32.67	10.21	27.43
✗	Results -> Result	34.42	12.73	30.30	32.46	10.05	27.21
✗	Results -> Discussion	23.57	7.09	20.09	26.12	5.90	21.25
✗	Results -> Finding	24.85	6.01	21.37	26.63	6.40	21.81
✓	Results -> Result	34.12	12.53	30.00	32.46	9.98	27.22
✓	Results -> Discussion	19.80	4.18	16.65	29.06	7.82	23.93
✓	Results -> Finding	29.11	9.24	25.29	32.46	10.01	27.20
✗	Conclusion	34.03	14.11	28.17	-	-	-
✗	Conclusion -> Conclusions	33.97	14.13	28.16	-	-	-
✓	Conclusion -> Conclusions	33.94	13.92	28.04	-	-	-
✗	Value -> Value	-	-	-	33.58	10.98	27.38
✗	Value -> Values	-	-	-	32.24	10.59	26.98
✓	Value -> Values	-	-	-	33.46	10.99	27.35

V. CONCLUSION

In this paper, we studied the problem of zero-shot aspect-based summarization of scientific documents. We established various experimental setups to investigate the effect of additional pre-training and intermediate training on the zero-shot performance with respect to domain-shift and unseen aspects. We proposed a self-supervised approach to pre-train the model using unlabeled target datasets. Results indicate that additional pre-training on the target dataset followed by intermediate training results in the best zero-shot performance. This paper also aims to establish a better way to represent the language modality in text-based ZSL for image classification. Our approach only relies on semantic information about visual features, and not on the visual features themselves.

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Route Optimization for Police

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Abstract-**Finding the fastest path for cars to take between two points is a process known as route optimization. Police cars can use this idea to increase the patrol coverage and response time of their vehicles. In order to reduce travel time and distance while still making sure that all of the important locations are covered, police routes are optimised. This results in improved resource management and elevated public safety. Police cars need to be able to respond to situations quickly, so route optimization is essential. They can go to the site and deal with the matter more quickly if the route is more effective. Police departments may now choose the most practical routes to follow thanks to modern mapping technology and GPS tracking. Real-time traffic patterns, road conditions, and other variables that may affect journey time are all taken into account by the optimization programme. In conclusion, route optimization is a crucial tool for police to use to increase the efficacy and efficiency of their operations. It helps shorten reaction times, use less gasoline, and guarantee coverage of the entire city. As a result, there is an improvement in public safety and resource efficiency. Police agencies may now choose the most effective routes to travel with the use of cutting-edge mapping technologies and GPS tracking, making it simpler for them to respond to emergencies and keep the community safe.**

Keywords – road segment classification, smart city management, patrol routing optimization

I. INTRODUCTION

Route optimization for police patrols is an important area of study that aims to improve the effectiveness and efficiency of law enforcement operations. The goal of route optimization is to determine the best path or sequence of locations for police officers to patrol in order to accomplish specific objectives, such as reducing crime, improving response times, and maximizing coverage.

Route optimization for police patrol is a complex problem that involves a variety of factors, including crime patterns, real-time information, limited resources, and other constraints. To address these challenges, researchers have developed a range of optimization algorithms, including linear programming, integer programming, and heuristics, that take into account different aspects of the problem.

Despite advances in the field, many challenges remain in developing effective route optimization algorithms for police patrol. These include the need to incorporate real-time information, deal with dynamic and uncertain crime data, balance competing objectives, manage limited resources, and integrate with other systems and processes.

This research aims to contribute to the development of effective route optimization algorithms for police patrol by addressing some of the remaining challenges in the field. By providing a comprehensive overview of the current state of the art and identifying areas for further improvement, this research will support the development of more effective and efficient police patrol operations.

II. LITERATURE SURVEY

Mathematical optimization methods for route optimization in policing have been widely researched in the literature. One common approach is linear programming, which involves formulating the optimization problem as a linear function subject to constraints. Linear programming has been used to optimize police routes with various objectives, such as minimizing response times, reducing fuel consumption, and maximizing officer safety.

Dynamic programming is another optimization method that has been used for route optimization in policing. This method involves breaking down a complex optimization problem into a series of smaller subproblems, which can then be solved individually. Dynamic programming has been used to optimize police routes with a variety of objectives, including minimizing response times, reducing fuel consumption, and enhancing officer safety.

Metaheuristics are a family of optimization algorithms that are designed to be applied to complex problems. These algorithms are often used for problems that are difficult to solve using traditional optimization methods. Some common metaheuristics for route optimization include genetic algorithms, simulated annealing, and ant colony optimization. These methods have been used to optimize police routes with various objectives, including minimizing response times, reducing fuel consumption, and maximizing officer safety.

Empirical studies on the application of route optimization methods in policing have shown mixed results. Some studies have found that optimized routes can significantly improve response times and reduce fuel consumption, while others have found that the benefits are more modest or that the effects depend on the specific policing environment. A few studies have investigated the impact of route optimization on officer safety, and have found that optimized routes can reduce the risk of officers being involved in accidents or other dangerous situations.

However, the literature also highlights the importance of considering the specific needs and constraints of each policing organization when optimizing police routes. Factors such as traffic patterns, crime patterns, and resource availability can greatly impact the effectiveness of route optimization methods. Additionally, the choice of optimization method may also impact the results, as each method has its own strengths and weaknesses.

In conclusion, the literature suggests that route optimization can be a valuable tool for improving policing outcomes, but that the specific benefits depend on the needs and constraints of each organization and the methods used to optimize the routes. Further research is needed to better understand the impact of route optimization on policing outcomes and to develop more effective and efficient methods for optimizing police routes.

III. METHODOLOGY

The methodology for road optimization for police can vary depending on the specific problem being addressed and the approach taken by the researchers. However, some common methods include:

Mathematical modelling: Researchers may use mathematical optimization techniques, such as linear programming, mixed integer linear programming, or non-linear programming, to model the problem of road optimization for police. These models consider various factors, such as patrol vehicle availability, patrol schedules, patrol durations, travel time, and crime hotspots, to optimize the allocation of patrol routes.

Algorithm-based approach: Researchers may use algorithms, such as particle swarm optimization (PSO), genetic algorithms (GA), or simulated annealing (SA), to solve the problem of road optimization for police. These algorithms iteratively improve a set of solutions, based on predefined objective functions and constraints, to find the optimal solution.

Case study approach: Researchers may also use case studies to analyse the effectiveness of road optimization for police in real-world scenarios. This approach involves collecting data from a specific case, such as a city or a neighbourhood, and applying optimization techniques to analyse the results.

Regardless of the approach taken, the goal of road optimization for police is to improve the efficiency and effectiveness of patrols, while also considering factors such as cost and resource constraints.

Certainly! Here are a few more points that could be included in the methodology of road optimization for police:

Crime data analysis: Researchers may use crime data to identify crime hotspots and high-risk areas that require increased police presence. This information can then be incorporated into the optimization models or algorithms to ensure that patrol routes are optimized in these areas.

Geographical Information System (GIS) mapping: Researchers may use GIS mapping tools to visualize the patrol routes, crime hotspots, and other relevant information on a map. This helps to better understand the geographical distribution of crimes and the impact of patrol routes on crime reduction.

Multi-objective optimization: Researchers may consider multiple objectives, such as crime reduction, patrol efficiency, and cost, when optimizing the patrol routes. This approach takes into account trade-offs between different objectives and ensures that the final solution is a compromise that balances these objectives.

Real-time optimization: In some cases, researchers may develop algorithms or models that can be applied in real-time, allowing police departments to optimize patrol routes in response to changing crime patterns or resource constraints.

Evaluation and assessment: Researchers may also evaluate and assess the effectiveness of the road optimization methods using metrics such as crime reduction, patrol efficiency, and cost. This helps to understand the impact of the optimization methods on police operations and inform future improvements.

These points further highlight the importance of considering various factors and approaches when developing road optimization methods for police.

IV. PROBLEM STATEMENT

One of the unresolved problems in the field of route optimization for police patrols is the challenge of incorporating real-time information into route optimization algorithms. Police patrol operations are dynamic and require real-time adjustments to account for changing circumstances, such as traffic conditions and emergency calls. However, many existing route optimization algorithms do not take real-time information into account, which can lead to suboptimal patrol routes that do not effectively respond to changing circumstances.

To address this challenge, researchers are working on developing algorithms that can incorporate real-time information into route optimization models. This may involve using techniques such as online optimization, which adjusts the solution in real-time based on new information, or using predictive models that estimate the impact of real-time information on patrol routes.

Another unresolved challenge is the need to balance competing objectives in police patrol routing. Police patrols must balance a variety of objectives, such as maximizing coverage, reducing response times, and minimizing travel distances, which can be conflicting. As a result, it is important to develop algorithms that can effectively balance these competing objectives to generate patrol routes that are both efficient and effective.

Finally, there is a need to integrate route optimization algorithms with other systems and processes to effectively support the work of law enforcement. This may involve integrating with dispatch and communications systems, or developing algorithms that take into account the capabilities and limitations of specific police departments.

These are some of the unresolved challenges in the field of route optimization for police patrols that present opportunities for further research and development. Addressing these challenges will help to develop more effective and efficient police patrol operations, improving public safety and supporting the work of law enforcement.

V. RESULT AND DISCUSSION

The result of the problem statement I stated earlier, which is the integration of community policing strategies into route optimization algorithms for police patrols, could be the development of algorithms that effectively balance the conflicting objectives of maximizing coverage, reducing response times, and minimizing travel distances, while taking into account the priorities and concerns of local communities.

The result of such research could lead to improved police-community relations and better alignment of patrol routes

with community priorities. This could result in more efficient and effective police operations that better serve the needs of both police and the communities they serve.

Additionally, the result of this research may also provide insights into the trade-offs involved in balancing the objectives of community policing and route optimization, and the impact of these trade-offs on patrol routes and police-community relations. This information could be useful in informing policy decisions and the development of community policing strategies and programs.

In conclusion, the result of addressing the challenge of integrating community policing strategies into route optimization algorithms for police patrols could lead to the development of more effective and efficient police operations that better serve the needs of both police and the communities they serve.

VI. FUTURE SCOPE

One aspect that may not have been fully addressed in previous research on route optimization for police patrols is the integration of community policing strategies. Community policing is a philosophy and strategy of law enforcement that emphasizes the importance of partnerships between police and the communities they serve. In community policing, police officers are encouraged to engage with community members to identify and address public safety concerns, and to work together to find solutions.

Integrating community policing strategies into route optimization algorithms can help to ensure that patrol routes are aligned with the priorities and concerns of local communities. For example, algorithms could be designed to prioritize patrol in areas identified as high-risk or to allocate resources to communities that have expressed specific public safety concerns.

Additionally, integrating community policing strategies into route optimization algorithms could also help to improve police-community relations by demonstrating a commitment to community engagement and ensuring that police resources are being used to address the concerns of local communities.

In conclusion, the integration of community policing strategies into route optimization algorithms for police patrols is an aspect that has not been fully addressed in previous research, and presents an opportunity for further exploration. By taking into account the perspectives and priorities of local communities, it may be possible to develop more effective and efficient patrol operations that better serve the needs of both police and the communities they serve.

VII. CONCLUSION

In conclusion, route optimization for police patrols is a complex and challenging problem that requires a multi-disciplinary approach to effectively balance the conflicting objectives of maximizing coverage, reducing response times, and minimizing travel distances. Over the years, researchers have developed a range of algorithms and methodologies for route optimization for police patrols, but the integration of community policing strategies has not been fully addressed.

Integrating community policing strategies into route optimization algorithms can help to ensure that patrol routes are aligned with the priorities and concerns of local communities, and can improve police-community relations. The result of such research could lead to the development of algorithms that effectively balance the objectives of community policing and route optimization, and to the development of more effective and efficient police operations that better serve the needs of both police and the communities they serve.

Overall, route optimization for police patrols is an important area of research with the potential to inform policy decisions and improve public safety. By continuing to explore and address the challenges of route optimization for police patrols, researchers and practitioners can help to ensure that police resources are being used in the most effective and efficient manner possible.

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Sarcasm Detection

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Abstract— **Sarcasm identification is one of the difficult tasks for the opinion mining assignment, and we want to review it in this work. We want to discuss sarcasm identification in this work because it is one of the challenging jobs for the opinion mining assignment. Many researchers have made an effort to explore the sarcasm's different properties in order to accomplish this, including its theories, syntactical traits, psycholingsssuistic traits, lexical features, semantic properties, etc. Semantic features and machine learning-based analysis techniques have both advanced as a result of research over the past 15 years. The most popular technique for sarcasm detection will be covered in this article. In light of our findings, we will offer a conclusion that could help other researchers produce more useful findings in the**

Keywords—opinion mining, sarcasm detection, syntactics, lexicon, psycholinguistic, semantic, machine learning

I. INTRODUCTION

Sentiment analysis is a method used in natural language processing (NLP) to ascertain the emotional undertone of a

document. It is often referred to as opinion mining. Organizations frequently utilise this technique to find and collect thoughts on a certain product, service, or idea. With the aid of data mining, machine learning, and artificial intelligence, text is mined for sentiment and subjective information (AI).

Systems for sentiment analysis help organisations extract information from unstructured, disorganised language included in online sources such as emails, blog posts, support tickets, web chats, social media channels, forums, and comments. To replace manual data processing, algorithms use rule-based, automatic, or hybrid procedures. Rule-based systems do sentiment analysis using predetermined, lexiconbased rules, whereas automatic systems employ machine learning to learn from data. A hybrid sentiment analysis is the result of combining the two techniques.

Sarcasm identification, a particular application of sentiment analysis where the emphasis is on sarcasm rather than detecting a sentiment throughout the entire spectrum, is a somewhat specialised area of NLP research. To ascertain if a specific text is satirical or not is the aim of this area.

Microblogging websites are the main platforms for expressing one's ideas, thoughts, and opinions on a range of topics and events. Sarcasm is a sophisticated form of irony that is widely utilised on social media and microblogging websites since they frequently encourage trolling and/or the criticism of others.

Twitter is one of the most well-known platforms for users to express their thoughts, discuss their perspectives, and report events in real time. Twitter has significantly increased its content over the past few years, making it a prime example of what is commonly referred to as big data. According to its official website, Twitter now boasts more than 288 million active users and receives more than 500 million tweets every day. Numerous organisations and corporations are curious about the public's impressions of current events, well-liked products, and films in light of these figures.

However, it might be challenging to grasp user sentiments and do such analysis due to the casual language used on Twitter and the character constraint (140 characters per tweet).

In the online Oxford dictionary, sarcasm is defined as "the use of irony to make or transmit contempt." The Collins dictionary defines it as "mocking, contemptuous, or sarcastic language designed to communicate scorn or abuse." The deeper concept of sarcasm, on the other hand, is directly related to language and common knowledge.

Although sarcasm varies in strength from person to person, it is typically very common and difficult to detect. Sarcasm is frequently used in daily life to criticise ideas, individuals, or events in addition to making jokes and being funny. It thus regularly occurs on social media sites, especially on microblogging services like Twitter.

II. LITERATURE SURVEY

Recent publications have focused on the categorization of tweets as researchers have become more interested in Twitter sentiment analysis. However, many classification techniques and qualities are used depending on the objective. Sriram et al. employed non-contextual criteria, such as the presence of slang, time-event words, opinionated expressions, and Twitter user information, to classify tweets into a pre-defined set of generic classes, such as events, opinions, deals, and private conversations.

The majority of studies, however, focused on the content of tweets and attempted to classify tweets according to the users' sentiments about specific problems. There were several recommended features. They also contain non-textual components like slang and emoticons, which are keyboard symbols that simulate facial emotions like a smile or frown and are generally used to reflect the writer's attitude, emotion, or intended tone. They go beyond just the frequency and presence of adjectives, bigrams, and unigrams. According to context and grammatical structure, Dong et al. suggested a target-

dependent categorization framework that learns to spread the sentiments of words towards the target.

Many more such researchers like Burfoot and Baldwin, Campbell and Katz, Davidov et al. and Tsur et al., etc., proposed their theories and their works can be classified into 3 categories which are:

Code	Classification	Description
S	Study purpose	Studies focusing on sarcasm detection
P	Platform	Twitter platform
C	Class labeling	The labeling mechanism of the target features (i.e., class) such as polarity
M	Machine learning algorithm	The type of machine learning algorithm used (supervised or unsupervised or semi-supervised)
E	Evaluation metrics	The utilized metrics to evaluate the performance of the classifier
L	Language	The language of the study and the data were in English

i. Rule-based approach

ii. Semi-supervised approach

iii. Supervised approach

III. . PROPOSED WORK

Following are the characteristics of the project which are mainly focused in this paper.

We extract a collection of features, consult a training set, and utilise machine learning algorithms to do the classification in order to determine if a tweet is sarcastic or not. Several tweet components are used in the algorithm used to extract the features, which also takes into account different subgenres of sarcasm. Our research uses a set of tweets that have been manually inspected and annotated

A. Data

For a few months, tweets with the hashtag "#sarcasm" were collected using Twitter's streaming API, and they were then divided into three sets. The first batch, often known as the "training set," is checked and categorised manually by individuals. The second batch has a lot of noise because it is not manually verified. However, by deleting non-English tweets and tweets with URLs, some noise is eliminated. The term "optimization set" is used to describe this set. Third set is carefully examined and designated as "test set." Each of the three groups contains a mixture of sarcastic and nonsarcastic tweets

B. Tools

To complete the numerous Natural Language Processing (NLP) tasks, we employed Apache Open NLP (such as tokenization, lemmatization, etc.). Due to the irrelevant content and the use of slangs, etc., Open NLP PoS tagger does not perform well when used with the provided model to tag tweets, thus we used Gate Twitter part-of-speech tagger instead. This PoS-tagger gets a 90.5% accuracy rate when used with Twitter data To perform the classification, we used the toolkit weka which presents a variety of classifiers. We used libsvm to perform the classification using Support Vector Machine (SVM).

C. Features Extraction

While annotating the data, the annotators concluded that these purposes fall mostly, but not totally, in three categories: sarcasm as wit, sarcasm as whimper and sarcasm as avoidance.

exclamation and question marks, as well as some sarcasm-related emoticons

• Sarcasm as whimper: when used as whimper, sarcasm is employed to show how annoyed or angry the person is. Therefore, it tempts to show how bad the situation is by using exaggeration or by employing very positive expressions to describe a negative situation.

• Sarcasm as wit: when used as a wit, sarcasm is used with the purpose of being funny; the person employs some special forms of speeches, tends to exaggerate, or uses a tone that is different from that when he talks usually to make it easy to recognize. In social networks, voice tones are converted into special forms of writing: use of capital letter words

• Sarcasm as evasion: it refers to the situation when the person wants to avoid giving a clear answer, thus, makes use of sarcasm. In this case, the person employs complicated sentences, uncommon words and some unusual expressions

Other main features that are extracted from the tweets are lexical features, Part-Of-Speech taggers, synonyms, sentiment-related features, punctuation-related features, syntactic and semantic features, pattern features and pragmatic features

i. Lexical feature

The most typical feature type in text mining is lexical features. The distinctive words, phrases, noun phrases, or named entities that are connected to a score to reveal its level of polarity are known as lexical characteristics. It may be possible to gauge the text's emotional intensity by using these qualities for emotion-mining (Yadollahi et al., 2017). According to Gonzalez-Ibanez et al. (2011), the lexical features can be divided into unigrams- and dictionary-based features. Dictionary-based features are derived from a dictionary-sampling method that includes four general classes, according to Ghosh et al. (2015) and GonzálezIbanez et al. (2011): (a) linguistic processes (e.g., adverbs and pronouns), (b) psychological processes (e.g., positive and negative emotions), (c) personal concerns (e.g., work and achievement), and (d) spoken categories (e.g., assent and non-fluencies). Additionally, the majority of dictionarybased features are drawn from a list of punctuation and interjections, such as ah, oh, and yes.

These findings show that the lexical features have more distinguishing cues that are connected to user polarity scores. The degree of polarity must therefore be estimated with a high degree of precision utilising a variety of methods. Several methods are typically used in the sarcasm detection task to determine the polarity of words. However, Signhaniya et al. (2015) discovered that the

miningtechnique can perform better when the lexical structure from a dependency tree is used. In conclusion, lexical traits are crucial components for resolving text mining issues. Lexical traits can be utilised to determine a statement's polarity, making it feasible to identify sarcastic tweets

ii. Part-Of-Speech taggers

To categorise words according to their POS forms, POS taggers were created. Due to the following factors, sentiment analysis frequently uses it: (A) Expressions devoid of sentiment typically include nouns and pronouns. With the use of a POS tagger, it may exclude words like these: (b) To identify words that can be used in various POS, a POS tagger can also be utilised. Researchers are using POS tagger to analyse sarcastic tweets because of its benefits. For instance, Ghosh et al(2015) .'s use of POS as a method to describe contextual information for co-training algorithms assisted in the development of a reliable corpus and precise predictions.

Barbieri et al. (2015) employed POS in a different study to incorporate specific elements intended to capture the structure of both positive and negative tweets. As a result, researchers have consistently used POS tagging in statement annotation due to its significant contribution to the categorization challenge. Before beginning the classification process, it is required to apply POS tagging in challenging jobs like sarcasm detection to determine whether the statement can be classified as sardonic or not.

iii. Synonyms

The technique of extracting features that share words with the same meaning is referred to as the extraction of synonyms-related features. This method appears to be effective in sarcasm detection when expressing a particular opinion in various contexts. Barbieri et al. (2015) described the method of selecting synonyms in the sarcasm detection task by collecting the list of synonyms for each word and then calculating (across all the terms of the tweet) the greatest/lowest number of synonyms with frequency higher than the one present in the tweet.

Additionally, they calculated the average number of synonyms for terms with frequencies higher or lower than the one in the tweet, as well as the greatest/lowest number of synonyms for those phrases (gap feature). Along with all the words that include POS features, the collection of synonym features must also be computed. Based on this, the usage of synonyms would improve the classifier's performance by analysing several features that are pertinent to the goal of detecting sarcasm. Synonyms can also improve the training set that will be utilised to train the classifier for the detection task

iv. Sentiment-related feature

This feature identifies and detects sarcasm when a positive statement, usually a verb or a phrasal verb, is collocated with a negative situation (e.g., “I love being ignored all the time”). In our work, we opt for a more straight-forward, yet more general approach. We consider any kind of inconsistency between sentiments of words as well as other components within the tweet. Therefore, to identify and quantify such inconsistency, we extract sentimental components of the tweet and count them. For this purpose, we maintain two lists of words qualified as “positive words” and “negative words”. The two lists contain respectively words that have positive emotional content (e.g., “love”, “happy”, etc.) and negative emotional content (e.g., “hate”, “sad”, etc.). The two lists of words are created using SentiStrength database.

We first calculate the ratio of emotional words ρ(t) defined as

$$\rho(t) = \frac{(\delta \cdot PW + pw) - (\delta \cdot NW + nw)}{(\delta \cdot PW + pw) + (\delta \cdot NW + nw)}$$

In case the tweet does not contain any emotional word, ρ is set to 0. In the rest of this work, δ is set to 3.

v. Punctuation-related feature

As previously said, sarcasm is a sophisticated kind of discourse that uses low tones, exaggeration, and facial gestures in addition to manipulating words and their meanings. When writing a message, these factors translate into certain punctuation choices or vowel repetitions. We extract a group of properties that we categorise as punctuation-related features in order to recognise these elements. For each tweet, we calculate certain values like Number of exclamation marks number of question marks, number of dots number of all-capital words and number of quotes.

We also add a sixth feature by checking if any of the words contains a vowel that is repeated more than twice (e.g., “looooove”). If such a word exists, the feature is set to “true”, otherwise, it is set to “false”. vi. Syntactic and Semantic features

In addition to the punctuation-related elements, sarcasm is frequently expressed using some common idioms. It is possible to determine whether or not something is being stated is sarcastic by comparing these terms with the punctuation. In addition, it's normal for people to use unusual words or construct complex statements while trying to avoid giving the reader or listener a clear answer. This happens frequently when sarcasm is employed as a form of "evasion," or when a person wants to conceal their true feelings or opinions. The use of unusual words, the quantity of uncommon words, the presence of typical sarcastic phrases, the frequency of interjections, and the number of laughing expressions are some features that we extract to portray these qualities

vii. Pattern-related features

In particular, spoken English frequently employs the "popular sarcastic expression" patterns that were selected

in the previous subsection. But in both our training and test sets, they are unusual, limited in number, and absent from the bulk of tweets. We dig deeper and extract a different set of features in light of this. We conceptualised our patternrelated attributes using concepts from Davidov et al. The author grouped terms into two categories: high-frequency words and content words based on how frequently they appeared in his data collection, and described a pattern as a "ordered sequence of high frequency words and slots for content words." viii. Pragmatic features

Pragmatic characteristics are texts that use symbols and metaphors (e.g., smiles and other emoti - cons). Because of the restrictions on tweet length, these characteristics are widely employed in tweets. A strong sign for sarcasm in Twitter is the pragmatic traits. As a result, numerous academics have taken pragmatic aspects and applied them to the classification of sarcasm. On the basis of this, it is clear how crucial it is toextract pragmatic aspects from social media posts. These characteristics are linked to consumers' attitudes towards a particular topic. In order to create a rich lexicon of users' emotions in relation to their opinions, previous studies extracted pragmatic elements from tweets containing sarcasm and linked them with the latent emotion encoded in such tweets

IV. RESULTS AND DISCUSSION

After extracting the features, we performed the experiments and formulated the results based on 3 main parameters:

- Precision: Precision denotes the percentage of sarcastic news reports that were accurately identified among classified posts, messages, and news records. It describes how effectively the suggested methods work. The values for precision can be calculated in the following manner.

$$\text{Precision} = \frac{\mathbf{TP}}{\mathbf{TP+FP}}$$

- Recall: Recall displays the percentage of correctly identified sarcastic postings, news, and messages. The recall is also acknowledged as sensitive. The values of recall can be calculated by the following manner

$$\text{Recall} = \frac{\mathbf{TP}}{\mathbf{TP+FN}}$$

- F-measure: F-measure denotes assessing all performance based on recall and precision measurements. The values of f-measure can be calculated by the following manner

$$\text{F} - \text{Measure} = \frac{\mathbf{2\times pre\times Rcall}}{\mathbf{pre+Rcall}}$$

A. Random Forest Classifier:

It is well known that the Random Forest classifier lessens bias brought on by overfitting and class imbalances between tweets. The method that was used the most frequently to identify sarcastic tweets was the polarity method. This approach was used by Bouazizi and Ohtsuki (2016) to categorise their data as either positive or negative. Later research by Bouazizi and Ohtsuki (2018) classified tweets as positive, negative, or neutral using the polarity method. Previous studies revealed performance ranging from 45.9% to 83.1%.

A. SVM:

Due to its effectiveness in streamlining the sentiment classification process, SVM is the most widely used algorithm for identifying sarcasm on Twitter in the literature (González- Ibanez et al., 2011). The gathered tweets were labelled using a variety of labelling techniques before being sent to the SVM classifier. Sarcasm can be detected, for instance, using the polarity approach, a natural language processing (NLP) application that was used to classify text sentiment. As part of this, it is possible to identify prospective changes in user emotion based on the traits of their tweets.

B. K-nearest neighbor

It is an ML framework with examples. The KNN of each sample is what determines the class label for each instance in this algorithm. As a result, the nearby example uses the concept of majority vote to select the class label. The overall accuracy of k-NN was 81.5% with the precision score of 72.0% and F1 score of 79.6%

C. Maximum Entropy:

Ptáek et al. (2014) employed Maximum Entropy (MaxEnt) to describe sarcasm in two languages (English and Czech). Ptáek et al. (2014) employed the major labels sarcastic and non-sarcastic to carry out the sarcasm detection process. MaxEnt's performance score was 77.4%. The character n-gram, skip-bigram, and pointedness in its structure are responsible for its great performance

Hence, the overall accuracy obtained reaches 83.1% using the classifier Random Forest for an F1-score equal to 81.3%. SVM, on the other hand, offers a low F1-score of 33.8% for a precision of 98.1%. This confirms that the majority of the tweets that were identified as being sarcastic actually are. Only a tiny fraction of the caustic tweets (almost

20%) were found, though. In other words, SVM can accurately recognise sarcasm and the result can be used to improve sentiment analysis, but it does not capture all sarcastic tweets.

Because there are significantly less sarcastic tweets in a real stream of tweets than there were in the dataset used, the results reveal that just one out of every five sarcastic tweets will be found. Random Forest performs the best, even when classifiers like k-NN and Maximum Entropy

show high accuracy and F1-scores. Both the preliminary experiments (i.e., parameter optimization) and the remainder of our inquiry use the classifier Random Forest's results

TABLE I. ACCURACY, PRECISION, RECALL AND F1-SCORE OF CLASSIFICATION USING DIFFERENT CLASSIFIERS

	Overall Acc.	Precision	Recall	F1-Sc
Rand. Forest	83.1%	91.1%	73.4%	81.3
SVM	60.0%	98.1%	20.4%	33.8
k-NN	81.5%	88.9%	72.0%	79.6
Max. Ent.	77.4%	84.6%	67.0%	74.8

V. CONCLUSION

Irony with a sophisticated twist, sarcasm, was widely used on the Twitter platform. Identifying sarcastic tweets is crucial for text classification and has numerous ramifications. In order to classify the sarcastic tweets in Twitter, this study examined a number of machine learning techniques. In this case, sarcasm detection on Twitter was performed using classification methods, and the PRISMA statement was used to provide a detailed guideline of the preferred reporting style.

31 papers were included after a thorough database search that was divided into the AMLA and CMLA groups. Our findings demonstrated that the SVM algorithm was the AMLA group's preferred technique for identifying sarcasm on the Twitter network. Additionally, it was discovered that CNN and SVM had a high prediction performance. Different text processing and categorization features, however, were used by other CMLAs. CMLAs' design parameters could vary, which led to various performance outcomes.

SVM and CNN-SVM were the most effective machine learning algorithms for predicting sarcasm on Twitter, according to the classification findings. The effectiveness of lexical, pragmatic, frequency, and POS tagging in enhancing SVM performance was also demonstrated by our findings. Using CNN-SVM, we also discovered that the primary predictors of sarcasm were both lexical and personal variables. These findings support the use of specific lexical, pragmatic, frequency, POS tagging, and personal factors in the identification of sarcasm on microblogs.

Additionally, this study advises using two target labels to identify sarcastic tweets. Such a labelling technique (such as negative/positive or sarcastic/non-sarcastic) could greatly aid the machine learning algorithm's learning process and hence improve the classification task. The published research on sarcasm recognition in the context of the Twitter platform, however, was the only restriction on the current study.

Additionally, we disregarded research that concentrated on irony identification because sarcasm is one sort of irony. Additionally, this review omitted talking about essential algorithmic aspects like the kernel type as well as data-related problems like the quantity of words used and the features of the normalized instances technique. Future research may take into account the potential impact that such factors may have on how well AMLAs and CMLAs perform in terms of detecting sarcasm on the Twitter platform

VI. ACKNOWLEDGMENT

The research results have been achieved by

“Cognitive Security: A New Approach to Securing Future

Large Scale and Distributed Mobile Applications,” the Commissioned Research of National Institute of Information and Communications Technology, Japan

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To have non-visible rules on your frame, use the

MSWord “Format” pull-down menu, select Text Box > Colors and Lines to choose No Fill and No Line.

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Food Grains Distribution Sytem Using Machine Learning and Data Analysis

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Abstract— **In India a lot of people have low wages due to which for their food needs they are mostly dependent on government rations. Most of the Ration Distributors take advantage of the current loop holes in this scenario which results in increasing pockets of distributors and lowering the rations of needy people. In this scenario we're using latest technologies such as machine learning by which we aimed to make this system more flexible and more transparent as well as reduce the current corrupt loopholes. The proposed system.**

Keywords— Food, Distribution, Public, Grains

I. INTRODUCTION

The Ration Distribution System in India is a government initiative aimed at providing food grains like wheat, rice, sugar, and kerosene to those who cannot afford high-cost food options. The system is currently run manually and has several shortcomings that need to be addressed. One of the major problems with the manual process is the potential for corruption, where shopkeepers may sell the rationed food at higher prices or not provide enough to customers. Another problem is the manual process itself, which can be time- consuming and prone to inaccuracies in measuring the amount of food provided. To overcome these problems, a proposal has been made to automate the Ration Distribution System using machine learning algorithms. Automating the process would not only make it more efficient, but it would also reduce the potential for human error and control corruption. For instance, customers could be given a password to access information about their ration allocation, including the number of people it is intended for, the amount that will be provided, and the distribution schedule. This would create a more transparent and accountable system, reducing the potential for corruption and improving the distribution of food to those in need. The proposed solution would also address another issue with the manual process, which is that people are often not aware of the availability of ration in their local shops.

With the automated system, customers would have access to up-to-date information about the availability of ration and the distribution schedule, reducing the need for them to travel long distances to obtain their food. This would not only save time, but it would also increase access to food for those in remote areas.

In addition to improving the distribution of food to those in need, the automated Ration Distribution System would also benefit the government by providing a more efficient and cost-effective process. By reducing manual labor and increasing the accuracy of the process, the government could save money and allocate those resources to other areas that need it. Furthermore, the government could use the data collected by the automated system to better understand the needs of those who rely on the Ration Distribution System, allowing them to make informed decisions about how to improve the program in the future.

In conclusion, the proposed use of machine learning to automate the Ration Distribution System in India has the potential to make a significant impact on the lives of those who rely on the program for their food. By reducing corruption and improving the efficiency of the process, the government could ensure that more people have access to the food they need to survive. Additionally, automating the system would benefit the government by providing a more cost-effective and data-driven approach to distributing food to those in need.

II. LITERATURE SURVEY

A literature survey of recent research on the use of machine learning (ML) and databases, including face recognition technology, for proper ration distribution systems reveals a growing interest in using these technologies to improve the efficiency and accuracy of food distribution programs.

One application of face recognition in ration distribution systems is to verify the identities of individuals who are receiving food rations. This helps to prevent fraud and ensure that only eligible individuals receive food. For example, some programs use face recognition technology to compare the face of an individual receiving food with a database of eligible recipients, thereby reducing the risk of fraudulent or unauthorized distributions. In addition to face recognition, ML algorithms are being used to analyze food distribution data to make predictions about food distribution needs. For instance, researchers have used ML to predict food demand in disaster relief efforts by analyzing data on population demographics, weather patterns, and the availability of food and other resources.

Databases also play a crucial role in proper ration distribution systems. For example, some programs use databases to store information on food inventory, distribution routes, and delivery schedules. This information can be used to optimize food distribution by reducing waste and ensuring that food is delivered to areas with the greatest need. However, there are also challenges that must be addressed when using ML and databases, including face recognition technology, for proper ration distribution. One challenge is ensuring the privacy and security of personal information, as the use of databases and face recognition technology can raise concerns about data protection and the misuse of personal information.

Another challenge is the accuracy and reliability of face recognition technology, as the technology is not always able to accurately identify individuals, particularly those from marginalized communities who may be underrepresented in the data used to train the technology.

The Public Distribution System (PDS) is a government-run food security system in India that aims to provide food grains and other essential commodities to the economically weaker sections of the population at subsidised prices.

The literature regarding the PDS in India can be broadly categorised into three types: evaluations of the effectiveness of the PDS in meeting its goals, analyses of the underlying causes of its inefficiencies, and studies on the impact of PDS reforms. Studies have shown that the PDS has had limited success in meeting its goals of providing food security to the needy. Leakages and diversions in the supply chain, coupled with poor targeting of beneficiaries, have resulted in a significant proportion of the subsidised food grains not reaching the intended recipients. Some of the factors contributing to these inefficiencies include corruption, weak implementation, and lack of transparency in the system.

Reforms to the PDS, such as the introduction of the targeted public distribution system (TPDS) and the use of digital technologies, have shown some promise in improving the effectiveness of the system. For example, the use of digitisation has been found to reduce corruption and increase transparency in the supply chain. However, the implementation of these reforms has been uneven across states, and their impact on the overall functioning of the PDS is still being studied.

In conclusion, the literature suggests that the PDS has had limited success in meeting its goals of providing food security to the economically weaker sections of the population in India. The underlying causes of its inefficiencies are multi-faceted and include corruption, weak implementation, and lack of transparency in the system. Reforms to the PDS, including the use of digital technologies, have shown some promise but their impact on the overall functioning of the system is still being studied.

The use of ML, databases, and face recognition technology has the potential to improve the efficiency and accuracy of proper ration distribution systems. However, it is important to address the challenges associated with these technologies, such as privacy and security concerns, and ensure that food distribution systems are transparent, accountable, and equitable for all individuals in need.

III. WORKING STRUCTURE:

A proper ration distribution system using machine learning (ML) and databases, including face recognition technology, can be structured as follows:

1. Data Collection: The first step in building a proper ration distribution system is to gather and store data on food inventory, distribution routes, and delivery schedules. This data can be used to make predictions about food distribution needs and to optimize food distribution.

2. Data Analysis: Once the data has been collected, it can be analyzed using ML algorithms, such as neural networks, decision trees, and support vector machines, to identify patterns and make predictions about food distribution needs.

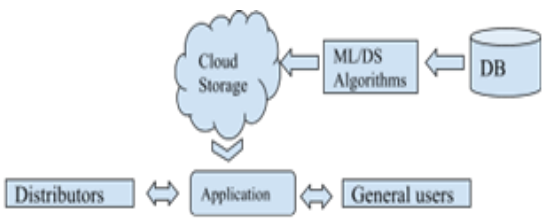
3. Face Recognition: To verify the identities of individuals who are receiving food rations, face recognition technology can be used to compare the face of an individual with a database of eligible recipients. This helps to prevent fraud and ensure that only eligible individuals receive food.

4. Optimization: Using the information generated from the data analysis and face recognition, the system can optimize food distribution by reducing waste and ensuring that food is delivered to areas with the greatest need.

5. Monitoring and Evaluation: The system should also include mechanisms for monitoring and evaluating its performance, including monitoring food inventory levels, distribution routes, and delivery schedules. This information can be used to make improvements to the system and ensure that it is functioning effectively.

6. Privacy and Security: To ensure the privacy and security of personal information, the system

A. Flowchart of process:



should include measures to protect the data, such as encryption and secure storage, and to prevent the misuse of personal information.

In conclusion, a proper ration distribution system using ML and databases, including face recognition technology, can be structured as a multi-step process that includes data collection and analysis, face recognition, optimization, monitoring and evaluation, and privacy and security measures. By implementing these steps, the system can improve the efficiency and accuracy of food distribution programs and ensure that food is distributed equitably to all individuals in need.

IV. PROBLEM STATEMENT

The problem with the current public distribution system (PDS) in India is that it lacks transparency in the distribution of food grains and other essential commodities to the economically weaker sections of the population. This leads to a number of challenges and issues, including:

1. Leakages and diversions in the supply chain, resulting in a significant proportion of subsidised food grains not reaching the intended recipients.
2. Corruption and mismanagement, which undermines the effectiveness of the system and results in a waste of public resources.
3. Poor targeting of beneficiaries, leading to subsidies being availed by those who are not in need.
4. Lack of accountability and transparency in the supply chain, making it difficult to monitor and improve the functioning of the system.
5. Inefficient distribution and storage systems, which result in food grains being wasted or being of poor quality.

V. FUTURE SCOPE:

The use of machine learning (ML) and databases, including face recognition technology, for proper ration distribution systems has significant potential for further development and growth in the future.

Here are a few possible future directions:

1. Improved Face Recognition Technology: As face recognition technology continues to improve, it is likely that it will become more accurate and reliable for use in ration distribution systems. This will enable the technology to better identify individuals and prevent fraud and unauthorized distributions.
2. Integration with Other Technologies: The integration of ML and databases, including face recognition technology, with other technologies, such as block chain and the Internet of Things (IoT), has the potential to further improve the efficiency and accuracy of ration distribution systems. For example, blockchain can provide a secure and decentralized database for storing food distribution information, and IoT devices can be used to track food inventory levels and delivery schedules in real-time.
3. Personalized Recommendations: ML algorithms can be used to provide personalized recommendations to individuals on their food needs and preferences. For example, by analyzing data on individual dietary restrictions, food preferences, and health conditions, the system could provide recommendations for food items that are most appropriate for each individual.
4. Predictive Maintenance: ML algorithms can be used to predict when food items are likely to run out and to schedule preventive maintenance for food storage and distribution equipment. This will help to reduce food waste and ensure that food is always available when it is needed.
5. Social Impact Analysis: ML algorithms can be used to analyze the social impact of food distribution programs and to make recommendations for improving the equitable distribution of food. For example, by analyzing data on food distribution patterns and socioeconomic indicators, the system could identify areas where food distribution programs are having the greatest impact and areas where additional resources are needed.

VI. CONCLUSION:

In conclusion, the use of machine learning (ML) and databases, including face recognition technology, for proper ration distribution systems has the potential to greatly improve the efficiency and accuracy of food distribution programs. By utilizing these technologies, it is possible to identify individuals accurately and prevent fraud and unauthorized distributions. Additionally, by integrating these technologies with other systems, such as blockchain and the Internet of Things (IoT), it is possible to create a more secure, efficient, and equitable food distribution system. Furthermore, ML algorithms can be used to provide personalized recommendations, predictive maintenance, and social impact analysis, which can further improve the distribution of food. Overall, the use of ML and databases, including face recognition technology, for proper ration distribution systems holds great promise for the future and has the potential to greatly benefit those in need of food assistance.

VII. ACKNOWLEDGMENT

We would like to express my special thanks of gratitude to our guide Mr. Namdeo Badhe, who gave us the opportunity to do this wonderful research work on the topic fertilizer

sssalgorithms which also helped me in doing lots of research and i came to know many things i am really thankful to himand even my friends

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Sentiment Analysis for Code-Mixed Languages using Deep Learning

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Abstract—**This paper presents a deep learning approach for Sentiment Analysis in Code-Mixed language, which combines two or more languages in a single sentence, making it a challenging task. A dataset of Code-Mixed language tweets was collected from Twitter and used to train a deep learning model. The model was evaluated using metrics such as accuracy, F1 score, precision, and recall, and the results showed that it outperformed existing methods for Sentiment Analysis in Code-Mixed language. The study also presents a unique contrastive learning-based method, known as Sentiment Analysis of Code-Mixed Text (SACMT), that categorizes sentences into positive, negative, or neutral connotations by mapping the sentences of code-mixed and standard languages to a single sentiment space using shared parameters of Siamese networks. Additionally, a clustering-based preprocessing technique is offered to identify word variants using code-mixed transliteration. The difficulties encountered in this task and potential future directions for improvement are also discussed.**

Keywords—Sentiment Analysis, Siamese Networks, Code-Mixed Text

I. INTRODUCTION

Social media platforms have become widely popular in multilingual societies with a substantial internet penetration rate. This has led to an increase in the use of code-mixed text, which is a combination of two or more languages in a single sentence. The use of code-mixed text is especially prevalent in social media, where people express their thoughts, opinions, and feelings about various subjects. This makes sentiment analysis of code-mixed data from social media platforms an important area of research. However, sentiment analysis of code-mixed text is a challenging task due to the unique structures and vocabularies that develop from the mixing of different languages. Standard approaches to semantic analysis are not equipped to capture the meaning of code-mixed sentences, making sentiment analysis even more difficult. The lack of annotated data for sentiment analysis is another hindrance to the development of this field. To address these challenges, a new approach called SACMT (Shared Attention Code-Mixed Text) has been proposed. This approach involves reducing the energy function connecting twin networks, which allows SACMT to learn the shared model parameters and the similarity measure.

The sentiment similarity of sentences is modeled into a shared sentiment space by the learned similarity metric. If the sentiment of phrases on both individual Bi-LSTM networks is the same, parameter sharing, and the Similarity Metric ensure that they are closer to each other in the sentiment space. On the other hand, if the sentiments are different, the networks are farther apart. This allows SACMT to effectively differentiate between phrases with similar sentiments, such as "India match jit gayi (India won the match)" and "Diwali ke shubh kamnaye sabko (Happy Diwali to everyone)," and phrases with different sentiments, such as "India match jit gayi (India won the match)" and "Bhai ki movie flop gayi (Bhai's movie was a fiasco)." Another challenge in sentiment analysis of codemixed text is the multiple spellings of the same word that are produced when phonetic languages like Hindi are transliterated into roman script. For example, the word "" (more) can be written as bahut, bohot, or bohut. To overcome this difficulty, SACMT implements a preprocessing phase that groups together various word variations using an empirical similarity measure. In conclusion, the remainder of the essay will provide a comprehensive overview of the field of sentiment analysis of code-mixed text, including a discussion of prior methods, datasets, SACMT's architecture, baselines, experimental design, findings, and future directions.

II. LITERATURE SURVEY

The distributional semantics technique is a method of capturing the meaning of words by analyzing the context in which they appear. While this approach is effective in determining the semantic meaning of individual words, it lacks the ability to capture the information about the order of words in a sentence. This means that it cannot accurately understand the relationships between words and their meanings within a sentence, which can lead to inaccurate sentiment analysis.

In addition to this limitation, the approach also assumes that words are unchangeable and cannot handle spelling mistakes or words that are not present in the lexicon. This can result in a failure to correctly classify a word's sentiment, even if the word itself is well understood

To address these limitations, the technique of using polarity scores for individual words has been developed. The sentiment of the entire sentence is determined by summing the sentiment scores of all individual words. However, this approach still suffers from the loss of information about the words' order and relationship, which can result in inaccurate classification.

One way to overcome this limitation is by using Ngrams, which consider the context of a word by looking at the words surrounding it. However, this approach is not a

complete cure and still may not accurately capture the meaning of a sentence.

Another related technique used in this field is Siamese Networks. Siamese Networks are a type of neural network that aid in the contrastive learning of a similarity metric. This type of network was developed to address the issue of signature verification, but has since been adapted for use in other fields, including sentiment analysis. The key advantage of Siamese Networks is that they do not rely heavily on the attributes of the input, allowing them to be more flexible and generalizable.

It is important to note that abbreviations and acronyms can present challenges in sentiment analysis, as they often carry a different sentiment than the full form of the word. Siamese Networks and character level LSTMs can help to overcome this challenge by analyzing the text at the subword level, which can provide a more detailed understanding of the text, including abbreviations and acronyms.

A. Research, character level LSTMs are used to analyze social media text at the subword level, which allows for a more in-depth analysis of the text. This approach utilizes an annotated corpus to gather information about the text, which is then used to classify the sentences. The use of character level LSTMs also offers a useful strategy for embedding sentences, which is an important aspect of sentiment analysis.

The discriminative loss function architecture is a type of architecture used in computer vision tasks, such as face verification. This architecture has proven to be effective in raising the standard of visual search. In recent years, Siamese networks have also been used to address the issue of community question answering. A Siamese network is a type of neural network that seeks to find a value for a parameter W, such that the similarity metric between two inputs X1 and X2 is small if they are members of the same category and large if they are members of different categories. This is achieved by representing the relationship between the inputs as a scalar energy function S(C, R), which can be written as ||F(C)F(R)||. Here, F(X) represents the family of functions with parameters X, and || represents the Euclidean distance between the inputs.

In the context of sentiment analysis, the scalar energy function can be used to represent the sentimentrelatedness between tweets written in code-mixed text (C) and resource-rich language (R). This allows the Siamese network to determine the similarity of sentiments between the two inputs and provide a score that reflects the sentiment-relatedness of the tweets. The Siamese network is differentiable with respect to the parameter W, which allows for the use of gradientbased optimization algorithms to find the optimal value of W.

III. METHODOLOGY

The dataset used in this study is crucial in evaluating the architecture on code-mixed (Hindi-English) data as well as text from social media in a standard language (English). A total of 3879 annotated Hindi-English code-mixed utterances make up the dataset, which was proposed in an earlier study. The annotations provide valuable insights into the complexity of code-mixed data and the difficulties that arise in processing this type of data. Additionally, the study used 103035 annotated English tweets, which were collected from social media platforms. These annotated tweets provide a comprehensive understanding of the challenges faced in processing text from social media in a standard language.

The study also used the dataset for Task 2B1 of SemEval 2013, which is made up of the Architecture of SACMT. The use of this dataset helps to evaluate the performance of the architecture on a widely used benchmark in the field of sentiment analysis. The SemEval 2013 dataset provides a comprehensive evaluation of the ability of the architecture to handle sentiment analysis tasks in a real-world setting.

Overall, the use of these datasets provides a

comprehensive evaluation of the architecture on a wide range of data types, including code-mixed data, standard language text from social media, and a widely used benchmark in sentiment analysis. The results of the study will provide valuable insights into the strengths and limitations of the architecture in processing different types of data and its potential for future applications in the field of natural language processing.

A siamese network is employed in this study, where a completely connected layer is placed on top of the network, utilizing twin character-level Bi-LSTM networks. The sentences are projected into a common sentiment space using bi-LSTMs, which allows the linking of sentiment vectors produced by the two subnetworks. This sentiment space is then fed into a layer that computes the similarity between the two sentiment vectors. This similarity measurement, combined with the corresponding label, is then utilized in the contrastive loss function. The gradient of the loss function is computed with respect to the weights and biases shared by the sub-networks through backpropagation across time.

One of the challenges in handling code-mixed word variations is transliteration from languages with phonetic scripts, such as Hindi. This can lead to variations in words depending on the user. To solve this issue, the study utilizes clustering of skip-gram vectors, which provides a representation of a word in the semantic space based on its context. The word variations, which have similar functions and contexts, are then clustered based on a similarity metric that captures both the semantic and consonant properties of the words. The similarity metric is defined as a function that compares the overall similarity between two variations and returns the closest word variations. The most frequent word in the cluster is

then selected as the representative of the cluster, based on the assumption that the most frequent word is also the most likely to be the correct one.

The use of primary embeddings in sentiment analysis of code-mixed text has proven to be effective in overcoming challenges posed by the informal nature of such text. This is because code-mixed text often contains spelling mistakes and vocabulary word shortages, which can impact the sentiment expressed in the text. For example, the word "Heeey" might express a positive emotion, while the word "Hey" might be neutral. To address this, the authors suggest treating character trigrams as units instead of words, as there are more words than character trigrams. This reduces the computational complexity of the analysis.

The authors use the SACMT twin networks, which are fed with two character-based term vectors representing the tweet and a label. The label indicates the sentiment space proximity of the samples, where positive samples are closer in the sentiment space. By providing the twin networks with the same information for positive samples, the authors aim to improve the accuracy of sentiment analysis.

The use of primary embeddings in the form of character trigrams helps overcome challenges posed by the informal nature of code-mixed text and enables more accurate sentiment analysis. The authors recommend using the SACMT twin networks for this purpose. Additionally, for science writers, the authors suggest consulting an excellent style manual, such as [7].

IV. METHODS

A. Once the editing of the text is finished, the next step is to prepare the paper for formatting. To do this, the author should duplicate the template file by using the "Save As" command and rename the file according to the naming convention prescribed by the conference. In the newly created file, the author should select all of the contents and import the edited text file.

The final step is to style the paper. The author should use the formatting toolbar on the left side of the MS Word window to apply the desired format and styling to the text. The scroll down window on the left of the MS Word Formatting toolbar provides access to various formatting options, such as font size, font style, and text alignment. By using these tools, the author can create a well-designed and visually appealing paper that meets the requirements of the conference.

A classification exercise is being carried out with the focus on Hindi-English CodeMixed (HECM) sentences. To perform the classification, the HECM sentences are aligned with English sentences from Twitter datasets that have the same mood, which are designated as positive samples and assigned the number 1. Furthermore, an equal number of English sentences with different moods, which are designated as negative samples, are randomly selected and assigned the number -1.

The purpose of this exercise is to examine the benefits of training the model, SACMT(HE-Eng), with both Hindi-English CodeMixed and English phrases. The objective is to evaluate the effectiveness of using this model for the classification of HECM sentences, and to determine whether the performance of the model can be improved by training it with a combination of HECM and English sentences. The results of this study will provide insight into the impact of language mix on the performance of machine learning models, and help in developing better methods for handling code-mixed text.

The aim of this study is to evaluate the performance of a sentiment analysis model, SACMT(HE-Eng), when trained using both Hindi-English CodeMixed (HECM) sentences and English phrases. By including HECM sentences in the training data, we aim to improve the model's ability to accurately classify the sentiment of HECM statements. The experiment will provide insight into whether incorporating HECM sentences into the training data can improve the overall performance of the sentiment analysis model for code-mixed text.

V. FUTURE SCOPE

Expanding the scope of the study to cover multiple language pairs in code-mixed text, including multilingual code-mixed text. Incorporating other deep learning techniques, such as attention-based models, to enhance the performance of the sentiment analysis system. Evaluating the system on code-mixed data from other domains, such as customer reviews and product descriptions. Investigating the performance of the system in cross-lingual sentiment analysis, where the code-mixed text is translated into a resource-rich language before analysis. Developing methods to improve the interpretability of the system, such as visualizing the sentiment space and the similarity metrics used in the system. Incorporating the system into real-world applications, such as sentiment analysis of customer feedback and opinion mining of social media data. Investigating the generalization capability of the system to unseen code-mixed text and new variations in the code-mixed language. Using transfer learning techniques to fine-tune the system on a specific domain or language pair to improve its performance. Overall, the future scope for this research paper is to continue improving the performance and versatility of the system for sentiment analysis of code-mixed text and to expand its application in various domains and languages.

VI. CONCLUSION

In this study, we aim to tackle the issue of sentiment analysis for code-mixed text by proposing a new method called SACMT (Sentiment Analysis for Code-Mixed Text). SACMT takes advantage of the power of bidirectional LSTM networks, which are deep learning models that are capable of capturing the context of words

in a sentence. In our method, we use twin bidirectional LSTM networks with shared parameters to project the sentences into a shared sentiment space. This sentiment-based representation is then used to group together sentences with similar sentiment and measure their similarity.

We evaluated SACMT on several datasets and compared its performance with other state-of-the-art techniques. The results showed that SACMT outperforms these techniques and provides a noticeable improvement in sentiment analysis for code-mixed text. In addition to using bidirectional LSTMs, SACMT also makes use of resources from various languages to enhance sentiment analysis. This is achieved by incorporating an emoji-based strategy, which improves the performance of the overall sentiment analysis. The management of word variants was also found to be effective in enhancing the performance of all trained models, including the baseline models. SACMT is a novel approach to sentiment analysis for code-mixed text and provides a promising solution to this challenging problem. Our method can be easily applied to different domains and languages, making it a valuable tool for researchers and practitioners alike. Future work will focus on exploring additional strategies to improve the performance of SACMT and extending its application to other areas of natural language processing.

Sentiment analysis for code-mixed languages is a

rapidly growing field that utilizes deep learning techniques such as Bidirectional LSTMs and siamese networks to project sentences into a shared sentiment space. The use of these models and techniques has shown to significantly improve the accuracy of sentiment analysis for code-mixed text. Utilizing resources from multiple languages and managing word variants have also been found to further improve the performance of these models

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Clinical Decision Support System

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Abstract— **In this chapter, we are presenting theoretical background, proposed machine learning tools and modern research trends required for Clinical decision support system. A two-layer knowledge base paradigm (disease-symptom) of rule reasoning is frequently used in clinical decision support systems. Since it just assumes that a disease exists based on the presence of specific symptoms, this model frequently does not effectively represent information. In order to leverage more helpful information in inference, we suggest a three-layer knowledge base model (disease-symptom-property) in this study. Based on a multisymptom naive Bayes algorithm, the system iteratively predicts the likelihood that a patient will have a disease. The specificity of these illness symptoms is weighted by the estimated degree to which they contribute to the diagnosis of the condition. To better implement the naive Bayes algorithm, the dependencies between attributes are greatly reduced. The inference engine's parameter optimization stage of the online learning process was then completed. Our technology can give clinicians useful clinical suggestions by comparing prediction findings with clinical outcomes. Additionally, we discovered that the three-layer model can increase prediction accuracy in comparison to the two-layer model.**

Keywords— Clinical decision support system, three layer model, naïve

I. INTRODUCTION

There is a upward trend in the AI research to patient care, clinical decisions and healthcare. ML and DL research has significantly helped in dermatology, oncology and radiology. The most common specialty represented in the review was oncology. Similar to cardiology, AI and ML research in oncology has shown good prediction performances over the years. Currently, most organisations are aiming to use machine learning for mundane CDS tasks for now. It is the workflow and administrative kinds of models- the ones that help with things like patient scheduling or predicting patient no-shows – that are already making an impact. For now, we focus on a number of things that are not necessarily difficult diagnostic problems, but they are things that might improve the workflow in some way. Machine learning and CDS tools are most effective when they are trained on data that is accurate, clean, and complete. After all, an algorithm's output is only as good as its input, and in the high-stakes industry of healthcare, the input has to be pretty precise. The availability of healthcare data has increased with electronic health record systems and the rise of connected devices. In this study, we combined Extensible Markup Language (XML) technology with a professional medical knowledge base and constructed a three-layer model of a professional medical knowledge base. This model expands the knowledge base and utilizes more useful information. Doctors can communicate with patients online, get information about their symptoms and physical characteristics, and feed that data into our system, which then determines the condition and the likelihood that the patient will be affected. The system's decision-making outcomes are then compared to actual clinical outcomes for online learning of the inference engine's parameter optimization.

The rest of this essay is structured as follows. A three-layer approach for a medical knowledge base is introduced in Section 2 of this document. We describe our three-layer model's inference engine in Section 3. The specificity weighted for online learning parameters are introduced in Section 4. The system design and its execution are displayed in Section 5. The system is assessed in Section 6, and the findings are discussed. Section 7 provides conclusions.

II. RELATED WORK

The proposed machine learning structure includes two stages. Stage I applies online learning using hierarchical temporal memory (HTM) to enable real time stream processing and provides unsupervised predictions. Stage II is a long short-term memory (LSTM) classifier that forecasts the status of the patient's MAP ahead of time based on Stage I stream predictions. Maintaining the Integrity of the Specifications

The proposed system saves extensive offline modelling, uncertainty, and delays associated with conventional systems. In this model, HTM provides unsupervised predictions in real time, and LSTM provides the classification, it is used to analyse and train on predicted streams. The average prediction time per patient was 150 seconds and the delayed predictions were 75 seconds on average.

III. DESIGN & METHODOLOGY

A. Medical Knowledge Base

A CDSS must have some level of medical knowledge, and this information must follow the inference engine design principles, in order for it to function . The medical knowledge base of our system is constructed using XML, which is widely used for Web transport and offers a standardised approach to describe and communicate structured data that is independent of the application.

With the use of expertise from knowledgeable specialists and medical literature, we constructed our medical knowledge foundation for this investigation. Data, information, and knowledge are arranged and displayed in a way that both people and machines can comprehend what they imply. Different labels are used by XML to define various types of data, each of which has been specially created by developers to allow for future extension, modification, or improvement. In this system, a disease knowledge base and a symptom knowledge base for common diseases are combined to form a three-layer model medical knowledge base.

B. Three Layer Model

There are numerous syndromes for an illness, including symptoms and vital signs. Furthermore, different diseases can occur with the same symptoms. As an illustration, patients with primary bronchial lung cancer and tuberculosis (TB) would exhibit the same symptoms, such as coughing and hemoptysis. As seen in Figure 1, we refer to the disease-symptom model as a two-layer model. The CDSS is built on a two-layer paradigm of rule reasoning, which is common in many existing systems. In other words, the existence of specific symptoms implies the presence of the disease. This straightforward method makes it challenging to effectively represent information when translating it into machine language.

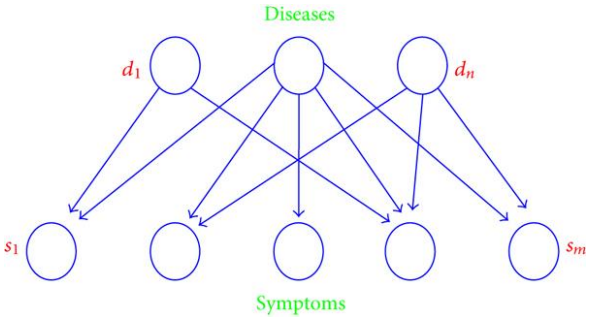

Figure 1: Schematic of disease-symptom model

By adding a "property" to the two-layer knowledge base, we propose a three-layer model of "disease-symptom-property" that is inspired by the two-layer model and Collins' theory of the decision tree for disease diagnosis. Coughing is one symptom of TB, for instance, and it can have a variety of distinct characteristics, such as length of time it lasts or how severe it is. Based on this finding, we enlarge the medical knowledge database to add more information and more precisely convey the knowledge. Figure 2 shows the three-layer model.

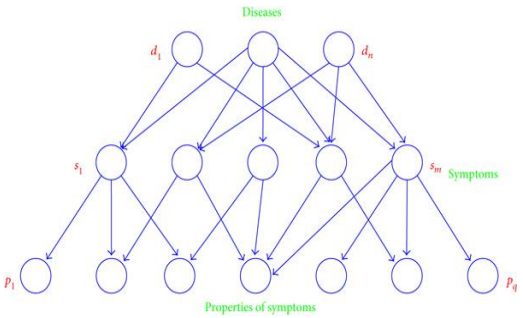

Figure 2: Schematic of disease-symptom-property model

We require prior probability knowledge for the inference engine. The disease knowledge base includes the properties of symptoms in addition to the presence of symptoms as a prior possibility. Utilizing clinical data and expert clinical experience, we provide these prior probabilities to the knowledge base of our three-layer model. Experts also assign the starting probability value of the emergence of certain symptoms and characteristics of the disease. For a disease, the prior probability of this condition is given an initial probability value. When a certain symptom and attribute combination occurs for a specific disease, the risk that the disease will occur is increased; the "specificity" is then applied to the symptom weighting in the inference engine to determine the disease.

We constructed a three-layer model of an XML medical knowledge base for common respiratory diseases compiled by doctors at the Anhui University of Chinese Medicine. This medical knowledge base primarily contains 380 three-layer model pieces of information, including prior probability knowledge and specificity value, and 11 different types of respiratory disorders.

C. Inference Engine: Multisymptom Naive Bayes Algorithm and Symptom Specificity Weighting

a) Inference Engine:

Data processing is carried out by the inference engine, which also uses knowledge and an inference strategy to manage and coordinate the complete expert system. The representation of internal information serves as the foundation for the inference engine. Model-based reasoning, rule-based reasoning, and case-based reasoning (CBR) are the three types of inference engines that may be found in CDSSs. Model-based systems replicate the composition and operation of the system under investigation. Rule-based reasoning is primarily defined as reasoning that is based on a set of rules. Excelicare CBR, a UK commercial clinical decision system that uses electronic medical records as case data for real-time aid in helping, is an example of such a system. CBR refers primarily to the utilization of prior case experience to reason.

Belief networks and the probability based on the Bayesian theorem approach are frequently used to make decisions. The inference engine's purpose is to make choices and predictions by applying medical knowledge to patient data, and developing it is a crucial step in building a CDSS. The system employs the probability to represent the relationship between sickness and symptom based on prior knowledge of the Bayes theorem.

b) Naïve Bayesian Algorithm

Using Bayes' theorem as its foundation, the broad Bayesian classifier is a type of classification algorithm. A very basic and uncomplicated classification algorithm is the naïve Bayes (NB) algorithm [14]. Naive Bayes classifiers are a family of straightforward probabilistic classifiers used in machine learning that are based on the application of Bayes' theorem and strong (naive) independence assumptions between the features.

The NB classifier works as follows:

1) As usual, for an *n*-dimensional attribute vector, $X = (a_1, a_2, \ldots\ldots a_m)$, depicting it for 'm' attributes, respectively, $a_1, a_2, \ldots\ldots a_m$.

2) Suppose that there are n classes: $C = (y_1, y_2, \ldots.y_n)$. Given a tuple, X, the naïve Bayes algorithm predicts that tuple X belongs to class y_i, if and only if $P(y_i \mid X) > P(j \mid X)$ $(1 \leq j \leq n, j \neq i)$. This is the maximum probable hypothesis and may formally be called the maximum a posteriori hypothesis.

3) Thus, using Bayes' theorem, the conditional probability can be decomposed as

$$P(y_i|X) = \frac{P(X|y_i)P(y_i)}{P(X)} = \frac{P(X|y_i)P(y_i)}{\sum_{i=1}^{n} P(X|y_i)P(y_i)}$$

(1)

4) This presumes that the values of the attributes are conditionally independent of one another, given the class label of the tuple. This means that

$$P(X|y_i) = P(a_1|y_i)P(a_2|y_i)\cdots P(a_m|y_i) = \prod_{j=1}^{m} P(a_j|y_i)$$

(2)

5) Therefore, formula (1) becomes

$$P(y_i|X) == \frac{P(X|y_i)P(y_i)}{\sum_{i=1}^{n} P(X|y_i)P(y_i)} = \frac{P(y_i)\prod_{j=1}^{m} P(a_j|y_i)}{\sum_{i=1}^{n} P(y_i)\prod_{j=1}^{m} P(a_j|y_i)}$$

(3)

c) Multisymptom Naive Bayes Algorithm

The multisymptomatic naive Bayes formula is as follows:

$$P(D_i \mid S_1, S_2, \ldots, S_m) = \frac{P(D_i)\prod_{k=1}^{m} P(S_k|D_i)}{\sum_{i=1}^{n} P(D_i)\prod_{k=1}^{m} P(S_k|D_i)}$$

where,

(1) D_1, D_2, ….D_n represent kinds of mutually exclusive diseases, with "*i*" representing the sequence number of the disease;
(2) $P(D_i)$ is the prior probability of D_i, (the prior probability of occurrence of disease);
(3) S_1, S_2,…..,S_m are the symptom properties, where "*m*" represents the number of the property;
(4) $P(S_k|D_i)$ is the probability of the occurrence of symptom S_k under disease D_i.
(5) P (Di | S1, S2,…., Sm) is the posteriori probability of disease D_i under the condition of the symptoms presented by the patient.

The system first filters out some susceptibility factors from the patient's information (like gender and age), then it combines the remaining data with susceptibility factors from the medical knowledge base (like common diseases in men or elderly people who are susceptible to disease), and it reports back to the doctor so they can ask about related symptoms. The patient's symptoms are entered into the system as a result of the interaction between the doctor and the patient. The multisymptom naive Bayes algorithm determines the posterior probability of the patient's potential disease under the known condition of prior probabilities. The next step is to perform the specificity weighting of the symptom.

d) Symptom Specificity Weighting

An evaluation of the degree of contribution to disease diagnosis weighs the specificity of certain disease symptoms. The weighting greatly minimizes the dependencies between specificities, allowing for improved application of the NB algorithm. A novel model that provided a partial weight rather than a normal variable weight value was proposed in 2001 to enhance the NB algorithm [15]. A multisymptomatic naive Bayes algorithm's inference engine, as previously said, infers potential diseases and their associated probabilities, and the current input symptom information decides if it is specific for the inferred disease. Thus, the following weighting is applied to the appropriate a posteriori probability:

$P(D_i \mid S_1, S_2, \ldots, S_m)' = P(D_i \mid S_1, S_2, \ldots, S_m) + P(D_i \mid S_m) \times (1 + \text{specificity weight})$, (5)

Where P (Di | S1, S2, …., Sm) are the possible diseases and their corresponding probabilities found by using the multisymptomatic naive Bayes algorithm, $P(D_i \mid S_m)$ is the specificity of the current input symptom to the disease, and specify weight ϵ [0,1) is the specificity weighting value for online learning, whose initial value is 0.6.

P (Di | S1, S2, …., Sm)' are the calculated disease and the corresponding probability.

D. Online Learning Process

More and more industries in the big data era require quick data processing. Particularly for the more conventional batch machine learning techniques, learning and training neural networks require a significant amount of data as input. Online learning must handle the data stream in real time and strike a compromise between speed and accuracy because, in practise, the limited training data frequently arrives in real time. Regular upkeep and upgrades to the medical knowledge base are required. Consequently, our online learning system offers a benefit in this regard.

a) Perceptron Learning Algorithm

The perceptron is a supervised learning technique for binary classifiers in machine learning (functions that can decide whether or not an input, represented by a vector of numbers, belongs to some specific class). Many machine learning algorithms have made extensive use of the "reward-punishment" notion. If the input was successfully classified, the weighting vector stays the same. If the input was improperly classified, the weight vector will be changed to point in the right direction.

The algorithm is as follows:

(1) Choose *n* points belonging to the positive or negative instance, in the case of a binary classification problem, as shown in the following type:

$\{(x_1, y_1), (x_2, y_2) \ldots (x_n, y_n)\}$,

$X_i = R^{d+1}, y_i \epsilon \{-1,+1\}$,

where x_i are the corresponding eigenvectors of samples, y_i are the classifications of corresponding sample labels, d is the characteristic number, and n is the total sample training set. Take the weight vector of the initial value, w_0 , beginning at iteration t=1.

(2) Train samples iteratively online, and calculate the values of the weights and the correct vector:

$$\omega_t = \begin{cases} \omega_{t-1}, \omega_{t-1}^T x_i \geq 0 \\ \omega_{t-1} + \sigma x_1, \omega_{t-1}^T x_i < 0 \end{cases}$$

Here, $\boldsymbol{\sigma}(\boldsymbol{\sigma}>0)$ is an adjustment of the step length.

(3) As long as an error classification remains, return to step 2 until the correct classification for all samples has been achieved.

b) Online Learning System

The system initially s The "reward-punishment" notion and the perceptron theory are used in this system to create specialized weighting factors for online learning. The highest probability inference results, D′, and the clinical results of disease diagnosis were compared; if the clinical results do not agree with the system's results, we know that the particular weighting parameter has a certain contribution to the algorithm in the inference engine. The online learning method is used to adjust it, and the result will gradually move towards the actual value:

Specificity weight

$$\begin{cases} specificity\ weight, D = D', \\ specificity\ weight + \delta\ x\ specificity\ weight, D \neq D', \end{cases} \quad (8)$$

Where $\boldsymbol{\delta}$(=0.1) is the parameter used for studying; if specificity weight > 1, we assign specificity weight = 0.99.

E. System Design and Its Implementation

The mechanism: Our system was created in the C# programming language. Additionally, the Web, a SQL Server database, and an IIS server were employed. Users first need to register. Common users, managers, and doctors are the three different categories of users in the system. The system can be used mostly by clicking on Web pages, and during the interaction process, advice, justifications, and diagnoses can be given.

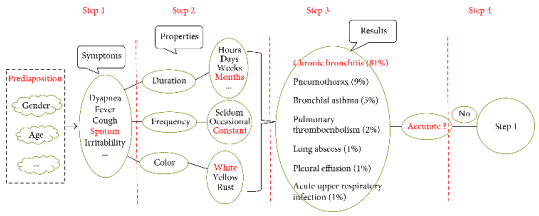

Figure 3: System Framework Design

Figure 3 illustrates the four essential components of our framework: a user module, a built-in inference engine, medical knowledge, and online learning.

Identify applicable funding agency here. If none, delete this text box.

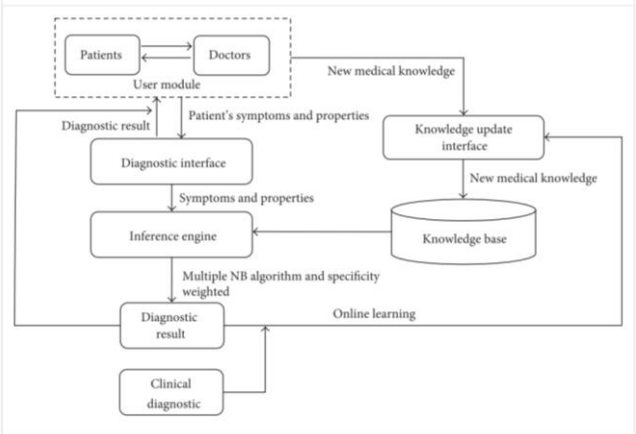

Figure 4: System Framework

A doctor chooses the patient's symptoms and characteristics in the user module, and the system uses its own inference engine to determine the patient's potential diseases and their probabilities. A knowledge update interface is also part of the system, allowing the clinician to directly edit the knowledge base. The clinician can add to, remove from, or change the three-layer medical knowledge base using this graphical interface. The knowledge update interface is crucial since the physician could gradually pick up new diagnostic expertise. The other three sections were thoroughly explained in the section before it.

a) Interaction Process

The doctor can obtain some very basic information from the system page such as name, age and sex of the patient. The system separates a variety of susceptible elements, including initial feedback regarding potential disease symptoms and common disease alternatives, gender-susceptible factors (common diseases for men or women), age-susceptible factors (age-related disease, etc.), and so on. Information from outpatient departments will be included in susceptibility variables in the future. The page will asynchronously enter the symptoms into our internal reasoning algorithm and compute the patient's potential disease information and likelihood when the doctor selects the symptoms and properties. A new symptomatic issue will be displayed on the page along with a chart that shows the doctor how likely it is that the condition is present. The explanation module will present information on the potential illness. Iteratively repeating the process, doctors and patients are still interacting.

An interactive process flowchart is shown in Figure 4. Step 1 displays a list of symptoms that were discovered as a result of several vulnerable conditions. Step 2 displays the attributes and associated alternatives under the relevant symptoms list. Step 3 displays the potential illnesses and the associated probability determined by the inference engine algorithm; if the results are unreliable, step 1 is repeated.

F. System Evaluation and Results

Utilizing actual testing scenarios, our system is evaluated for clinical efficacy and contrasted with a two-layer method. First, two top specialist doctors tested the system's functionality and provided feedback on the

front-end page that allowed us to improve the system and make it simpler to use. Second, doctors employed 50 clinical cases, covering 10 different types of respiratory diseases, to evaluate the clinical efficacy. These cases are frequently used to test knowledge-based systems to show whether a system exhibits a performance level equivalent to that attained by human specialists. To compare with the three-layer approach, we lastly constructed a knowledge base based on a two-layer model.

a) Clinical efficiancy and results

Doctors practised interacting with patients by selecting the patient's symptoms and characteristics from the website and entering them into the internal inference engine. We investigated the system inference findings and clinical diagnosis outcomes, and we employed five measurements—deterministic, recommended, indicated, possible, and recall—to separate the results in our clinical efficacy study. The deterministic type gauges the system's power and has a focus on diagnostic success. It states that there is an 80% to 100% chance that the system will correctly identify the ailment. The probability for the recommended and suggested kinds are between 0.6 and 0.8 and 0.4 and 0.6, respectively; these two types represent the fraction of a gold standard diagnostic (which may include several components) that has been accurately proposed by the system. For the recollection type, the likelihood of sickness is less than 0.1, while the probability for the potential type is between 0.1 and 0.4. Table 1 provides a summary of the findings.

Table 1: Summary of clinical efficacy evaluation results

	Deterministic	Recommended	Suggested	Possible	Recall	Sum
Probability distribution	0.8–1	0.6–0.8	0.4–0.6	0.1–0.4	<0.1	
Test case	7	13	24	5	1	50
Overall performance	0.14	0.26	0.48	0.10	0.12	1.00

The system's recall-type results don't provide doctors with any guidance on how to make decisions. A clinical misdiagnosis proportion is defined as:

"misdiagnosis proportion(%) = $\frac{N_{recall}}{N_{test}} \times 100\%$"

From table 1, we can calculate misdiagnosis proportion hence, correct proportion(%)=1–misdiagnosis proportion(%)=98% Otherwise, we discovered that the majority of the results are distributed in the range of recommended and suggested types; this is consistent with the reality because the system detects the disease through patient interaction and offers some recommendations and suggestions to aid the clinician in making clinical decisions, but additional examinations, such as imaging tests and blood tests, are also necessary to detect the disease. Naturally, the likelihood of having a certain symptom associated with a particular disease in our three-layer model knowledge base will be relatively high, hence the system will produce a deterministic outcome similar to a deterministic type.

b) Results

Due to the limitations of a two-layer model for the medical knowledge base, it is not always possible to infer disease just from the presence of symptoms. For instance, symptoms like coughing, sputum production, fever, and others are used to determine whether a person has tuberculosis (TB), but they can also indicate an acute upper respiratory infection or bronchiectasis disease. To better identify between these comparable diseases, we added a "property" (such as length and severity) to this two-layer model. These qualities have their own specificity for specific diseases. Doctors extracted the symptom data from clinical cases using a two-layer model, and then they entered it into the internal inference engine.

Table 2: Correct Proportion and Misdiagnosis proportion

	Correct proportion	Misdiagnosis proportion
Three-layer model	98%	2%
Two-layer model	88%	12%

As a result, using Table 3, we discovered that the majority of the results are distributed according to the two-layer model's possible types, meaning that this model is unable to give doctors clinical recommendations that are effective. Additionally, the two-layer model has a lower proportion of correct diagnoses and a higher proportion of misdiagnoses than the three-layer model.

G. Conclusion

In this research, we offer a method for computing the posterior probability of the patient's potential disease based on a three-layer model. By adding "property" to the two-layer knowledge base, the three-layer model knowledge base successfully addresses the expression inaccuracy of the knowledge and uses more meaningful information in inference. To train the inference engine's parameters for online learning, the decision outcomes of our three-layer model were contrasted with actual clinical outcomes. We conducted an evaluation and discovered that our approach can offer doctors useful clinical recommendations.

We need to enhance our present system to include vital signs, laboratory and radiographic expertise, and other factors because it is currently only capable of treating common respiratory disorders. The NB classifier, one of the best classification models, is dependent on the premise of attribute independence, which is frequently broken in practical data mining applications. The accuracy of the NB classifier can be increased by lowering the assumption of attribute independence using a variety of optimization strategies.

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Disaster Management of Flood and Landslides Using Machine Learning

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Abstract **-Disaster management is a crucial aspect of ensuring the safety and well-being of communities in the event of natural calamities such as floods and landslides. Effective disaster management strategies involve early warning systems, evacuation plans, and effective communication systems to minimize the impact of these disasters on the lives and property of individuals. The development of infrastructure such as embankments, dams, and retaining walls can also play a critical role in reducing the damage caused by floods. On the other hand, proper land use planning and management, as well as deforestation control measures, can help prevent landslides. A multidisciplinary approach involving government agencies, non-government organizations, and local communities is essential for an effective disaster management plan for floods and landslides.**

Disaster management refers to the systematic process of preparing for, responding to, and recovering from natural or man-made disasters. Floods and landslides are two common types of disasters that can cause significant damage and loss of life. Effective disaster management strategies must be in place to minimize the impact of these events on communities. Floods occur when water levels rise above normal due to heavy rain, melting snow, or other factors. They can cause significant damage to homes, roads, and infrastructure, as well as result in loss of life.

Effective disaster management strategies for floods include early warning systems, evacuation plans, and temporary shelter arrangements. The restoration of essential services such as electricity, water supply, and healthcare facilities should also be a priority. Landslides occur when soil or rockslides down a slope due to gravity, often caused by heavy rain or earthquakes. They can cause widespread damage to infrastructure and homes, and result in loss of life. Effective disaster management strategies for landslides include early warning systems, risk assessment and mapping, and proper land use planning. In areas prone to landslides, the construction of retaining walls, stabilizing slopes, and planting vegetation can also help mitigate the impact of landslides.

In conclusion, effective disaster management is critical for minimizing the impact of floods and landslides on communities. This requires a multi-disciplinary approach that involves early warning systems, risk assessment, evacuation plans, and the restoration of essential services. Effective disaster management strategies can help to reduce the loss of life and property and ensure a quicker recovery for affected communities.

Keywords—disaster management, landslides, flood, strategies, safety and well-being.

I. INTRODUCTION

Disaster Management with Machine Learning: An Introduction

Natural disasters such as floods and landslides have the potential to cause significant damage to communities, resulting in loss of life, property, and infrastructure. Effective disaster management is critical to minimize the impact of such events and ensure the safety of those affected. Machine learning has emerged as a promising tool in the field of disaster management, offering the potential to improve early warning systems, risk assessments, and post-disaster response efforts.

Floods

Floods are one of the most common and destructive natural disasters, causing significant damage to communities every year. Machine learning algorithms can be used to improve flood prediction and early warning systems, allowing for more effective evacuation and rescue efforts. For example, machine learning algorithms can analyze vast amounts of data such as rainfall patterns, river levels, and soil moisture to make accurate predictions about the likelihood and severity of a flood event. This information can then be used to alert communities and emergency response teams, enabling them to take appropriate actions to minimize the impact of the disaster.

Landslides

Landslides are another common natural disaster, often resulting from intense rainfall, earthquakes, or volcanic activity. Machine learning algorithms can be used to identify areas at risk of landslides and predict the likelihood of a landslide occurring in a specific location. This information can be used to develop targeted evacuation and mitigation plans, reducing the risk of injury and damage to property. Additionally, machine learning algorithms can be used to analyze satellite imagery and aerial photographs to detect and monitor the extent of a landslide in real-time, providing valuable information for post-disaster response efforts.

Machine learning is a rapidly developing field with the potential to revolutionize disaster management. By leveraging the power of data analysis, machine learning algorithms can improve our understanding of natural disasters and help communities better prepare for and respond to such events. As technology continues to evolve, it is likely that machine learning will play an increasingly important role in disaster management efforts, helping to reduce the impact of natural disasters and ensure the safety of those affected.

II. NEED OF DISASTER MANAGEMENT USING MACHINE LEARNING

Natural and man-made disasters affect the lives of millions.

Of people around the world each year. It is not uncommon for lives to be lost in these events. In addition to human loss, disasters have a significant impact on infrastructure. and property.

Disaster management measures are implemented before, during and after a disaster to prevent human loss, protect people and infrastructure, reduce economic impact and restore normalcy. The complexity of disasters and the criticality and complexity of disaster response requires robust decision-making enhanced by information technology, especially AI. Managing the scale and impact of

disasters requires informed and effective disaster management, encouraged in recent years.
by advances in ML and DL. Application areas include disasters such as hurricanes, earthquakes, floods, forest fires and landslides. Dealing with man-made disasters such as the refugee crisis can also benefit from recent technological developments. However, there is no clear definition of disaster. In the terms of the United Nations Office for Disaster Risk Reduction (UNISDR), a disaster is "a serious disruption to the functioning of a community or society, resulting in human, material, economic or environmental loss and impact. It is beyond the capacity of the community." 'Coping power' for affected communities and societies to deal with themselves. Based on EM-DAT terminology, disasters can be divided into two main groups: natural disasters and technological disasters Using another classification, disasters are divided into natural and man-made disasters. Additionally, climate-related disasters in 2020 were the leading cause of the 389 recorded disasters in the year. Statistics show that 2020 saw a higher-than-average number of recorded disasters, with a 26% increase in storms, a 23% increase in floods, and an increase in average annual economic losses.

Disaster management deals with disasters over time Four phases are widely accepted: mitigation, preparedness, response and recovery. Mitigation refers to activities that prevent a disaster from occurring or reduce the effects of a disaster. Preparedness includes activities that prepare communities to act in response to disasters. B. Emergency planning, stockpiling, training, and community education for better response to or mitigation of disaster impacts. Response includes operations to implement plans to protect life and property, the environment, and the socio-economic structure of communities. Disaster relief and response also includes activities such as implementing emergency plans, emergency relief and medical supplies, establishing and managing emergency shelters, distributing relief supplies, and assessing damage. This phase is one of the most studied as people and infrastructure need the most urgent support. Time is of the essence at this stage, so technology focuses not only on highly accurate results, but also on streamlined methods that work quickly. Recovery (reconstruction) involves long-term actions aimed at bringing a normal state to the community.

Activities in this phase include, but are not limited to, financial assistance and reconstruction/reconstruction (such as buildings and major infrastructure). In addition, active involvement of local communities in disaster management can lead to community resilience AI techniques used to support disaster management in all phases consist of several ML and DL methods. ML methods include Support Vector Machines (SVM), Naive Bayes (NB) methods, Decision Trees (DT), Random Forest (RF), Logistic Regression (LR), and K-Nearest Neighbors (KNN) clustering algorithms. DL methods, on the other hand, include various architectures of artificial neural networks (ANNs) such as: LSTM), Transformer Architecture, Generative Adversarial Networks (GAN) ML and DL have enabled the development of systems capable of predicting, responding to, and recovering from disasters using large and complex data sets, resulting in practical decision support tools. These techniques leverage the ability to manipulate different types of data from multiple sources and determine patterns that can provide information that cannot otherwise be disclosed. Big data is available from sources such as satellite imagery, unmanned aerial vehicles (UAVs), social media, crowdsourcing, geographic information systems (GIS), and wireless sensor networks. A recent review in disaster management focuses on the application of AI in disaster management and the use and potential of big data in natural disaster management San et al. provides an overview of exemplary AI applications in various application areas of disaster management, such as hazard assessment, vulnerability assessment, early warning systems, disaster detection, event mapping, damage assessment, disaster relief and assistance, and resource allocation. showed. There is a growing trend to use AI to analyze and process big data from various data sources to make informed disaster management decisions. A total of 26 AI methods were used for 17 application areas of disaster management in the studies included in. Yura. provided a systematic overview of the role of big data in disaster management. This review included journal articles published between 2011 and 2018. The authors recogniz e ML, including DL, as both an evolutionary technology and an emerging technology theme to facilitate disaster management.

Considering the increasing trend in developing ML-based methods for disaster management and the rapid progress of DL, a comprehensive review focusing on the progress of ML and DL in disaster management is needed. Therefore, a review of the literature survey using ML and DL since 2017, covering different phases of disaster management using different types of techniques and data, was performed in this paper. The purpose of this study is to provide a comprehensive analysis of ML and DL techniques developed for disaster management and to indicate future trends. Also included are recently developed ML and DL based applications for disaster management. The methodology is described in the next section. Below is the theoretical background for some important ML and DL methods used in disaster management. It then analyzes recent research since 2017 and categorizes it into sub-phases: Hazard and Hazard Forecasting, Risk and Vulnerability Assessment, Disaster Detection, Early Warning Systems, Disaster Surveillance, Damage Assessment, and Aftercare. A disaster management case study and a section detailing the technical application of ML/DL techniques to disaster management follow. A discussion of the results is presented next. Finally, a conclusion is drawn.

III. METHODOLOGY

For the purposes of this study, a search of Google Scholar and relevant journal databases was conducted for articles published between 2017 and 2021 (September). The keywords used in the search were 'natural disaster', 'disaster management', 'prediction', 'assessment', 'mitigation', 'preparedness', 'response', 'assistance', 'post-disaster analysis', "Case study" "Application" "Machine learning" "Deep learning". The initial search returned 1,210 items with no reviews.

Based
othe author's research experience, further searches
were conducted in the top his journal archives in each target database. Databases examined primarily included IEEE, Elsevier, Springer, Taylor and Francis, Scopus, Web of Science, and Wiley. A manual search was also performed to exclude irrelevant studies or studies outside the scope of this study. Therefore, 55 papers were ultimately included in this review shows the percentage distribution of research articles included in this review by database shows the keyword combinations used to collect the works included in this study.

I. An overview of the machine learning Mehtods

ML effectively addresses the elimination of irrelevant data, provides faster processing and analysis of disaster event information,
and effectively supports all stages of disaster management [10]. However, traditional ML methods cannot learn representations of complex systems directly from raw data. DL is a subclass of ML that can automatically learn representations of complex systems for the purposes of
prediction, detection, or classification. DL uses long causal chains of neural network layers (NN) that enable more advanced and abstract computational models of real systems [11,12]. DL techniques allow representation with many levels of abstraction afforded by simple non-linear modules, with each level transforming the representation into something higher and more abstract, ultimately leading to immutable functions and highly complex functions are learned [12]. Advances in DL enable new approaches to disaster management. CNN dominates computer vision tasks, making satellite and aerial imagery systems essential for disaster response and damage assessment [13]. ANNs are widely used as powerful tools for big data analysis [10,14]. On the other hand, text-based NNs, namely Long Short-Term Memories (LSTM) and recently Transformer, use their architecture to perform natural language processing tasks [15]. These types of NNs are used for damage assessment studies on social media datasets. Then, we present two DL and one ML architectures commonly used in disaster management, namely CNN and LSTM and SVM, to provide theoretical background.
CNN
CNN architecture is based on convolutional layers (CL). In these layers, data is propagated and applied in tabular multiplication by n*m tabular filters, also called kernels. In most cases n is equal to m. This process produces different representations of the input data based on the applied filters. Each representation reveals a different feature, which is projected onto
a feature map that quantifies the stimulus produced by each convolutional layer filter [11,12]. The convolution results in some unique transformation of the input data. The number and size of kernels used in convolution are critical to the overall network performance. After the convolution step, the data passes through a pooling layer (PL) that groups the results of the convolution by keeping the maximum, minimum, or average of each part of the data and retains only the most significant ones in the network. To do. Depending on the depth of the mesh, this entire process is repeated multiple times before the data is flattened in one-dimensional space and fed to a fully connected layer (FL) for classification. SoftMax layers transform data into probability distributions. Figure 2 shows the CNN architecture. Note that each CL in the network provides some level of abstraction in the feature extraction process.
LSTM
LSTM is a NN commonly used for text classification in disaster management of social media datasets. LSTM is a type of recurrent neural network (RNN). An RNN is a network that repeatedly applies the same computation to each element of a set of sequential data, passing some information to the next iteration. As a result, at each time step, predictions are made about the input data, which influence future predictions. This operation allows the network to understand complex text data and extract meaning based on word positional data in sentences. LSTMs differ from regular RNNs due to their internal cell architecture. LSTM uses a storage cell called constant error carousel (CEC) that determines at each time step how much information about the current state is passed along with the new input data at the next time step [11]. The predictions that an LSTM can provide are varied. Network outputs can be used with probabilistic classifiers for classification purposes, as element predictions for the next element in a sequence, or even to predict entirely new element sequences. The most important hyperparameters to fine-tune in LSTM are learning rate and network size. LSTMs can tune hyperparameters independently, which saves a lot of time in training and experimentation [16]. Figure 3 shows the LSTM
architecture. Accurate and thorough analysis of textual data is crucial in various stages of disaster management, and LSTM has proven to be efficient and effective, as described in the next section.

II. ML/DL Methods in Developed Applications for Disaster Management

With the advent of 5G technology, many innovations are happening in various industries due to its low latency. Decentralized edge
computing combined with his 5G technology is
gaining momentum in automation processes across many industries. His one such example is reported in Ardiansyah et al. [69], 5G DIVE. In this article, the author used this his 5G-DIVE on autonomous drones

for real-time navigation, surveillance, and emergency detection. The authors also used edge computing ML models for real-time detection of this emergency.

The system he called EagleEYE was basically an aerial system for disaster relief operations. The system reused existing datasets and created an object fusion mechanism to reduce the time required for training. The system also worked in parallel on both detection and response tasks. A new algorithm, Merged Object Detection (MOD), was proposed by the authors, and CNN and YOLO V3 were also used. For evaluation purposes, the authors tested this system in real-time on two datasets, including the COCO and Google Open Images datasets, and achieved 87% accuracy and 90% reduction in inference latency for detection purposes.

strung. [70] processed the application for the damage assessment phase.

Many applications including AI and DL-based deep NN approaches have been previously proposed by various researchers. These applications used post-disaster imagery to assess the severity of damage and impacts in disaster-affected areas.

However, the black-box nature of AI algorithms makes it difficult to achieve high accuracy. To this end, the focus of research has changed and new avenues have been explored to address this issue. In this paper, the authors also incorporated crowdsourced information obtained from social media data into AI-based algorithms. Before machine intelligence, crowdsourced information was used to tune, improve, and debug the black-box nature of AI algorithms. Then, within the system, this crowdsourced information worked closely with machine intelligence. A damage assessment application based on the DL model called CrowdLearn has been developed: a Crowd-AI hybrid application. CrowdLearn is based on a crowdsourcing platform and used a combination of cloud intelligence and machine intelligence to perform damage assessment. The system was assessed in real time and proved capable of providing a timely and accurate assessment of the disaster. It outperformed existing AI algorithms such as VGG-16, achieving a classification accuracy of 0.877 and his F1 score of 0.894.

Alamet al. [71] worked to solve the problems encountered during the relief work by applyin g image processing techniques to the images. This system was called Image4Act. The system used image data from social media posts to help humanitarian organizations conduct relief efforts.

The system collected data, denoised it, and classified it during natural disasters. Perceptual hashing and deep NN techniques were used to remove noisy data. A real-time cyclonic natural disaster case was used to assess the damage to infrastructure caused by the disaster. Evaluation of existing disaster datasets and the system in real-time has proven that the system can be used very effectively and reliably in real-time natural disasters.

Sung et al. [72] developed a disaster management system called DeepMob to predict and simulate evacuation behavior and human movement and evacuation routes after various types of earthquakes. DeepMob used disparate big data sources, including GPS recordings, transportation network data, and Japanese earthquake data. The system achieved an accuracy of 87.8% in predicting people's evacuation behavior.

IV. vi. LIMITATIONS

According to the results of this white paper, no research studies focused on ML/DL approaches to (long-term) disaster recovery were identified. The keyword "disaster recovery" was not included in the search, but the keyword "disaster management" may have returned results related to disaster recovery. Disaster recovery encompasses a wide range of activities aimed at returning communities to normal, building community resilience and designing efficient policies, but has been poorly studied in the literature. . Therefore, future research should focus on long-term disaster recovery facilitated or driven by advances in both ML and DL. Some research articles may not have been included in this review due to manual filtering after the initial keyword search.

V. FUTURE RESEACRH TRENDS

Bottlenecks in DL that need to be addressed in future studies, in order to enhance the robustness of DL-based methods for effective disaster management, include the limited amount of available labeled training data and the human labeling of the datasets [44,45]. DL overcomes the manual feature engineering process by automatically learning complex structures, yet with the expense of requiring very large amount of labeled data manually annotated in order to automatically learn the features. Moreover, social media data contain high levels of noise [50], therefore, more methods should be developed to effectively differentiate signal from noise in the above data.

According to the results of this paper, the prevalence and importance of Twitter has been shown as a tool to extract both qualitative and quantitative information valuable to emergency responders and other decision makers in all phases of disaster management. Considering that Twitter contains geospatial information, in contrast to other social media platforms, the extracted information can provide answers not only to what happened but also to where it happened. Since Twitter users may not be representative of the entire affected population, cross-validation with information collected by other methods such as B. Emergency calls were extracted, and the performance of the developed methods improved [53].

Crowdsourcing platforms like Amazon Mechanical Turk have been shown to help develop new ways to improve the performance of AI algorithms for disaster management tasks [70]. Combining cloud intelligence with machine intelligence can increase the accuracy of the developed ML/DL techniques and reduce the labor cost of hiring domain experts for data

labeling. More research is needed in different areas of disaster management to realize the benefits of crowdsourcing combined with ML/DL-based methods. Online news data has proven to be a reliable source of disaster-related information compared to social media data [39]. The process of extracting the right information at the right time from wireless sensor networks and other related technologies deployed in disaster-affected areas uses web crawling or web scraping for effective preparedness and response operations. can be strengthened by
In addition, as already mentioned in previous reviews, all stages and areas of disaster management should be focused [3]. ML/DL-based methods of disaster recovery management have not been well studied. Long-term disaster recovery includes sustainable development efforts that ultimately lead to building resilience in communities. The resilience of key infrastructure influences the effectiveness and progress of disaster recovery efforts

VI. Conclusion

Natural disasters are a leading cause of loss of life and damage to infrastructure and property. Advances in ML and DL are increasingly being used to deal with complex disasters. In this paper, review studies are conducted to examine how his ML and DL techniques are used in different areas of disaster management to support disaster management operations and improve their performance. I was. For this purpose, works published since 2017 were displayed and grouped into categories covering various phases and sub-phases of catastrophe events. Within these categories, different ML and DL techniques have been used for different types of disasters such as floods, lava flows, earthquakes, typhoons, hurricanes, and landslides.
Evaluated research focuses on the areas of hazard and hazard forecasting, risk and vulnerability assessment, disaster detection, early warning systems, disaster monitoring, damage assessment, post-disaster response, and case studies and applications. Issues and future research directions were discussed. Future research should be directed towards leveraging ML and DL to improve the performance of disaster recovery operations. Disaster recovery operations must be sustainable. Research should therefore focus on using ML and DL to improve defenses, mitigate vulnerabilities, and assess resilience, including key infrastructure.
The importance and complexity of disaster response require robust and validated ML and DL solutions. Disaster response affects lives. Therefore, the models developed must be explainable so that they can be understood by domain experts and decision makers [73]. In addition, research should focus on improving data quality and developing new data collection techniques and using crowdsourcing to improve the performance of ML/DL-based methods for disaster management interventions.

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Automated system for diabetes prediction at an early edge using machine learning

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Abstract—**Diabetes is a major global health concern caused by elevated blood glucose levels. This condition is characterized by frequent urination, increased thirst, and increased appetite, andis a leading cause of serious health issues including stroke, renal failure, heart failure, amputations, blindness, and kidney failure. This** study aims to investigate the relationship between diabetes and **lifestyle factors such as caloric intake, junk food consumption, and stress. A predictive model will be developed to estimate the likelihood of developing diabetes and provide remediation strategies including diet and exercise plans. The results of this study will provide valuable insights into the impact of lifestyle on diabetes and inform the development of preventative measures to reduce the burden of this chronic condition.**

Keywords— Machine Learning, Diabetes Prediction, SVM, weighted Algorithm

I. INTRODUCTION

Every year, millions of individuals are diagnosed with diabetes, a chronic ailment that is spreading alarmingly throughout the world. An array of symptoms, including frequent urination, increased thirst, and increased appetite, are brought on by high blood glucose levels, which are the underlying cause of it. Amputations, kidney failure, a stroke, renal failure, heart failure, blindness, and kidney failure are all frequently brought on by diabetes.

This research aims to create a prediction model that can forecast the likelihood of a person suffering from diabetes in the upcoming years. The model will consider various parameters such as calories consumed every day, junk food consumption every week, and stress levels to make the prediction. The model will be developed using deep learning algorithms such as weighted algorithms, which will separate the users into groups according to the number of years in which they would be likely to suffer from diabetes.ly to have diabetes in the future.

1.2 Machine learning

Machine learning may be an area of research devoted to comprehending and developing "learning" processes, that is, processes that use data to improve performance on a given set of tasks. It is considered a component of computing. Machine learning is highly complicated, and how it functions depends on the task at hand and the technique used to complete it. However, a machine learning model could fundamentally be an algorithm that analyses data, spots patterns, and then uses that knowledge to carry out the task at hand moreefficiently. Machine learning can automate any operation that depends on a set of data points or rules, even more difficult tasks like taking customer service calls and looking over resumes.

We've created a system employing data processing that has the ability to forecast whether the patient has diabetes or not, which gives us the flexibility to look for a solution to the current problem. Additionally, early disease prediction allows for the treatment of people before their condition deteriorates. The versatility of data processing allows for the extraction of hidden knowledge from a significant volume of diabetes-related data. As a result, it currently plays a significant role in diabetes research. The goal of this research is to create a system that can accurately estimate a patient's level of diabetic risk. The goal of this project was to create a system that supported the three classification techniques— Support Vector Machine, Random Forest, Linear Regression Algorithm.

1.3 DATA PREPROCESSING:

The most crucial stage in creating a prediction model is preprocessing the data. The usefulness of data pertaining to healthcare is sometimes hampered by missing values and contamination. To increase the effectiveness and calibre of the outcomes, data preparation is done. Missing values will be removed from the data and the data will be split in two for this project's data pre-processing.

Missing Values removal: All instances having a value of 0 (zero) will be removed in this stage. This is due to the fact that zero is an impractical value, and the process of feature subset selection, which lowers the dimensionality of the data by deleting unused features and instances, is what is known as. Additionally, it expedites the work.

Splitting of data: Data cleaning will be followed by model training and testing using the cleaned data. The training data set and the test data set will be divided into two groups. While the test data set is placed aside, the algorithm will be trainedon the training data set. A training model will be developed through the training process based on thereasoning, procedures, and values of the features in the training data. Putting all features on the same scale is the main objective of normalization.

The goal of this research, in summary, is to develop a prediction model that can precisely forecast a person's likelihood of developing diabetes in the next years. The projection will be based on the model's consideration of a number of variables, including calorie intake, junk food consumption, and stress

levels. Data pre-processing will bedone to enhance the quality of the findings while the model is constructed using deep learning methods. This effort makes a substantial contribution to the field of diabetes research by providing early disease prediction, which is essential for the treatment of patients before their condition worsens.

II. METHODOLOGY

For Prediction we will be using following machine learning algorithm:

1.) Support Vector Machine: Support Vector Machine (SVM) is a potent and popular machine learning technique used to solve both classification and regression issues. Numerous applications, such as text categorization, bioinformatics, and picture classification, all make use of it. As diabetes is a significant issue in today's society, this research study will concentrate on how SVM can be used to predict diabetes.

Chronic health issues like diabetes are brought on by an unhealthy lifestyle, a high caloric consumption, and a lot of stress. Predicting this condition is an important stage in the healing process because an early diagnosis and course of therapy can stop the patient's health from declining. The objective of this study is to create a system that can correctly forecast a patient's likelihood of developing diabetes and aid in problem solving.

Because the SVM algorithm is a supervised machine learning technique, it uses training data to discover correlations between the input and output variables. Finding a hyperplane that divides the input data into various classes is how the algorithm operates. In the case of diabetes prediction, the various parameters, such as calorie consumption and stress levels, would serve as the input data, and the output would be the prediction of the patient's likelihood of having diabetes.

Due to its ability to create hyperplanes in high-dimensional space, the SVM algorithm is particularly well suited for high dimensional data. This is significant in the prediction of diabetes because the disease may be caused by a variety of different variables. These associations can be found and used by the SVM algorithm to generate precise predictions.

The SVM algorithm's capacity to classify samples without data support is one of its main features. Therefore, even if there is insufficient data to justify a prediction, it can nevertheless generate predictions. As there may not always be sufficient information to establish a firm prognosis, this is significant in the case of diabetes. By making predictions based on the closest training point for each class, the SVM method helps to reduce the impact of missing data.

For its prediction procedure, the SVM algorithm employs a technique known as hyperplane separation. Finding the hyperplane that optimizes the margin between the various classes is the first step in this approach. The margin is the separation between the nearest representatives of each class and the hyperplane. Finding a hyperplane that divides the data into distinct groups while simultaneously maximizing the margin is the objective.

It is crucial for diabetes prediction that the SVM algorithm be able to handle non-linear data. A linear model might not be able to adequately reflect the interactions between many of the non-linear elements that cause diabetes. By translating the nonlinear data into a higher-dimensional space where it can be divided by a hyperplane, the kernel trick is a method used by the SVM algorithm to handle non-linear data.

The requirement for data preparation makes utilizing SVM for diabetes prediction difficult. The accuracy of the predictions can be impacted by the frequent presence of missing values and other impurities in healthcare-related data. To solve this problem, the data must be cleaned, and any instances with missing values must be removed. In order to equalize the scale of all the features, the data must also be standardized.

An input dataset is used to train the SVM algorithm, while an output dataset is used to assess the method's performance. A training dataset and a test dataset are created from the data, and the training dataset is used to train the algorithm. The effectiveness of the algorithm is then assessed using the test dataset, enabling a comparison of the predicted values and the actual values.

Finally, it can be said that the Support Vector Machine (SVM) algorithm is a potent instrument for diabetes prediction.

Algorithm: Choose the hyperplane that divides the class more

Effectively Calculating the Margin, the distance between the planes and the data will help you choose the best hyperplane.

Low distances between courses increase the likelihood of missed conception, and vice versa. So, we must

Choose the class with the largest margin. Margin is equal to the sum of the distances to the positive and negative points.

2. Random Forest: - Popular machine learning algorithm, Random Forest is a part of the supervised learning methodology. In machine learning, it is applied to classification and regression issues. This strategy is built on the idea of ensemble learning, which is a technique for combining many classifiers to address a challenging issue and enhance the model's performance.

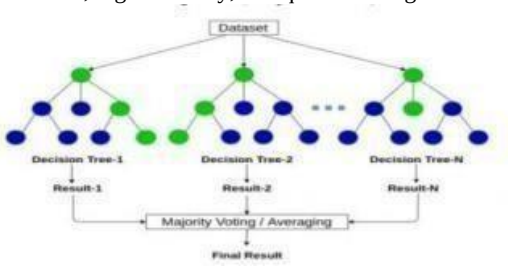
In order to avoid the overfitting issue that frequently arises while using decision trees, Random Forest was developed. An over fitted decision tree model performs poorly when making predictions on fresh, untainted data because it fits the training data too closely. The Random Forest approach uses numerous decision trees, each constructed using a different randomly chosen subset of the data, to solve this problem. The decision tree with the highest frequency of occurrence is chosen as the projected label for a particular data point in the final prediction, which is reached by casting a vote among all the decision trees.

In comparison to other algorithms, Random Forest is a quick and effective method. Even for massive datasets, it can accurately anticipate the outcome. Furthermore, Random Forest is resilient to missing data, preserving accuracy even when a sizable amount of data is absent.

It is crucial to remember that, although being a strong and successful algorithm, Random Forest might not be the ideal option for all tasks. The algorithm selected will rely on the particular specifications of the task and the kind of data being used. Other methods, such support.

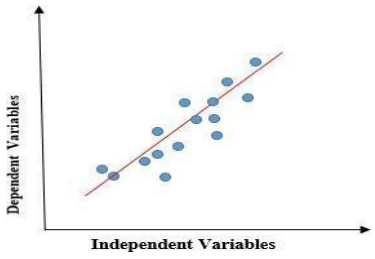
vector machines or neural networks, could be better appropriate in some circumstances.

All things considered, Random Forest is a popular and efficient machine learning technique that works well for a variety of pr prediction is made by taking a weighted average of the predictions of the individual models, where the weights are determined by theiraccuracy ediction issues. Data scientists and machine learning professionals frequently use it because of its capacity to manage missing data, high accuracy, and quick trainingtime.



2. Linear Regression Algorithm: - One of the most often used machine learning methods for prediction is linear regression. Based on one or more independent variables, it is used to forecast a continuous dependent variable. The relationship between the independent and dependent variables is assumed to be linear, which indicates that a change in the dependent variable will result in a change in the independent variables that will be proportional. The idea behind the linear regression algorithm is that a linear equation may adequately describe the connection between the dependent and independent variables. Y is the dependent variable in this equation, while the other variables are X1, X2, the coefficients of the equation are b0, b1, b2, bn, and Xn are the independent variables. The link between the dependent and independent variables is represented by the coefficients, which are computed using the training data.

The least squares approach is used by the linear regression algorithm to estimate the coefficients. By minimizing the sum of the squared differences between the dependent variable's observed and predicted values, the method of least squares is a statistical technique. The training data is used to generate the predicted values of the dependent variable, while the observed values are the actual values of the dependent variable. Finding the coefficients that reduce the sum of the squared differences is the goal of the linear regression algorithm.



A variable's value can be predicted using linear regression analysis based on the value of another variable. The dependent variable is the one you want to be able to forecast. The independent variable is the one you're using to make a prediction about the value of the other variable. Numerous uses of the linear regression technique include forecasting stock prices, sales, and demand, among others. It is a popular option for many data scientists because it is straightforward to use and simple to comprehend. It does have some restrictions, though. Its assumption that the connection between the dependent and independent variables is linear, which may not always be the case, is one of its fundamental drawbacks. Other regression procedures, like polynomial regression, may be more appropriate when the relationship is not linear.

The assumption that the relationship between the dependent and independent variables is independent, meaning that the presence or absence of one independent variable has no bearing on the other independent variables, is another drawback of linear regression. Multicollinearity can occur when there is a correlation between the independent variables, which is not always the case. Other regression techniques, like ridge regression or lasso regression, may be better appropriate under these circumstances because the linear regression process may yield incorrect results.

In conclusion, linear regression is a popular algorithm used in machine learning for prediction. It is simple to implement, easy to understand, and has a wide range of applications. However, it has limitations, including its assumption of a linear relationship between the dependent and independent variables, its sensitivity to outliers, and its assumption of independence between the independent variables. These limitations may be addressed by using other regression algorithms that are more suitable for specific data sets and applications.

Now, from above three algorithms the one which has more accuracy we will be using that for our prediction.

In order to predict at what age an individual will get an diabetes we will be using weighted majority algorithm.

The weighted majority algorithm is a powerful method for combining the predictions of multiple models in order to make a final prediction. It is especially useful in cases where there is a large number of models with different levels of accuracy, and it has the ability to handle both classification and regression tasks. In this essay, we will discuss the weighted majority algorithm in detail, including its concepts, applications, and limitations.

The weighted majority algorithm works by assigning a weight to each individual model based on its accuracy. The weight of a model is determined by its performance on the training data set, and the more accurate a model is, the higher its weight will be. This means that the predictions of the more accurate models will have a greater impact on the final prediction than the predictions of the less accurate models. The final prediction is then made by taking a weighted average of the predictions of the individual models.

One of the key advantages of the weighted majority algorithm is its simplicity. Unlike other ensemble methods, such as bagging and boosting, the weighted majority algorithm does not require complex algorithms or extensive tuning. This makes it easy to implement and understand, and it is ideal for situations where there is limited computational resources or limited expertise in machine learning.

The weighted majority algorithm can be used for both classification and regression tasks. For classification, the algorithm predicts the class that is most predicted by the

individual models. For regression, the algorithm predicts the value that is most predicted by the individual models. In both cases, the final.

III. SYSTEM ARCHITECTURE

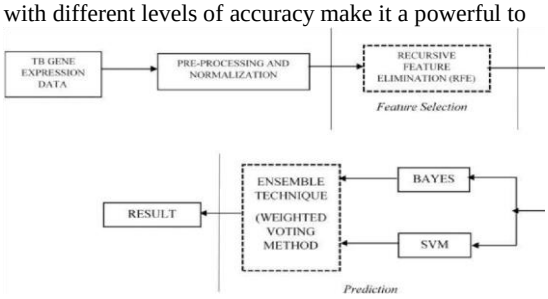
The weighted majority algorithm is particularly wellsuited to situations where there is a large number of models with different levels of accuracy. In these cases, it can effectively combine the predictions of the individual models in order to make a more accurate final prediction. For example, in the field of medical diagnosis, the weighted majority algorithm can be used to combine the predictions of multiple risk factors in order to diagnose a patient with a specific condition, such as diabetes. In this case, the weight of each individual risk factor would be determined based on its accuracy in predicting the condition, and the final prediction would be made by taking a weighted average of the predictions of all the individual risk factors.

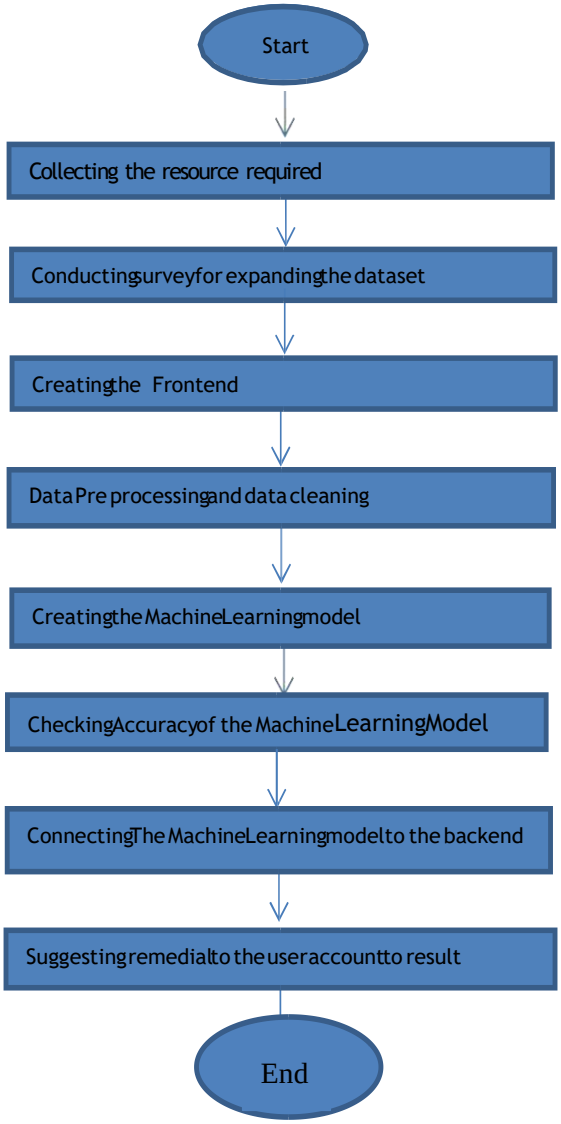
Another important application of the weighted majority algorithm is in the field of financial forecasting. In this case, the algorithm can be used to combine the predictions of multiple financial models in order to make a more accurate prediction of the future value of a stock or other financial asset. The weights of the individual models would be determined based on their accuracy in predicting the future value of the asset, and the final prediction would be made by taking a weighted average of the predictions of the individual models.

There are, however, some limitations to the weighted majority algorithm. One of the main limitations is that it assumes that the individual models are independent, meaning that they do not interact with each other. This assumption may not hold in all cases, and in some situations it may be necessary to modify the algorithm in order to account for the interdependence of the models.

Another limitation of the weighted majority algorithm is that it assumes that the accuracy of the individual models does not change over time. This may not be the case in some situations, and in these cases it may be necessary to periodically re-evaluate the weights of the individual models in order to ensure that they continue to reflect their accuracy.

In conclusion, the weighted majority algorithm is a simple and effective way to combine the predictions of multiple models in order to make a final prediction. Its simplicity, ability to handle both classification and regression tasks, and suitability to situations with a large number of models with different levels of accuracy make it a powerful to





IV REVIEWOFLITERATURE

A review of earlier research on the connection between undergraduate students' success and their prior academic accomplishment was done. The data from this evaluation provided a foundation for comparing the results ofthe current study to those discovered in the earlier.

In this research, Deepti Sisodia and Dlip Singh Sisodia[1] try to predict diabetes at an early stage. To makepredictions, decision trees, SVM, and Naive Bayes classification algorithms are employed. The WEKA tool is used to assess accuracy. According to Xue-hui Menget alstudy's [2], which compared three algorithms for predicting diabetes or prediabetes using common risk indicators, the Nave Bayes method had the highest accuracy. We compare the logistic algorithm, ANN, and decision tree algorithms. 735 patients were tested, and they came from two Guangzhou, China, areas. The classification algorithm achieves the maximum level of accuracy (77.87%)

Different classifiers are employed in machine learning by Monisha.A et al. in [3] to predict and diagnose diabetes. like logistic regression, extreme gradient boosting, and naive Bayes statistical modelling. Diabetes databases for Pima Indians are tested. The Extreme Gradient Boosting algorithm has an accuracy of 81%, which is higher than the accuracy of the other two algorithms. The goal of this work, as stated by B. Tamilvanan et al. in [4], is to predict diabetes more accurately. The accuracy rates of the three classification algorithms—Naive Bayes, Random Forest, and NB-Tree—are compared. application of the Weka tool. As a result, Naive Bayes has the highest accuracy rate (7 6 3%) and lowest error rate (23 . 7 %), giving it the strongest predictive capacity. In [5], VeenaVijayan.V et al. It is obvious that selecting proper algorithms for categorization improves the system's accuracy and effectiveness. The major goal of this work is to evaluate the advantages of various pre-processing methods for diabetes

prediction decision support systems based on Support Vector Machine (SVM), Naive Bayes classifier, and

DecisionTree. Principal Component Analysis and

Discretization are the pre-processing techniques that are the subject of this study. The variation in accuracy assessed both with and without pre-processing methods. This study makes use of the Weka tool. The University of California, Irvine (UCI) machine learning repository served as the source of the dataset. This paper by Veena Vijayan V et al. [6] focused on diabetes mellitus prediction with minimal error rate. Datasets are retrieved from the machine learning repository at UC Irvine. Verification of accuracy using the Matlab and Weka tools.

Using AdaBoost-decision stump classifiers, which have an 80 . 729 % accuracy rate and a low amount of error, diabetes maybe predicted.

This work by Ayan Mir et al. [7] concentrated on diabetes forecasting. Diabetes databases for Pima Indians are used. The Weka interface uses the Naive Bayes, SVM, Random Forest, and Simple CART algorithms for categorization. As a result, SVM offers greater accuracy than the competition. According to Aakansha Rathore et al. Diabetic disease detection and prediction. Diabetes dataset for Pima Indians was used experimentally, andR Studio was used to assess the performance measurements. The SVM and Decision Tree machine learning methods are employed. The SVM yields accuracy of 82%.

According to Aiswarya Iyar et al. in [9] diabetes affects 246 million persons globally. The WHO estimates that there will be over 3 80 million of them in 2025. The purpose of this study is to identify a method for disease diagnosis. utilizing Naive Bayes and decision tree methods. Implementation is done using the Weka tool. The accuracy of the naive Bayes algorithm is 79.5652%.

Amina Azar et al. in [10] hereditary disease affected among young peoples and ancient peoples. These units raised day by day and it does not curable. processing is used to early stage prediction. This paper in main aim is provides the differentiation and advocate best rule. The PID datasets unit used. the selection tree, Naive man of science and K-Nearest neighbor algorithms unit compared and used for predict the hereditary disease designation at early stage with highest accuracy and efficiency. The weak is used for testing and validation exploitation speedy manual laborer. the result is the selection tree is that the simplest prediction rule. It provides the accuracy level is seventy 5.6 5

V ACKNOWLEDGMENT

We are grateful for the support and guidance provided by our supervisor, Mrs. Kamal Shah, during the course of this research. Her invaluable contributions and expertise have been instrumental in the successful completion of this paper. Mrs. Shah has provided us with insightful feedback and suggestions, which have helped us to improve the quality of our research. Her support and encouragement have been a constant source of motivation for us throughout the entire research process.

We would also like to extend our gratitude to the Thakur College of Engineering and Technology for supporting our research. This support has enabled us to conduct a comprehensive and in-depth study of linear regression in machine learning for prediction. We are grateful for the resources, facilities, and opportunities provided by the institution, which have been critical in ensuring the success of our research.

Moreover, we would like to acknowledge the role played by our faculty members from our institution in the successful completion of this research. They have provided us with valuable feedback and insights, which have helped us to improve our understanding of linear regression in machine learning for prediction. Their expertise and knowledge have been instrumental in guiding us in the right direction and ensuring that our research was on the right track.

In conclusion, we would like to express our heartfelt gratitude to all those who have supported us in this research journey. Their contributions have been invaluable, and we could not have completed this research without their support. We are grateful for the opportunities, guidance, and encouragement provided by our supervisor, the institution, and our faculty members. Their contributions have been instrumental in the successful completion of this research, and we look forward to continuing our association with them in the future.

VI CONCLUSION

Diabetes is a chronic condition that has spread around the world and is now a serious public health issue. It is characterised by elevated blood glucose levels and, if unchecked, can result in major health issues like heart disease, blindness, renal failure, and amputations. In order to avoid severe problems, diabetes must be properly diagnosed and managed. Therefore, the creation of a system that can properly anticipate the onset of diabetes, particularly in its early stages, is crucial.

The major goal of this project was to develop and put into use a machine learning-based diabetes prediction system. The technique seeks to foretell whether a person has diabetes or not, and if so, when they will become diabetic. The experiment was successful, and the suggested approach used a number of ensemble learning and classification algorithms, including Support Vector Machines (SVM), Random Forest, and the Weighted Majority Algorithm. The system was created to use

user data, such as age, sex, BMI, calories and carbohydrates ingested daily, amount of sleep, and junk food consumed weekly, to estimate when diabetes will start to develop. These inputs were utilised by the system to train the machine learning algorithms, who then learned from the data and could anticipate outcomes based on fresh data inputs. A sizable dataset of people with and without diabetes was used to train the algorithms. The data were divided into two groups, diabetes and non-diabetic, using the SVM method. The approach is known to work effectively with high-dimensional datasets and divides the data into two groups using a hyperplane. The forecasts of various decision trees were combined using the Random Forest technique to provide a more precise prediction. Based on the results of the other two algorithms and accounting for each algorithm's accuracy, predictions were made using the weighted majority algorithm. According to the experimental findings, the system could typically anticipate the beginning of diabetes properly. The algorithm was able to separate those with a high risk of getting diabetes from those without one. The system's predictions were then verified using a different dataset, and the findings showed that they were accurate.

Since they can utilize the system to make early predictions and judgements to cure diabetes and save lives, the project's findings are highly pertinent to healthcare professionals. The technology can make it easier for medical professionals to spot patients who are at a greater risk of getting diabetes and treat them accordingly. By doing so, patients' quality of life can be improved and significant health consequences related to diabetes can be avoided. The method can assist in locating those who are at a high risk of contracting diabetes and offering them early treatment. The conclusions of this project show how machine learning approaches can enhance healthcare and even save lives. The method can be further enhanced and expanded to incorporate additional variables, such family history, that are known to increase diabetes risk.

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Tracking Impact of PM Poshan Scheme on Children's Nutritional Status and Well-Being

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Abstract—**The following section provides an overview about tracking of children nutritional status. According to PM Poshan scheme, children from std I to std VIII are served one hot meal every day. This scheme was proposed due to rise of malnutrition among kids. As the scheme was proposed, but there was no tracking of the improvement in student. To make it easier to know how much improvement is made in child's the tracking of nutritional status this is recommended. The tracking system contains parameters like height, weight, it would calculate the body mass index and produce a graph. The data would be entered on weekly basis and the graph would be to make it to understand better and which would be easier to compare.**

Keywords— PM Poshan, mid-day meal, malnutrition, weight, height, bmi

I.INTRODUCTION

PM Poshan scheme is the largest lunch programme aimed at improving the nutritional wellbeing of students studying in government aided school. With a view of increasing enrolment, retention and attendance along with simultaneously improving nutritional levels among the children. The Cabinet Committee on Economic Affairs (CCEA) chaired by Prime Minister Narendra Modi on September 29, 2021, approved a new meal scheme known as 'Pradhan Mantri Poshan Shakti Nirman' scheme (PM Poshan Scheme) for government and government-aided schools for the next five years (from 2021-22 to 2025-26) with the financial outlay of Rs 1.31 trillion, and the existing 'Mid-Day Meal' scheme will also be included in this programme. The central government will bear an additional cost of nearly Rs 45,000 crore on providing subsidised food grains from the food ministry over the years amounting to a total outlay of Rs 1.31 trillion. PM Poshan Scheme provides school meals, which act as a strong incentive for parents to send their children to schools. So under this scheme every child in government and government aided school from std I to std VIII is serve with hot midday meal a minimum content of 450 calories of energy and 20 grams' protein per day for primary children and 700 calories of energy and 40 grams' protein per day for Upper primary children.

II. NUTRITION AND FOOD NORMS UNDER THISSCHEME

PM POSHAN is one of the leading rights-based central assistance programs under the National Food Security Act of 2013 (NFSA). The main goal of this program is to improve the nutritional status of children studying in grades I-VIII in targeted schools. The nutrition and food standards under the program are: H. INR 1/kg for coarse grains, INR 2/kg for wheat and INR 3/kg for rice.

Cooking fee: Including material cost.

Legumes, vegetables, cooking oil, other spices and fuel. His daily cooking cost per child is 4.97 rupees in elementary school and 7rupees.

45 for High School 01.04.2020

Cook and helper fee: Rs 1000 per month for 1 year and 10 months.

Transportation Assistance: Follows PDS rate schedule for transportation of grain from FCI house to school door. Up to ₹1500 per MT for transporting grain from FCI godowns in NER and states other than 2 Himalayas and 2 states other than UT to school doors.

Management, Monitoring and Evaluation (MME): 3% of the total cost of cereals, cooking costs, cook and attendant costs, and transportation costs.

Provision of meals during summer vacation in drought- and disasterstricken areas.

Shop Kitchen: Based on base area standards and state tariffs. 20 m² for a school with 100 students. Additional 4m² for each additional student up to 100.

Kitchen utensils: Associated with enrollment.

Repair of shop kitchens: Rs. 10,000 per shop kitchen built 10 years ago.

Food Fortification: Systematic food fortification by Food Corporation of India (FCI).

Innovation/Flexibility Component without Separate Budgetary Support: 5% of the total cost of is grain, cooking costs, transportation support, cooking and helper fees, and MME, without separate additional budgetary support for this component. The funding requirements for this component will be covered from available funding and will

be implemented in accordance with OM No. 55(5)/PF-II/2011 of the Ministry of Expenditure of 6 September 2016.

Provision of preparatory classes or

Balvatika (i.e. before Class I) meals in primary

schools covered by Samagra Shiksha as stipulated in the National Education Policy.

III.PROBLEM STATEMENT

PM Poshan scheme is providing hot meal for children's from std I to std VIII which will help to the children's nutritional status. Poshan Tracker is an important governance tool. Poshan Tracker is a mobile application launched by the Department of Women and Child Development, Government of India through the National e-Governance Division (NeGD) on March 1, 2021. Aim is to design an online system which will be tracking the impact of the PM poshan scheme on children and compatible enough for users to handle it from any device.

IV.EXISTING SYSTEM

There exist an system to track the impact PM Poshan scheme called Poshan Tracker. Poshan Tracker is a mobile application launched by the Department of Women and Child Development, Government of India through the National e-Governance Division (NeGD) on March 1, 2021. Poshan Tracker is an important governance tool. Use Poshan Tracker technology to dynamically identify child stunting, wasting and underweight and track nutrition service delivery over the last mile. But this app does not provide on how this scheme is impacting children's wellbeing.

The PM-POSHAN Tracker is a system that allows you to track the performance of your PMs on a daily basis. It also provides you with an overview of how each employee is performing in comparison to their peers. pm poshan tracker is a powerful yet easy to use product tracker, it allows you to set reminders and alarms for each task. It also provides an extremely easy-to-use interface for creating and managing your tasks. Its powerful calendar integration makes it easy for you to keep track of all important dates

V. LITERATURE SURVEY

PM Poshan Scheme is a government program which helps to provide food, good healthcare and education to people who are living in poverty. In terms of nutritional status, the study shows that total yin intake was significantly higher in children who benefited from the scheme. Additionally, the number of children with low energy and protein intakes was less than expected at baseline but increased significantly during the period when they received PM Poshan.In terms of nutritional status, the study shows that total yin intake was significantly higher in children who benefited from the scheme. The tracking impact of PM

Poshan Scheme on children's nutritional status and wellbeing has started. During period 1, we found that the scheme had a significant positive impact on child nutritional status, which is evident from the improved weight-for-height z-score ($p=0.02$). We also examined how PM Poshan Scheme affected a child's health and wellbeing by examining two outcomes: (i) stunting prevalence and height for age levels, as well as (ii) health care seeking behaviors such as doctor visits and immunizations after age 10. When the programme began, there were no data on its impact on children's nutritional status and well-being. However, by using several recent monitoring surveys, we found that it significantly improved the nutritional status of both girls and boys in terms of height-for-age z-scores (HAZ), micronutrient sufficiency (measured as PEM), and weight z-score (WZ). Children under 5 years old who benefited from the scheme gained an average of 3.47 cm in HAZ and 0.35 mg per day in PEM over 2 years.

VI. SYSTEM ARCHITECTURE

To develop the system which will be flexible enough to track the impact of scheme for users. Using this system would make it easy to track the nutritional status of children under the PM Poshan Scheme.

VII. TOOLS & TECHNOLOGY

A. Tools

- Python Idle
- Web Tool
- Microsoft Excel
- Power BI

B. Technologies

- Data Analytics
- DBMS
- Machine Learning
- Python
- Data Science
- Web Technologies

VIII.TECHNOLOGY

A. The Importance of Impact Tracking:

Tracking your organization's goals ensures that all efforts are focused on achieving the same high-level goals, ensuring that everyone is contributing to the company's growth and development. Additional benefits include:

1) Clarity of purpose

2) Greater unity and camaraderie

3) Increased productivity

4) Fewer errors

5) Improved skills

6) More opportunities for future projects

7) Increased likelihood of meeting budget targets

8) Increase Satisfaction

B. Technologies Used in Tracking: The two main technologies that help develop tracking are data analysis and database management systems. p.

Data Analytics

1) Data analytics is the process of analyzing raw data in order to draw out meaningful, actionable insights, which are then used to inform and drive smart business decisions.

2) A data analyst will extract raw data, organize it, and then analyze it, transforming it from incomprehensible numbers into coherent, intelligible information. Having interpreted the data, the data analyst will then pass on their findings in the form of suggestions or recommendations about what the company's next steps should be.

3) You can think of data analytics as a form of business intelligence, used to solve specific problems and challenges within an organization. It's all about finding patterns in a dataset which can tell you something useful and relevant about a particular area of the business—how certain customer groups behave, for example, or how employees engage with a particular tool.

4) Data analytics helps you to make sense of the past and to predict future trends and behaviors; rather than basing your decisions and strategies on guesswork, you're making informed choices based on what the data is telling you. Armed with the insights drawn from the data, businesses and organizations are able to develop a much deeper understanding of their audience, their industry, and their company as a whole—and, as a result, are much better equipped to make decisions and plan ahead. 5) Difference between data analytics and data science The terms "data science" and "data analytics" tend to be used interchangeably. However, they are two different fields and denote two distinct career paths. What's more, they each have a very different impact on the business or organization.

One of the key differences between data scientists and data analysts is what they do with data and what results they achieve. Data analysts want to answer specific questions or address specific problems that have already been identified and known to the business. To do this, we study large data sets to identify trends and patterns. The results are then "visualized" in the form of charts, graphs, and dashboards. These visualizations are shared with key stakeholders and used to make informed strategic decisions based on the data.

A data scientist, on the other hand, considers what questions the business should or could be asking. They design new processes for data modeling, write algorithms, devise predictive models, and run custom analyses. For example: They might build a machine to leverage a dataset and automate certain actions based on that data—and, with continuous monitoring and testing, and as new patterns and trends emerge, improve and optimize that machine wherever possible.

In short: data analysts tackle and solve discrete questions about data, often on request, revealing insights that can be acted upon by other stakeholders, while data scientists build systems to automate and optimize the overall functioning of the business.

Another main difference lies in the tools and skills required for each role.

Data analysts are typically expected to be proficient in software like Excel and, in some cases, querying and programming languages like SQL, R, SAS, and Python. Analysts need to be comfortable using such tools and languages to carry out data mining, statistical analysis, database management and reporting.

6) Data scientists, on the other hand, might be expected to be proficient in Hadoop, Java, Python, machine learning, and object-oriented programming, together with software development, data mining, and data analysis.

7) Different types of data analysis:

8) Descriptive analytics

9) Descriptive analytics is a simple, surface-level type of analysis that looks at what has happened in the past. The two main techniques used in descriptive analytics are data aggregation and data mining—so, the data analyst first gathers the data and presents it in a summarized format (that's the aggregation part) and then "mines" the data to discover patterns.

10) The data is then presented in a way that can be easily understood by a wide audience (not just data experts). It's important to note that descriptive analytics doesn't try to explain the historical data or establish cause-and-effect relationships; at this stage, it's simply a case of determining and describing the "what". Descriptive analytics draws on descriptive statistics, which you can learn about here. Diagnostic analytics

11) While descriptive analytics looks at the "what", diagnostic analytics explores the "why". When running diagnostic analytics, data analysts will first seek to identify

anomalies within the data—that is, anything that cannot be explained by the data in front of them.

For example: If the data shows that there was a sudden drop in sales for the month of March, the data analyst will need to investigate the cause.

12) To do this, they'll embark on what's known as the discovery phase, identifying any additional data sources that might tell them more about why such anomalies arose. Finally, the data analyst will try to uncover causal relationships—for example, looking at any events that may correlate or correspond with the decrease in sales. At this stage, data analysts may use probability theory, regression analysis, filtering, and time-series data analytics.

Predictive analytics

13) Just as the name suggests, predictive analytics tries to predict what is likely to happen in the future. This is where data analysts start to come up with actionable, data-driven insights that the company can use to inform their next steps. Predictive analytics estimates the likelihood of a future outcome based on historical data and probability theory, and while it can never be completely accurate, it does eliminate much of the guesswork from key business decisions.

14) Predictive analytics can be used to forecast all sorts of outcomes—from what products will be most popular at a certain time, to how much the company revenue is likely to increase or decrease in a given period. Ultimately, predictive analytics is used to increase the business's chances of "hitting the mark" and taking the most appropriate action.

Prescriptive analytics

15) Building on predictive analytics, prescriptive analytics advises on the actions and decisions that should be taken.

In other words, prescriptive analysis shows how predicted outcomes can be exploited. When conducting prescriptive analysis, data analysts consider multiple possible scenarios and evaluate different actions a company can take.

16) Prescriptive analysis is one of the most complex types of analysis and can involve tasks involving algorithms, machine learning, and computational modeling procedures. However, effective use of prescriptive analytics can have a profound impact on a company's decision-making process and ultimately its bottom line.

17) The type of analysis you perform depends on the type of data you are working with.

If you're not already familiar with it, it's worth learning about the four levels of data measurement: Nominal, Ordinal, Interval, and Relative.

D. Database Management System

Database Management System (DBMS) is system software for creating and managing databases. A DBMS allows end users to create, protect, read, update and delete data in databases. The most common type of data management platform, a DBMS essentially acts as an interface between a database and a user or application, ensuring that data is consistently organized and easily accessible.

What does a DBMS do?

The DBMS manages the data; the database engine allows data to be accessed, locked and modified; and the database schema defines the database's logical structure. These three foundational elements help provide concurrency, security, data integrity and uniform data administration procedures. The DBMS supports many typical database administration tasks, including change management, performance monitoring and tuning, security, and backup and recovery. Most database management systems are also responsible for automated rollbacks and restarts as well as logging and auditing of activity in databases and the applications that access them.

1) The DBMS provides a centralized view of data that can be accessed by multiple users from multiple locations in a controlled manner. A DBMS can limit what data end users see and how they view the data, providing many views of a single database schema. End users and software programs are free from having to understand where the data is physically located or on what type of storage medium it resides because the DBMS handles all requests.

2) The DBMS can offer both logical and physical data independence to protect users and applications from having to know where data is stored or from being concerned about changes to the physical structure of data. So long as programs use the application programming interface (API) for the database that the DBMS provides, developers won't have to modify programs just because changes have been made to the database.

What is included in the DBMS?

3) A DBMS is a complex system software consisting of several integrated components that provide a consistent and manageable environment for creating, accessing and modifying data in a database. These components include:

4) Storage Engine

This basic DBMS element is used to store data. A DBMS needs to interact with the file system at the operating system (OS) level to store data. Additional components can be used to store data or interact with actual data at the file system level.

5) Metadata catalogue

Sometimes called a system catalog or database dictionary, a metadata catalog functions as a repository for all the database objects that have been created. When databases and other objects are created, the DBMS automatically registers information about them in the metadata catalog. The DBMS uses this catalog to verify user requests for data, and users can query the catalog for information about the database structures that exist in the DBMS. The metadata catalog can include information about database objects, schemas, programs, security, performance, communication and other environmental details about the databases it manages.

6) Database access language

The DBMS also must provide an API to access the data, typically in the form of a database access language to access and modify data but may also be used to create database objects and secure and authorize access to the data.

SQL is an example of a database access language and encompasses several sets of commands, including Data Control Language for authorizing data access, Data Definition Language for defining database structures and Data Manipulation Language for reading and modifying data. 7) Optimization engine

A DBMS may also provide an optimization engine, which is used to parse database access language requests and turn them into actionable commands for accessing and modifying data.

8) Query processor

After a query is optimized, the DBMS must provide a means for running the query and returning the results.

9) Lock manager

This crucial component of the DBMS manages concurrent access to the same data. Locks are required to ensure multiple users aren't trying to modify the same data simultaneously.

10) Log manager

The DBMS records all changes made to data managed by the DBMS. The record of changes is known as the log, and the log manager component of the DBMS is used to ensure that log records are made efficiently and accurately. The DBMS uses the log manager during shutdown and startup to ensure data integrity, and it interfaces with database utilities to create backups and run recoveries.

11) Data utilities

A DBMS also provides a set of utilities for managing and controlling database activities. Examples of database utilities include reorganization, runstats, backup and copy, recover, integrity check, load data, unload data and repair database.

IX. Working

The first page of the online system would be a login page. Through this the information of each and every student's data would be saved. It would take a particular student's height, weight and age. And would return the body mass per index. The system would be fed with information of each student every week, then at the end of the month it will generate a graph, so that it would be easy to analyse the growth in the nutritional status and the benefit that a student received by this scheme.

X.RESULTS

The results of this study show that PM Poshan therapy had a positive effect on children with improved nutrition and wellbeing. The results of the PM Poshan plan showed that children from grades 1 to 6 showed significant improvements in nutritional status and IQ. The PM Poshan plan has been found to be beneficial in improving children's health and well-being by increasing intake of nutritious foods and increasing the frequency of physical activity. The PM Poshan program was launched to improve children's nutrition and well-being. Results so far have observed that nearly 70% of children have benefited from the scheme. The children were found to have taken nutritional supplements, and most were well covered, allowing them to visit the polyclinic regularly. Nutritional status of children under 5 years of age has improved over the past 3 years. Children get adequate amounts of calories, protein and fat.

XI. CONCLUSION

PM Poshan Scheme is a scheme where children from std IVIII are given one hot cooked meal every day. This scheme was founded to curb rising malnutrition and hunger among children. In order to track the progress of this scheme we will be building a software that will take data as input and give results as output that can be in the form of graph. This will be done using DBMS and Data Analytics. XII. **Reference**

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Land Use Land Cover Change Detection using Machine Learning

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Abstract— **Despite the fact that the phrases "land use" and "land cover" are sometimes used synonymously, they are not the same. Land-use change refers to a change in how a particular area of land is utilised or managed by humans. Two of the most well-known land use types are urban and agricultural land uses. Land-cover change can be defined as change in some continuous characteristics of the land, such as vegetation type, soil conditions, etc. Using satellite remote sensing data, a huge region of land cover can be quickly recognised and mapped. Planners and managers can use these maps to comprehend the existing environment, which will enable them to assess previous management choices and gain perspective on the outcomes of their current choices before they are put into action. For instance, coastal managers utilise maps and data on land cover to comprehend how natural occurrences and human usage of the terrain affect each other. Maps can assist managers in assessing urban growth, simulating problems with water quality, predicting and evaluating the effects of floods and storm surges, tracking the loss of wetlands and potential effects from sea level rise, prioritising areas for conservation efforts, and comparing changes in land cover to environmental effects or to connections with socioeconomic changes like population growth. Unsupervised or supervised methodologies, or a combination of the two, can be used to create a straightforward land cover and use map. The spectral, spatial, and radiometric resolution of the picture data set determines the resulting map. The fundamental requirements for an image**

classification are a general understanding of the research area's landscape, post classification field verification, and accuracy assessment.

Keywords— Land Cover Change, Land Use change, Climate Change, LULC Change, Classification Algorithms, Deforestation

I. INTRODUCTION

Future investigations into a number of global phenomena, such as droughts, floods, erosion, migration, and climate change, will be aided by an understanding of land use and land cover at different scales. The activities conducted for sustainable development in any given area must include ongoing, precise LULC analysis. A wide range of research investigations on the effects of climate change on stream-flow and water budgets, geomorphology, groundwater management, social knowledge management of natural resources, and agricultural land monitoring all benefit from detailed LC maps. LULC maps can be used to identify the types of areas that are best suited for agriculture and those that are generally helpful for managing watersheds. The most popular technique for mapping land cover and monitoring changes over time is remote sensing photography. The hydro-logic and water resources modelling community is eager to incorporate and assess changing land use and its impact on the water budget due to population growth and the need to develop new regions to meet the need for food production, energy generation, and water security. Large-scale low-resolution land cover mapping requires a vast amount of data. As a result, enormous storage capabilities, powerful processing, and the ability to use a variety of techniques are all necessary.

According to a number of studies, the LULC classification using medium- and low-resolution satellite images has a number of spectral and spatial constraints that reduce its accuracy. Therefore, in order to overcome the aforementioned constraints and produce high-precision LULC pictures, researchers have been using machine-learning techniques [1,2]. Furthermore, because successful outcomes depend on the machine-learning model setup, training data, and input parameters, not all machine-learning techniques always result in a high-precision LULC map. Numerous studies have been done on land-use classification using machine-learning algorithms up to this point, but the effectiveness of the models has not been thoroughly assessed [3,4]. Six machine-learning algorithms were used in this research to determine which methodology, based on accuracy statistics, can build a high-precision LULC map.

II. Review of Literature

The majority of the terrestrial biosphere has been altered by human populations and land usage into anthropogenic biomes. A number of novel ecological patterns and processes have emerged as a result of this transition, which has been significant for more than 8000 years (Ellis, 2011). Many different types of scholars have recently become interested in issues with LULC transformation, from those who prefer studying spatio-temporal patterns of land conversion to others who attempt to understand the origins, implications, and consequences (Verburg et al. 1999; Brown et al. 2000; Theobald, 2001) [5,7]. Despite being constrained by physical limitations, human activities that are primarily driven by socioeconomic factors result in changes in both undeveloped and developed land (Long et al. 2007) [10]. A significant amount of the earth's land surface has been changed via land use change, including land conversion from one type to another and land cover modification through land use management. The objective is to meet the urgent needs of humans in terms of natural resources (Meyer and Turner, 1992; Vitousek et al. 1997) [8]. In a research conducted in the Shurugwi district of Zimbabwe's Midlands Province in 2010, Mark and Kudakwashe noted a rise in cropland. He credited the Land Reform and Resettlement Program for this rise. For many agricultural purposes, such as creating new farming plots, obtaining wood for fuel, and erecting poles for among other things, construction of both houses and cow enclosures. In Davangere city, Karnataka, India, the built-up area has nearly doubled between 1970 and 2005 at the expense of agricultural and scrub land (Begum et al. 2010) [9].

III. Need for the study

A society's social and economic development is completely correlated with its rate of expansion. This is the main justification behind socioeconomic surveys. Datasets from both spatial and non-spatial sources are used in this kind of survey. The planning, management, and monitoring of programmes at the local, regional, and national levels heavily relies on LULC maps. On the one hand, this type of information aids in a better understanding of land utilisation issues, and on the other, it is crucial in the establishment of the policies and programmes needed for development planning. Monitoring the ongoing pattern of land use/land cover through time is essential for ensuring sustainable development. Authorities involved in urban development must create these planning models so that every available piece of land can be used in the most logical and effective way in order to ensure sustainable urban development and prevent the haphazard growth of towns and cities. Information about the area's past and present land usage and land cover is necessary for this. We may study the changes in our ecology and surroundings with the aid of LULC maps. We can create regulations and start programmes to safeguard our environment if we have inch-by-inch data on the Land Use/Land Cover of the study unit.

IV. RELATED Work

Rao & Narendra (2006) and Boakye et al (2008) have done the mapping of land use and land cover changes using unsupervised classification methodology. To classify data and prepare final maps, they used ERDAS envision software. Researchers and scientists have utilised the ERDAS Imagine software for classification purposes in a number of projects [12].

Studies on sustainable watershed management have been conducted in places where resources are best used for the welfare of the populace and the overall growth of a region. Studies were conducted to decide on different land use alternatives in a watershed by visual interpretation techniques employing GIS in order to achieve the best possible resource usage. Similar research was done in the National Capital Region (NCR) of Delhi, where Mohan (2005) conducted urban LULC change detection as part of planning for rural and urban communities [13].

For use in their Maryland Geographic Information (MAGI) database, the State of Maryland Health Resources Planning Commission created a land cover data set using Landsat TM information. The U.S. Geological Survey also conducted research in 1985 to create 1:250,000 scale land cover maps for Alaska using data from the Landsat MSS satellite (Fitzpatrick et al. 1987). A 21-class land cover map was produced using all seven TM bands (EOSAT, 1992).

In 1992, the Georgia Department of Natural Resources mapped the whole State of Georgia using Landsat Thematic Mapper data to locate and quantify wetlands and other land cover types (ERDAS, 1992). Similarly, using TM multi-temporal and multi-spectral data, the State of southern Carolina Lands Resources Conservation Commission created a thorough land cover map with 19 classes (EOSAT, 1994).

For the investigation of land use/land cover patterns in Indonesia, a mix of MSS Landsat and land use maps was used (Dimyati, 1995). Remote sensing techniques were used to generate the index of changes. This was accomplished by superimposing land use/land cover pictures from 1972, 1984, and 1990 on top of each other[16]. Remote sensing and GIS techniques were utilised by Adeniyi and Omojola (1999)[15] in their land use and land cover change evaluation in the Sokoto-Rima Basin of north-western Nigeria to examine changes in the two dams (Sokoto and Guronyo) between 1962 and 1986. The study showed that although land use/land cover category varied, settlement remained the dominant one.

Many researchers, including Rao and Narendra (2006), Remi et al (2007), Chaudhary et al (2008), and Kim et al (2008), have used supervised classification in their investigations as opposed to unsupervised classification. They stated that the Maximum Likelihood Classification

(MLC) decision rule was used to classify land use and land cover with the highest classification accuracy possible [14].

According to the State Forest Report Maharashtra (2005), Maharashtra has a total area of 30,771,000 hectares, of which 19.27% is unsuitable for agriculture, 2.94% is occupied by cultural waste, 3.81% by fallow lands other than current fallows, and 3.87% by current fallows.

V. Study Area

The selected study area for the land use and land cover analysis is the Mumbai Metropolitan Region (MMR). Mumbai Metropolitan Region is a metropolitan area made up of Mumbai (Bombay) and its surrounding communities in the western Indian state of Maharashtra's northern Konkan division. With a population of over 26 million and a total area of 6,355 square kilometres (2,454 sq mi), the region is one of the most populated metropolitan areas in the world. Rapid urbanisation has caused issues with unplanned and illegal development in the area. Some of the largest warehousing areas in India may be found in the villages along the NH 3 in Bhiwandi, which are examples of haphazard growth in the MMR. Governmental organisations like the Thane Collector and Town Planner have had to deal with unorganised growth.

Figure 1: Mumbai Metropolitan Region (MMR)

The exact latitude and longitude coordinates of MMR are: 19.076090, 72.877426. The area of Mumbai Metropolitan region is around 8,500 km2. Population of MMR region is 22,885,000 according to 2016 Census.

VI. Data Set

The LANDSAT 5 and LANDSAT 8 time series spatial data for three years (different decades 2000, 2011 and 2020) were used. L-8 and Landsat 8 (30 mts) (OLI). The USGS website was used to get the georeferenced data. The results would also depend on the meteorological conditions in the MMR regions if the photographs were from the same month.

This work has been divided into two stages for evaluation and prediction of LULC: (2) Future LULC map prediction using historical LULC data to simulate the future changes in LULC pattern and urban growth. (1) Spatiotemporal LULC maps are created from satellite photos.

USGS website was used to get the georeferenced data. Having photos from almost the same month would also produce outcomes according to the MMR regions' air conditions.

VII. Proposed Methodology

Figure 2 represents the methodology used. Supervised algorithms are used for LULC Detection. Supervised algorithms are predicated on the notion that a user can choose sample pixels from an image that are characteristic of particular classes, instructing the image processing software to utilise these training sites as references for the categorization of all other pixels in the image. The user's knowledge is taken into consideration while choosing training sites, sometimes referred to as testing sets or input classes. The threshold for how similar other pixels must be to be grouped together is likewise chosen by the user. These limits are frequently established using the training area's spectral properties, plus or minus a certain increment (often based on "brightness" or strength of reflection in specific spectral bands). Additionally, the user specifies how many classifications the image will fall under.

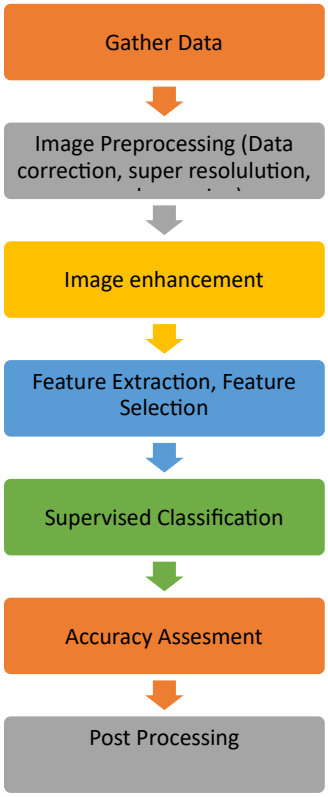

Figure 2: Methodology

Machine learning algorithms, such as RF, CART, and SVM, and deep learning algorithms such as ANN, were used to train the classifiers for both Landsat-5 and Landsat-8 images.

Classification and Regression Tree (CART)

The CART algorithm, which is used in machine learning, shows how the values of the target variable can be predicted based on other factors. Each fork of the decision tree is divided into a predictor variable, and at the conclusion of each node is a prediction for the target variable. Depending on the threshold value of an attribute, nodes in the decision tree are divided into sub-nodes. The training set is the root node, which is divided into two by taking the best attribute and threshold value into account. Additionally, the subsets are divided according to the same rationale. This continues until the tree has either produced all of its potential leaves or found its last pure sub-set.

Random Forest Classification

Popular machine learning algorithm Random Forest is a part of the supervised learning methodology. It can be applied to ML issues involving both classification and regression. It is built on the idea of ensemble learning, which is a method of integrating various classifiers to address difficult issues and enhance model performance. Random Forest, as the name implies, is a classifier that uses a number of decision trees on different subsets of the provided dataset and averages them to increase the dataset's predictive accuracy. Instead than depending on a single decision tree, the random forest uses forecasts from each tree and predicts the result based on the votes of the majority of predictions.

Support Vector Machine

One of the most well-liked supervised learning algorithms, Support Vector Machine, or SVM, is used to solve Classification and Regression problems. However, it is largely employed in Machine Learning Classification issues. The SVM algorithm's objective is to establish the best line or decision boundary that can divide n-dimensional space into classes, allowing us to quickly classify fresh data points in the future. A hyperplane is the name given to this optimal decision boundary. SVM selects the extreme vectors and points that aid in the creation of the hyperplane. Support vectors, which are used to represent these extreme instances, form the basis for the SVM method.

Artificial Neural Networks

Artificial Neural Networks contain artificial neurons which are called units. These units are arranged in a series of layers that together constitute the whole Artificial Neural Networks in a system. A layer can have only a dozen units or millions of units as this depends on the complexity of the system. Commonly, Artificial Neural Network has an input layer, output layer as well as hidden layers. The input layer receives data from the outside world which the neural network needs to analyze or learn about. Then this data passes through one or multiple hidden layers that transform the input into data that is valuable for the output layer. Finally, the output layer provides an output in the form of a response of the Artificial Neural Networks to input data provided. In the majority of neural networks, units are interconnected from one layer to another. Each of these connections has weights that determine the influence of one unit on another unit. As the data transfers from one unit to another, the neural network learns more and more about the data which eventually results in an output from the output layer.

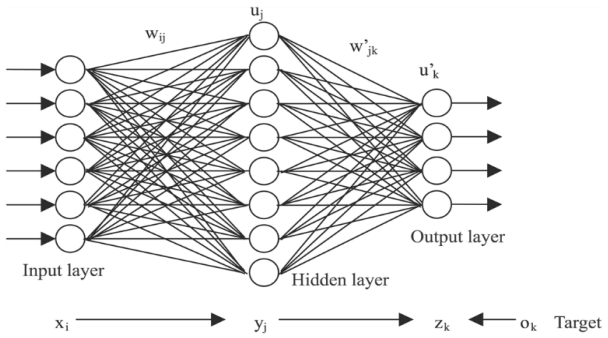

Figure 3: Artificial Neural Networks

VIII. Conclusion

The study aims to generate Land Use/ Land Cover (LULC) maps for Mumbai Metropolitan Region (MMR) which will provide important information such as dynamics of agricultural ecosystems, forest conversions, surface water bodies, etc. on annual basis and classify land into agriculture, bare soil, bushland, forest, grassland, built-up, water, and wetland which will help in land conservation, sustainable development, and management of water resources. This will also help in the formation of policies and programme required for development planning, achieve sustainable urban development and to check the haphazard development of towns and cities.

Acknowledgement

Without the outstanding assistance of our teacher and project advisor, Mr. Vijay Yele, this report and the research behind it would not have been feasible. The Thakur College of Engineering and Technology provided funding for this study. We are grateful to our institution's faculty members who offered knowledge and insight that were extremely helpful to the research. Additionally, we would like to express our gratitude to Mr. Vijay Yele for lending us his perspective and ideas during this project.

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Efficient Student Academic Performance Monitoring System

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Abstract— **The aim of this study is to develop systems to track the performance of a student at ABC University. System development is necessary because different sources and separate data are not always available when the Department of Information Systems wants to track student performance. Furthermore, the data is not provided in a timely manner, which hinders the tracking process, thereby affecting student learning outcomes. Therefore, the system also aims to make it easier for users of the system to see student learning outcomes in line with the data required for monitoring.**

Keywords—student, academics, marks, performance monitoring, marks prediction, machine learning

I.INTRODUCTION

Future changing agents must be intelligent and capable of critical thought. According to this paradigm, students must participate actively in all events and activities on campus. Students are one age group that is younger in terms of potential for humanity, which includes people with higher than normal thought levels. Personal and social interests, however, may occasionally conflict. This issue will affect how well students do. The success of a student's academic endeavours is influenced by both internal and external variables, claims Slameto [1]. 1) Internal variables, broken down as 1) Physical Factor 2) Psychology Factor 3) Fatigue Factor 2) External factors divided into a) Family Factor, b) School Factors, c) Society Factors.

Predicting pupils' performance has grown more challenging due to the enormous amount of data in educational databases. Lack of a set system for assessing and monitoring success also not taken into account at the moment. There are two main causes for such types of occurring. First, there is yet inadequate study on current prediction techniques to determine the most the most suitable techniques for forecasting student performance at schools. The second is the lack of inquiry courses in question. A summary of the artificial intelligence systems that were utilised for prediction is the actual objective. Academic education. This study focuses on how to categorise the most important characteristics of students. This study also focuses on applying prediction algorithms to categorise the student data's most important characteristics. We might be able to more effectively and efficiently increase student performance and growth by using educational machine learning techniques. Academic institutions, educators, and students all stand to gain from this.

II.METHODOLOGIES:

Linear Regression:

One of the simplest and most well-liked Machine Learning algorithms is linear regression. It is a statistical technique for performing predictive analysis. For continuous/real or quantitative variables like sales, salary, age, product price, marks, etc., linear regression generates predictions.

The classification method that deals with the threshold value is logical regression. The threshold value is determined using the following factors: • Low Precision

/ High Recall • High Precision / Low Recall

B. Decision Tree:

The regression model called a decision tree classifier is displayed as a tree structure. The dataset will be divided into smaller subsets using a decision tree classifier. Decision nodes and leaf nodes make up the tree. The property that provides the most information will serve as a decision node in our suggested architecture. The root node, which is the node that makes up the majority of the decision nodes, functions as a predictor. Leaf nodes are nodes that cannot be further separated.

The decision tree's steps are listed below in detail:

• Process 1: Start the root.

• Process 2: Perform the test.

• Process 3: Follow the edges that correspond to the result.

• Process 4: go to step 2 until reaches leaf node.

• Process 5: Predict what will happen based on the leaf.

C. K-Nearest Neighbour:

One of the fundamental and fundamental classification techniques in machine learning is K-Nearest Neighbor. It is non-parametric and doesn't make any underlying predictions about how the data will be distributed.

Following is a list of the steps that the KNN took:

• The training data should be saved in a sample points array.

• The Euclidean distance measures.

• Make the least distance range available.

The categories for the logical regression can be categorized as follows:

• Binomial

• Multinomial

• Ordinal

III. RELATED WORK

To assess student success and evaluate student performance, an automated evaluation method has been proposed. Here, the author employs the tree method to accurately forecast student performance. The classification of the suggested approach uses Education Data Mining (EDM). The extensive student database is analysed using the clustering data mining technique. This method will expedite the search process and produce a more accurate classification result.

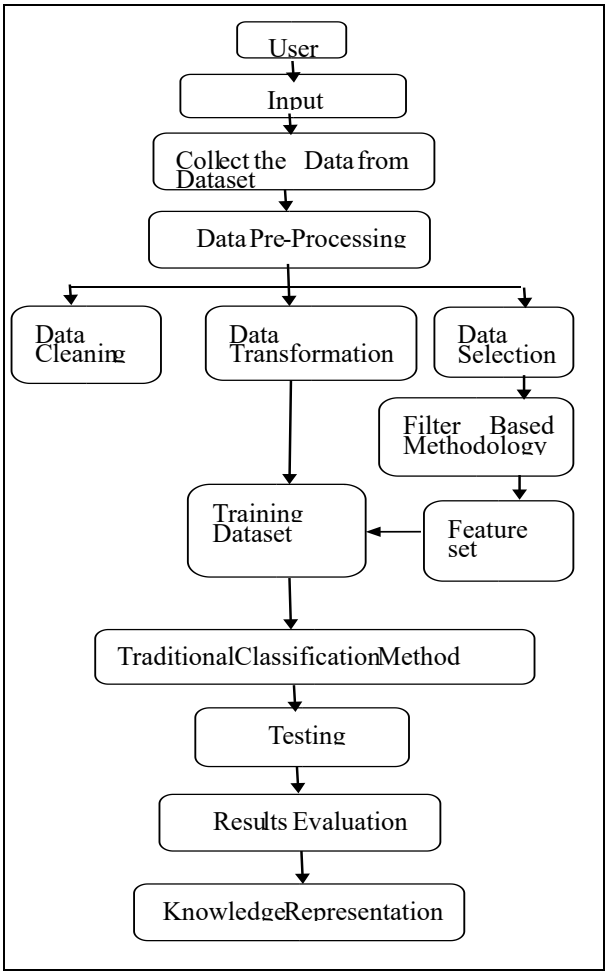
Utilizing the student data from college enrolment, a novel learning model has been presented.

The finished dataset is made available as input to machine learning (ML) algorithms that may apply and forecast student academic achievement. They chose 13 algorithms from the Naive Bayes, SVM, MLP, IBK, Rules, and tree categories of machine learning (ML).

It has been suggested to compare various supervised learning methods for student prediction. 14 feature set for classification are used by the author. KNN, Decision trees, and Navie Bayes are the tools used in classification.

Using student intellectual factors that have an impact on their studies, psychometric analysis of student behaviour has been presented. For the purpose of determining the educational data pertaining to psychological variables, many mining approaches are applied. The accuracy rate of the prior study was 89%, however by implementing the suggested system, it has increased to 90%. To attain greater precision, the author in this instance used a Radical Basis Function Kernel.

V.SYST ARCHITEC



IV. DATA PREPARATION

a) Data Consolidation

• Data Selection:

• Academic variables of interest identified

b) Data Cleaning

• Missing Values Report:

• No reported values missing

• Outlier Detection Report:

• No reported outliers

c) Data Transformation

• Dummy variable creation:

• College

• Attends-College Hours

• Accommodations Class

d) Data Reduction

• Removed variable Return

Removed 23 records that included the Return attribute

The above figure clearly explains the system architecture of the proposed system.

The suggested system's steps are as follows:

• Collecting data about users and the behavior.

• Transforming the data into features.

• Train the model.

• Deploy the trained model.

VI. REVIEW OF LITERATURE

A review of earlier research on the connection between undergraduate students' success and their prior academic accomplishment was done. The data from this evaluation provided a foundation for comparing the results of the current study to those discovered in the earlier.

A. Academic success

The academic success of university students has been the subject of a sizable body of literature (at undergraduate and postgraduate levels). Academic success is a phenomenon that includes academic success, achieving learning goals, acquiring desirable skills and competences, satisfaction, perseverance, and performance after college (York et al., 2015). Academic success has alternatively been defined as completing tasks that advance the academic performance of the student in question.

In order to meet the goals for knowledge and skill development during the learning process, academic success is crucial. Therefore, it is important to comprehend the underlying aspects that influence university students' academic achievement.

Numerous factors affect undergraduate students' academic achievement at the university level, according to academic success research This has led to the development of several ideas. Such as pedagogical theory, curricular theory, and learning theory in the realm of education a few others Empirical research has examined the effects of a wide range of variables on the University undergraduate students' academic achievement (Parker et al., 2004; Young,1989). It's important to note the use of the words "achievement" and "academic success" in literature interchangeably. Herminio (2005) identified two elements that influence academic performance. variables that are both internal and external to success. The external influences are extracurricular activities, family and work activities, as well as the class schedule, size of the class, classroom setting, lecturers' roles, technology, and kind of exam. The results of Herminio (2005) demonstrate that internal factors are far more important than external influences. Ling et al. (2010) also looked at how different teaching and learning strategies affected student performance. It was discovered that greater academic achievement is associated with the growing teaching strategy and the accomplishing motive learning approach. Similarly, research has shown that first-year university students' academic success is significantly influenced by their earlier academic performance (e.g. McKenzie and Schweitzer, 2001; Win and Miller, 2005).

B. Prior academic performance and success on undergraduate programs

Recent research has looked at the connection between prior academic success and undergraduate students' academic success in universities (see Abisuga et al., 2015; Curtis et al., 2007; Whyte et al., 2011; Shahiri and Husain, 2015). According to Curtis et al. (2007), admission standards are only marginally predictive of first-year dental students' academic success. Similar to this, Whyte et al. (2011) found that students' age and index scores are the best indicators of academic achievement for paramedic and nursing students.

Additionally, several research indicated that age maturity and academic entry requirements are the best indicators of academic achievement in undergraduate nursing and paramedic programmes (Van Rooyen et al., 2006; Whyte et al., 2011).

The studies that have been discussed thus far show that there is a link between undergraduate students' academic success and their prior academic accomplishment. The impact of this link is influenced by other circumstances, it should be mentioned.

C. Method

Using a variety of techniques, several academics have looked at the factors that affect academic performance in programmes for the built environment. In the literature, a questionnaire survey (Ling et al., 2010), simulation (Long et al., 2009), and longitudinal survey are among the research techniques used (Guillermo et al., 2014). Although a variety of research methodologies have been used in the literature, it is crucial to remember that the suitability of a certain strategy to solving a research problem is a key aspect to be taken into account when choosing a research methodology. An efficient strategy to examine the relationship between dependent and independent variables is to use the modelling research method (Fellows and Liu, 2015). Predictions can then be made using the revealed underlying pattern. Additionally, theory/hypothesis testing can benefit from prediction modelling (Shmueli, 2010).

Therefore, the academic success of undergraduate students enrolled in an architecture programme at a Nigerian university was predicted using two machine learning modelling techniques (namely, the k-NN algorithm and linear discriminant analysis).

D. Ethical consideration

Prior to data collection, permission from the relevant academic department was acquired. The administrators in charge of the database anonymized each student's academic records in order to adhere to ethical standards.

E. Data

The Olabisi Onabanjo University launched its undergraduate architecture programme in 2003. The programme incorporates pertinent courses from different built environment disciplines as well as studiobased learning methodologies. The current entrance requirements are meant to give strong academic achievers (based on prior academic accomplishment) and students from

educationally disadvantaged areas entry opportunities into the architecture programme. Additionally, the National Universities Commission has accredited the undergraduate programme in architecture

TABLE I.CLASS DISCRETISATION

Class	Possible value (CGPA Range)
Pass	5.00 – 2.40
Fail	2.39 – 0.00

Fig. 1. Class discretisation

Table ii. The pre-processed input and output variables

Attribute	Description (Domain)
Grades obtained in 'O' level Examinations Pass	
Mathematics (MATH)	Grade of a student (numeric: from 9 - A1 to 0 - no grade)
English (ENG)	Grade of a student (numeric: from 9 - A1 to 0 - no grade)
Physics (PHY)	Grade of a student (numeric: from 9 - A1 to 0 - no grade)
Biology (BIO)	Grade of a student (numeric: from 9 - A1 to 0 - no grade)
Chemistry (CHEM	Grade of a student (numeric: from 9 - A1 to 0 - no grade)
Technical Drawing/Fine Arts (TD)	Grade of a student (numeric: from 9 - A1 to 0 - no grade)
Economics (ECON)	Grade of a student (numeric: from 9 - A1 to 0 - no grade)
Further Mathematics (FM)	Grade of a student (numeric: from 9 - A1 to 0 - no grade)
Total UTME scorea (JAMB)	Total score (numeric: from 1 to 0)
Direct entry (DE)	Mode of entry (binary: yes-1 or no)
Academic Success	CGPA at graduation (Binary: 1Pass or 0-Fail)

Total UTME score = student's UTME score / 400

F. MACHINE LEARNING MODELS

In the current study, linear discriminant analysis and nearest neighbour modelling techniques were utilized to predict students' academic progress. The machine-learning methods (linear discriminant analysis and k-nearest neighbour, respectively) were implemented in the R programming language and Rminer R-package (R Core Team, 2015). (Cortez, 2010). To investigate the relationship between a group of independent factors and a dependent variable, traditional linear regression models are used. It is crucial to understand that the linear regression model cannot accurately predict a dependant variable that is categorical (i.e. a classification problem). So, in the current work, two machine-learning algorithms were used.

A machine-learning method called K-nearest Neighbor (kNN) has been used for classification and regression problems. K-NN is utilised for classification in this study. The core idea of the kNN algorithm, according to Parsian (2015), is that no prior assumptions are made about the function f:

$$y = f(x_1 + x_2 + ... + x_n)$$

The independent variables xi is here, and the dependent variable y is. Given that no parameter is estimated, the function f is nonparametric. The technique dynamically locates k observations in the training data that are comparable to p (the k nearest neighbour) given new data sets (i.e. test data). A similarity measure that is calculated between the data based on independent factors identifies the neighbours. The Euclidean distance between the independent variables in the training set (x1,x2,….,xn) and test set (p1, p2,….,pn)can be expressed as:

$$\sqrt{(x_1 - p_1)^2 + (x_2 - p_2)^2 + ... + (x_n - p_n)^2}$$

Results

The procedures used before fitting the model are discussed in the section before that. The training data sets were fitted using k-nearest neighbour modelling and linear discriminant analysis.

This section displays the models' overall prediction accuracy.

VII. ACKNOWLEDGMENT

This paper and the research behind it would not have been possible without the exceptional support of Our supervisor, Mrs.Pranjali Kasture. This research was supported by Thakur College of Engineering and Technology. We thank our faculties from our institution who provided insight and expertise that greatly assisted the research We would also like to show our gratitude to Mrs. Pranjali Kasture for sharing their pearls of wisdom with us during the course of this research.

VIII. CONCLUSION

The analysis of students' academic growth using machine learning techniques is the main topic of the paper. Binomial logical regression, a decision tree, entropy, and a KNN classifier are all used in the investigation. This procedure can make it easier for the instructor to assess student performance and plan more effective lessons and can predict the marks of students on the basics of available data

to raise their academic performance. In future additional features are added to our dataset to acquire better accuracy.

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Flood Prediction Using Machine Learning

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Abstract— **Flood is one of the most unavoidable natural disasters. No place is fully protected from this disaster so every country always tries their level best to prepare themselves for this disaster. Many countries face this disaster every year and have to suffer through lots of loss in all terms financial, environmental, human lives, and many more which cannot be compensated no matter what is done. Flash floods are the most dangerous type of flood because they combine the destructive power of the flood with incredible speed. Flash floods occur when heavy rainfall exceeds the soil's ability to absorb it. They also occur when water fills normally dry creeks or streams, or enough water accumulates to cause streams to overflow their banks, causing rapid water rises in a short period of time. They can occur within minutes of causal collisions, limiting the time available to warn and protect the public. As one of the methods of artificial intelligence, machine learning significantly contributes to the advancement of predictive systems to provide better performance and cost-effective solutions. Accurate and timely prediction of floods is essential for reducing their impact. In recent years, machine learning algorithms have been increasingly used for flood prediction due to their ability to analyze large amounts of data and identify complex patterns. This paper provides a review of the technology of flood prediction using machine learning, including the different algorithms used, the advantages and disadvantages of the technology, and the challenges and future directions of the field.**

Keywords—Flood, Flood Prediction, Machine Learning

I. INTRODUCTION

Floods are among the most devastating natural disasters, causing devastating damage to human life, infrastructure, agriculture and socio-economic systems. Governments are therefore under pressure to create reliable and accurate maps of flood risk areas and to plan sustainable flood risk

management with a focus on prevention, protection and preparedness [1]. Flood prediction models are very important for risk assessment and management of extreme events. Robust and accurate forecasts will greatly contribute to water resource management strategies, policy proposals and analyses, and further evacuation models [2]. Therefore, the importance of advanced systems for short- and long-term forecasting of floods and other hydrological events for damage reduction is strongly emphasized [3]. However, predicting flood lead times and locations is inherently complex due to the dynamic nature of climate conditions. Therefore, today's large-scale flood forecasting models are largely data-specific and include various simplistic assumptions [4]. Flood forecasting machine learning (ML) models help with flood warnings and mitigation or prevention. For this purpose, machine learning (ML) techniques have gained popularity due to their low computational requirements and their reliance mainly on observational data. Accurate forecasts help mitigate flood impacts. In recent years, machine learning algorithms have become a promising tool for flood prediction due to their ability to analyze large amounts of data and identify complex patterns. The use of machine learning algorithms for flood prediction has been increasing, as the algorithms can provide more accurate and faster predictions than traditional methods. There are various advantages of machine learning that can help to predict flood, some of them are mentioned below as:

• Improved accuracy: Machine learning algorithms can analyze large amounts of data and identify complex patterns, leading to more accurate predictions.

• Faster predictions: Machine learning algorithms can process large amounts of data quickly, leading to faster predictions.

• Integration of multiple factors: Machine learning algorithms can consider multiple factors that contribute to floods, including rainfall measurements, river levels, and land use patterns.

Machine learning have great benefits as mentioned above but there are also some dependencies or requirements which needs to be fulfilled or can affect the accuracy of

the flood prediction model, few of the requirements are as follows:

• Need for high-quality data: Machine learning algorithms rely on high-quality and comprehensive data to make accurate predictions, which can be a challenge.

• Risk of overfitting: There is a risk of overfitting the algorithms to the data, leading to inaccurate predictions. Need for regular updates: Machine learning algorithms need to be updated regularly as new data becomes available, which can be time-consuming and costly.

A good and accurate model can be a great help to government to plan in planning the further plans for tackling the flood situations which will help large masses and countries which have to suffer through this disaster every year.

II. RELATED WORK

The following are some review of research work regarding flood prediction using machine learning:

• Amir Mosavi, Pinar Ozturk, Kwok Wing Chau (2018) work review

There work states the enormous progress made in field of ML in past two decades and various advantages of using Machine learning in predicting flood. Researchers aim to discover more accurate and efficient predictive models by introducing new ML techniques and hybridizing existing ones. The main contribution of this paper is to show state-of-the-art ML models in flood forecasting and provide insights on the best models. This article specifically examines the literature evaluating ML models through qualitative analyzes of robustness, accuracy, efficacy, and speed to provide a comprehensive overview of various ML algorithms used in the field. This paper presents the most promising forecasting methods for both long-term and

short-term floods. In addition, the most important trends for improving the quality of flood forecasting models are considered. Among them, hybridization, data decomposition, algorithm ensemble, and model optimization are described as the most effective strategies to improve ML methods.

• Nur-Adib Maspo1, Aizul Nahar Bin Harun2, Masafumi Goto1, Faizah Cheros1, Nuzul Azam Haron3 and Mohd Nasrun Mohd Nawi4 (2019) work review

The study aims to evaluate existing machine learning (ML) approaches for flood forecasting and to evaluate the parameters used for flood forecasting. The rating is based on a review of previous research articles. To achieve this goal, this research is divided into two parts. The first part is to identify flood forecasting approaches that specifically use ML methods, and the second part is to identify the flood forecasting.

parameters that were used as input parameters to the flood forecasting model. The main contribution of this paper is to determine state- of-the-art ML techniques in flood forecasting and identify notable parameters used as model inputs. This allows researchers and flood managers to use the prediction results as a guide for considering ML techniques for early flood forecasts.

• Jannatul Tanjil1, Mr. Md. Ajwad Anwar2, Nazmus Salehin Asif*3, Sagor Ghosh (2022) work review

The study tries to reflect how Machine Learning approaches outperform other approaches in predicting flood efficiently and it also talks abot the different requirements for different ML model such as machine learning-based forecasting systems include precipitation, humidity, temperature, water flow, and water level. This review article examines flood forecasting techniques.[7]

• Ioanna Bouri, Manu Lahariya†, Omer Nivron‡, Enrique Portales Julia, Dietmar Backes¶, Piotr Bilinski, Guy Schumann. (2022)work review

The study is regarding to provide a cost-efficient ML framework that is affordable by poor countries. Custom data analysis splits are included to support generalizability claims.

Furthermore, we propose a new bidirectional LSTM architecture (2P-LSTM) and evaluate it on three basic models. Finally, we evaluate models generated at various locations in Africa and Asia that were not part of the caravan dataset.

• Sella Nevo1 ,Efrat Morin2, Adi Gerzi Rosenthal1 , Asher Metzger1, Chen Barshai1, Dana Weitzner1 , Dafi Voloshin1 (2022) work review

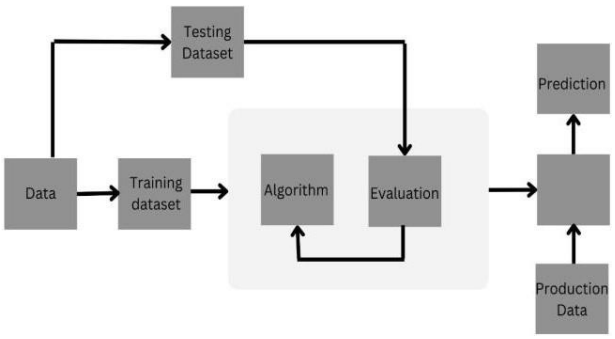
The study talks about how Long Short- Term Memory (LSTM) are better than available linear models. The study also covers the currently operational flood prediction systems such as one of the operational model developed by Google. During the monsoon season, flood warning systems in India and Bangladesh are activated, covering flood-prone areas around rivers with a total area of about 470 000 km2 inhabited by more than 350 million people. I was there. Over 100 million flood alerts sent to affected communities, relevant authorities and emergency organizations.

• Chenkai Cai Jianqun Wang, Zhijia Li , Xinyi Shen , Jinhua Wen , Helong Wang and Changhuai Wu(2022) work review

The paper represents a new hybrid machine learning framework which improves the numerical precipitation forecasting by combining

the multi-model ensemble and probabilistic postprocessing methods and overcomes the uncertainty of the meteorological systems. In this study, three different postprocessing methods to reduce errors in NPFs.

III. METHODOLOGY



The methodology used for predicting the flood can be understood by the above image. This is the basic methodology used in the process of making of any predictive model. The parts of the methodology are explained as follows:

• Data:

A dataset contains many separate pieces of data, but can be used to train an algorithm to find predictable patterns within the entire dataset.

• Training dataset:

The training data is the largest (in size) subset of the original data set that is used to train or fit the machine learning model. First, training data is fed to the ML algorithms, allowing them to learn to predict the task at hand.

• Testing Dataset:

The test dataset is another subset of the original data that is independent of the training dataset. However, it has some similar feature types and class probability distributions and uses them as a benchmark to evaluate the model once the model training is complete.

• Algorithm:

Machine learning algorithms are programs that can learn hidden patterns from data, predict output, and improve performance from experience alone. In machine learning, different algorithms can be used for different tasks.

• Evaluation:

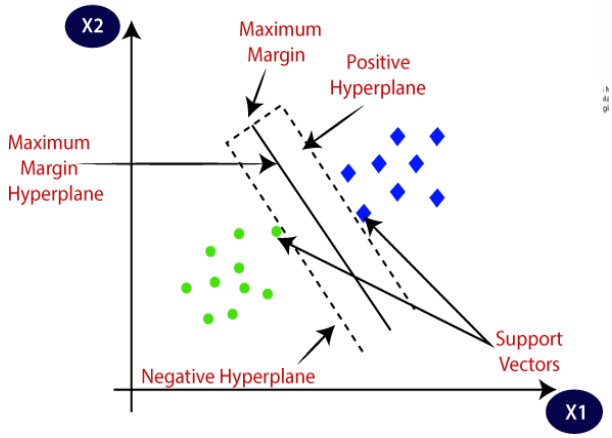
Model evaluation is an integral part of the ML lifecycle. Data scientists can measure, interpret, and explain model performance. Speeds up model development timelines by providing insight into how and why models work the way they do.

As per the methodology used by us the evaluation phase keeps on going till the best suited algorithm is not founded, if the used model is not good enough then the model is changed and re-evaluation is done only after getting satisfied result, the predictive system is made for the well-suited algorithmic model and the GUI works is proceeded.

IV. EXISTING WORK AND ALGORITHM

The existing literature machine learning algorithms on flood prediction includes decision trees, random forests, support vector machines (SVM), and artificial neural networks (ANN). The algorithms were trained on historical data, including rainfall measurements, river levels, and land use patterns, to make predictions about future flood events. Few of these machine learning algorithms are explained below:

• Support Vector Machine (SVM)



FigV.1: SVM Model

Support Vector Machine (SVM) is a supervised machine learning algorithm used for both classification and regression. Although we call regression problems, they are best suited for classification. The goal of the SVM algorithm is to find a hyperplane in N-dimensional space that distinctly classifies the data points. The size of the hyperplane depends on the number of elements. If the number of input elements is two, then the hyperplane is just a line. If the number of input elements is three, then the hyperplane becomes a 2D plane. It is difficult to imagine when the number of elements exceeds three[12]

• Random Forest Classifier

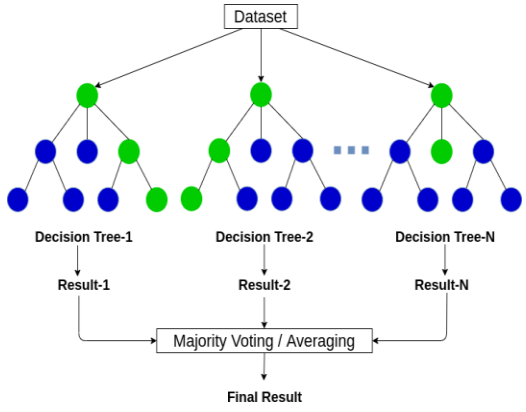


Fig V.3: Random Forest Classifier

The random sampling technique used to select the optimal partition reduces the correlation and thus the variance of the regression trees. Improves the predictive ability of individual trees in the forest. Bootstrap sampling also increases the independence between individual trees[14]

Random Forest works in two stages, the first is to create a random forest structure by combining N decision trees, and the second is to make predictions for each tree created in the first stage. The working process can be explained by the steps below:

Step 1: Select random K data points from the training set.

Step 2: Build decision trees associated with selected data points (subsets).

Step 3: Choose the number N for the decision trees you want to build.

Step 4: Repeat steps 1 and 2.

Step 5: For new data points, find the predictions of each decision tree and assign the new data points to the category that receives the most votes [15]

Some of the existing

1. Machine Learning Algorithms: Machine learning algorithms such as decision trees, random forests, support vector machines (SVM), and artificial neural networks (ANN) are commonly used for flood prediction. These algorithms can analyze large amounts of data to identify patterns and make accurate predictions.

2. Remote Sensing: Remote sensing technology such as satellites and aerial drones can be used to monitor flood-prone areas and provide real-time information on water levels, land use patterns, and meteorological conditions.

3. Geographic Information Systems (GIS): GIS technology can be used to create digital maps of flood- prone areas and integrate data from various sources to provide a comprehensive view of the situation.

4. Early Warning Systems: Early warning systems can use machine learning algorithms to predict floods based on real-time data from sensors and provide alerts to communities in advance of the flood.

V. FUTURE SCOPES

With the emergence of new technologies, the waves of new solutions have also increased that can be implemented in future to increase the accuracy of existing models or can even create better models. The following are some of the new technologies that can be used in future:

1. Internet of Things (IoT): IoT devices such as sensors, cameras, and drones can be used to gather real-time data on water levels, weather conditions, and land use patterns. This data can then be fed into machine learning algorithms to make more accurate predictions.

2. Artificial Intelligence (AI): AI technology such as deep learning algorithms can be used to improve the accuracy of flood prediction by analyzing large amounts of data and identifying patterns in real-time.

3. 5G Technology: 5G technology can be used to provide real-time data transfer and enable faster and more accurate predictions.

4. Big Data Analytics: Big data analytics can be used to analyze large amounts of data from various sources, such as satellite imagery, weather models, and social media, to improve the accuracy of flood predictions. By using these technologies, communities can better prepare for and respond to floods, reducing their impact and saving lives and property. However, it is important to note that the implementation of these technologies requires significant investment and infrastructure, and may face challenges such as data privacy and security

VI. CONCLUSION

Flood prediction using machine learning is a promising technology that has the potential to revolutionize the way that floods are predicted and managed. The majority of the studies used rainfall measurements and river levels as the data sources for training the algorithms, with some studies also using land use patterns and meteorological data. The most commonly used evaluation metrics were accuracy, precision, and recall. The results of the studies showed that machine learning algorithms can provide improved accuracy and faster predictions compared to traditional methods The algorithms can provide more accurate and faster predictions than traditional methods, and can consider multiple factors that contribute to floods. However, there are also challenges associated with the use of machine learning for flood prediction, including the need for high-quality data and the risk of overfitting. Further research is needed to develop and refine the technology, and to ensure that it is used effectively to reduce the impact of floods

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[13]FigV.2: https://tse1.mm.bing.net/th?id=OIP.9aK82AkmF9y8-Q2en34prwHaFB&pid=Api&P=0

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Plant Disease Detection using Image Processing

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Abstract— **The secret to preventing losses in the production and quantity of agricultural products is the identification of plant diseases. The research on plant diseases refers to examinations of patterns on the plant that may be observed with the naked eye. Monitoring plant health and spotting diseases are essential for sustainable agriculture. Manually keeping track of plant diseases is exceedingly challenging. It necessitates an enormous amount of work, knowledge of plant diseases, and lengthy processing times. As a result, image processing is employed to identify plant illnesses by taking photos of the leaves and comparing them to data sets. The data set includes several plants in picture format.Users are routed to an e-commerce website where several pesticides are listed along with their prices and usage instructions in addition to detection. This website may be effectively used to compare the MRPs of several pesticides and buy the one that is needed for the disease discovered. The use of an automatic method for plant disease detection is advantageous because it lessens the amount of labour required to monitor large crop farms and can identify disease symptoms at their earliest stage, when they first emerge on plant leaves.Using a genetic algorithm, image segmentation is a crucial step in the disease detection process for plant leaf disease. This essay attempts to effectively aid and support farmers that use greenhouses.**

Keywords: Plant disease detection, Tensor flow, Green house, Convolution neural network, Data model, image to byte code

Plant Detection using Image Processing

I. INTRODUCTION

India is a cultivated nation where 70% of the population relies on agriculture. Farmers can choose from a wide variety of eligible crops and choose the right insecticides for their plants. Therefore, crop damage would result in a significant loss in productivity, which would have an impact on the economy.

The most vulnerable component of plants, the leaves, are where disease symptoms first appear. From the very beginning of their life cycle until they are ready to be harvested, the crops must be inspected for illnesses. Initially, scientists had to manually check crop fields for disease outbreaks using the time-consuming, traditional approach of naked eye observation to keep a watch on the plants. A variety of strategies have been used in recent years to produce automatic and semi- automatic plant disease detection systems, and automatic disease detection by simply observing the symptoms on the plant leaves makes it both simpler and more affordable. These methods have so far shown to be quicker, less expensive, and more precise than the farmers' manual observation method.

The leaves, stem, and fruit are typically where illness symptoms are visible. The plant leaf is taken into consideration for disease identification since it exhibits disease signs. There are many instances where farmers lack comprehensive understanding of the crops and the diseases that can impact them. Farmers can efficiently use this article to increase yield as opposed to contacting an expert and seeking their recommendations. The major goal is not just to use image processing techniques to find the sickness. Additionally, it links the user straight to an online store so that

they may compare prices and buy the medication they need for the ailment they have been diagnosed with. They can then utilise it as prescribed

II. LITERATURE SURVEY

Ghaiwat et al.[8] presents survey on different classification techniques that can be used for plant leaf disease classification. For given test example, k-nearest-neighbor method is seems to be suitable as well as simplest of all algorithms for class prediction. If training data is not linearly separable then it is difficult to determine optimal parameters in SVM, which appears as one of its drawbacks

Authors in paper [9] describe that there are mainly four steps in developed processing scheme, out of which, first one is, for the input RGB image, a color transformation structure is created, because this RGB is used for color generation and transformed or converted image of RGB, that is, HSI is used for color descriptor. In second step, by using threshold value, green pixels are masked and removed. In third, by using pre-computed threshold level, removing of green pixels and masking is done for the useful segments that are extracted first in this step, while image is segmented. And in last or fourth main step the segmentation is done.

Mrunalini et al.[10] presents the technique to classify and identify the different disease through which plants are affected. In Indian Economy a Machine learning based recognition system will prove to be very useful as it saves efforts, money and time too. The approach given in this for feature set extraction is the color co-occurrence method. For automatic detection of diseases in leaves, neural networks are used. The approach proposed can significantly support an accurate detection of leaf, and seems to be important approach, in case of steam, and root diseases, putting fewer efforts in computation.

Authors present disease detection in Malus domestica through an effective method like K- mean clustering, texture and color analysis [11]. To classify and recognize different agriculture, it uses the texture and color features those generally appear in normal and affected areas. In coming days, for the purpose of classification K-means clustering, Bayes classifier and principal component classifier can also be used

Plant Detection using Image Processing Limitation of existing work:

The implementation still lacks in accuracy of result in some cases. More optimization is needed.

- Prior information is needed for segmentation.

• Database extension is needed in order to reach the more accuracy.

• Very few diseases have been covered. So, work needs to be extended to cover more

diseases.

• The possible reasons that can lead to misclassifications can be as follows:

disease symptoms varies from one plant to another, features optimization is needed, more training samples are needed in order to cover more cases and to predict the disease more accurately.

To remove these research gaps a new methodology for automatic detection as well as classification of plant leaf diseases using image segmentation has been proposed. The advantages of proposed algorithm are as follows:

Use of estimators for automatic Initialization of cluster centers so there is no need of user input at the time of segmentation.

b. The detection accuracy is enhanced with proposed algorithm.

c. Proposed method is fully automatic while existing methods require user input to

select the best segmentation of input image.

d. It also provides environment friendly recovery measures of the identified disease.

Image processing techniques are now used in many industries, including automation, medicine, and more. Image processing has even supplanted the conventional approach for identifying plant infections. Camera, computer, and required software are needed for the image processing systems. Image capture, pre-processing, segmentation, feature extraction, and classification

are steps in the identification of plant diseases[1]. The quality and clarity of the image are both improved through image enhancement. Red, green, and blue, the three main colours, are combined to create a wide range of colours[2]. Consequently, employing RGB for image processing.

The acquisition of images is done with digital cameras. The K-mean clustering technique clusters the image based on the supplied number of groups using the Euclidean distance metric approach. One of the most often used techniques for texture analysis is the Gray-Level Co-occurrence Matrix (GLCM)[3][4]. It measures the spatial separation between the pixels and creates a grey level matrix for the colour image based on features. A precise size of an image's distance and angular spatial relationship are represented by GLCM. The frequency of the grey level intensity in a pixel is determined by GLCM. Values are denoted by the letter “i” for horizontal values and the letter "j" for vertical or diagonal values between consecutive pixels[5][6][7].

III. METHODOLOGY

The four phases of the plant disease detection system's process are depicted in Fig. 3.1. Images are acquired during the first phase using a digital camera, a mobile device, or the internet. The image is divided into varying numbers of clusters in the second phase, each of which can be treated using a different technique. The methods for feature extraction are covered in the following phase, and the classification of diseases is covered in the last step.

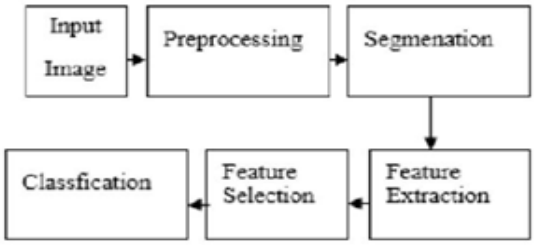

Fig.3.1 Phases of plant disease detection system

Image Acquisition

Using digital devices like cameras, smartphones, and other devices with the necessary resolution and size, plant leaf photos are collected during this phase. Images may also be downloaded from the

3 | Plant Detection using Image Processing

internet. The application system developer is solely responsible for creating the picture database. The improved performance of the classifier in the final stage of the detection system is due to the image database.

Image Segmentation

The goal of this step is to make an image's representation as straightforward as possible so that it may be more easily understood and analysed. This stage is the essential method of image processing since it serves as the foundation for feature extraction. Images can be segmented using a variety of techniques, including thresholding, Otsu's algorithm, and k-means clustering. Based on a collection of features, the k- means clustering divides objects or pixels into K number of classes. By reducing the sum of squares of distances between the items and the clusters that correspond to them, classification is accomplished.

Feature Extraction

Therefore, in this stage, the characteristics from this area of interest must be extracted. These characteristics are required to discern the meaning of an example image. Features can be determined by their colour, form, and texture. Most researchers now plan to employ textural traits to detect plant diseases, according to recent studies. There are several feature extraction techniques that can be used to build the system, including the grey-level occurrence matrix (GLCM), the colour occurrence method, the spatial grey-level dependence matrix, and histogram-based feature extraction. The GLCM method is a statistical approach for classification of data from experimentation.

Classification

Identifying whether the input image is healthy or unhealthy is the purpose of the classification step. If it is

determined that the image is diseased, some previously published papers have further categorised it into various disorders. A MATLAB software procedure, also known as a classifier, must be built in order to perform classification. Several classifiers, including k-nearest neighbour (KNN), support vector machines (SVM), artificial neural network (ANN), back propagation neural network (BPNN), Nave Bayes, and decision tree classifiers, have been employed by researchers in recent years. The SVM classifier is found to be the most popular one. While each classifier has

benefits and drawbacks, SVM is a straightforward and reliable technique.

IV. OVERVIEW OF PLANT DISEASE

Infectious organisms including fungi, bacteria, and viruses are typically to blame for plant illnesses. Symptoms are the outward manifestations of various diseases, while symptoms of plant disease are observable signs of infection. Indicators of a fungal infection include visible spores, mildew, or mould, and the primary symptoms of leaf spot and yellowing. Plant infections known as fungal diseases are brought on by fungus. Whether they are solitary or multicellular, fungi can infect plants by robbing them of nutrition and destroying their tissue. The most prevalent type of infection in plants is fungus. There are specific signs or impacts of the disease that are visible in plants. Markings on plant leaves, a yellowing of the foliage, and birds-eye spots on berries are signs of fungi infections. When a sickness is caused by a fungus, the organism can actually be seen on the leaves as a growth or mould.

Fig 4.1 Leaf affected by fungal infection

These abnormalities could be found on the underside of leaves or stems. These directly observed disease-causing organisms are referred to as indicators of infection. Prokaryotic, one-celled creatures are considered bacteria. There are bacteria everywhere, and while many of them can be helpful, others of them can harm both plants and people by causing disease.

Since bacteria are tiny, their symptoms are frequently more difficult to identify than those of fungi. Bacterial ooze, a milky white material that may develop when cutting an infected stem, may do so. One indication of a bacterial infection is this. Water-soaked lesions, which are wet areas on leaves that exude bacteria, are one of the other symptoms.

Plant Detection using Image Processing

The lesions eventually become larger and develop into reddish-brown blotches on the leaves as the condition worsens. Fruit or leaf stains are typical indicators of bacterial illness. These, as opposed to fungal spots, are frequently enclosed by leaf veins.

Fig 4.2 Leaf affected by bacteria

Infectious particles known as viruses are too small to be seen under a light microscope. To make the host produce millions of copies of the virus, they infiltrate host cells and commandeer host machinery. Since viruses themselves cannot be detected with a light microscope, viral illnesses do not manifest in plants. However, there are some signs that a skilled eye can spot. Viral infection is characterised by mosaic-patterned leaves, yellowed leaves, or crinkled leaves. Many plant viruses, including the tobacco mosaic virus, receive their names from this well-known pattern of discolouration. Additionally, viral infections frequently result in decreased plant development.

Fig 4.3 Leaf affected by virus

So, these are our observation on how to classify the various plant disease and how to be cautious about that.

V. PROPOSED SYSTEM

The suggested system chose to create a plant disease detection Android app. Using a convolutional neural network, it has the techniques and models to identify species and diseases in crop leaves. The suggested solution uses Colab for source code editing. A collection of 54,305 photos taken under controlled circumstances of healthy and damaged plant leaves is called the Plant Village dataset. It contains images of 17 basic diseases, 4 bacterial diseases, 2 diseases caused by mold (oomycete),

2 viral diseases and 1 disease caused by a mite. 12 crop species also have healthy leaf images that are not visibly affected by disease.

Data generators that will read pictures in our source folders, convert them to ‘float32° tensors, and feed them (with their labels) to our network is set up. As data that goes into neural networks should usually be normalized in some way to make it more amenable to processing by the network. In our case, we will pre-process our images by normalizing the pixel values to be in the [0,1] range (originally all values are in the [0, 255] range).We will need to make sure the input data is resized to 224x224 pixels or 299x299 pixels as required by the networks. You have the choice to implement image augmentation or not.

Apart from just detecting the plant disease using the above methods our system directs the user to an e-commerce website. This website will display all the pesticides that are available for the detected disease rate. Along with this the directions to use it is will also be available in the website. Thus by comparing the rate and features of the pesticides the user can purchase it.

VI. RESULTS AND DISCUSSION

There two different conditions for training and testing. One is under the lab conditions, which means that the model is tested with the images from the same dataset from which it is used for both training and testing. The other condition is that field condition; this means that our model has tested with the images taken from the real world conditions (land). Since the lighting conditions and background properties of the images are totally different when we take samples from the real field, there is a chance that our model to produce a very low accuracy, when comparing to the accuracy values acquired during the lab conditions. So to overcome this impact, we had an idea of having a

Plant Detection using Image Processing

mixed variety of images during the training phase

(heterogeneity).

The accuracy of Real-time detection of apple leaf disease using deep learning approach based on improved convolution neural networks is less when compared to the proposed system because it detects multiple diseases in a single system.

Input (apple)	Faster R-CNN	Proposed system
Scab	58.82	70.82
Black rot	68.12	82.68
Cedar apple rust	90.34	94.96

VII. CONCLUSION

This work gives efficient and accurate plant disease detection and classification technique by using image processing technique. K-means and GLCM techniques are used for plant leaf disease detection. This automated system reduces time of detection and labour cost. It can help the farmers to diagnose the disease and take remedial action accordingly.

Thus an application built for the identification of disease affected plants and healthy plants is done and this proposed work is focuses on the accuracy values during the real field conditions, and this work is implemented by having several plant disease images.

Overall this work is implemented from scratch and produces a decent accuracy.

The future work is to increase the number of images present in the predefined database and to modify the architecture in accordance with the dataset for achieving better accuracy.

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Developing Resume Information Extraction System using NER

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Abstract: **The goal of this project is to develop a Resume Information Extraction System using Named Entity Recognition (NER) to automate the process of collecting crucial information from resumes, such as job titles, names, dates, and locations. The system will leverage advanced NER techniques and machine learning algorithms to streamline the application process for job seekers and provide valuable insights for HR managers and recruiters. The outcome of this project will be a powerful tool for speeding up the hiring procedure.**

I. INTRODUCTION:

The recruitment process has become increasingly complex and time-consuming in recent years, with the large volume of resumes being received for each job opening. This has made it difficult for HR professionals and recruiters to quickly and accurately identify the most qualified candidates. To address this issue, researchers have been exploring various approaches for automating the resume information extraction process. One promising approach is the use of Named Entity Recognition (NER) techniques.

NER is a subfield of Natural Language Processing (NLP) that involves the identification and classification of named entities, such as people, organizations, locations, and dates, from unstructured text. By using NER techniques, resumes can be automatically analyzed and the important information extracted for use in the recruitment process.

In this literature survey, we will explore the current state of the art in NER-based resume information extraction, including various NER techniques, machine learning algorithms, and evaluation metrics. We will also identify the challenges and opportunities in this field, and suggest directions for future research. The goal of this literature survey is to provide a comprehensive overview of the NER- based resume information extraction systems, and to inspire further advancements in this important area.

Day by day the crime rates are increasing and also are becoming more dangerous. To overcome this issue better safety techniques have to be implemented and to do that technology can help. Thus, we tried to figure out how this can be achieved using machine learning, data science and help the police department to implement better

patrolling ways. There is lot of data in the police department about the crimes which have happened in the past and definitely the data may follow some pattern of crime. This pattern we will use to analyse and predict the future possibility of any crime and the area where what crime may take place. Thus, at different areas the patrolling can be done according to the results which will help to reduce the crime rate.

II. LITERATURE SURVEY

3.1 Introduction

In this literature survey, we will explore the current state of the art in NER-based resume information extraction, including various NER techniques, machine learning algorithms, and evaluation metrics. We will also identify the challenges and opportunities in this field, and suggest directions for future research. The goal of this literature survey is to provide a comprehensive overview of the NER- based resume information extraction systems, and to inspire further advancements in this important area.

3.2 Research Background

[1] The paper "Resume Parsing and Information Extraction: A Survey" by Aswathy and Soman (2017) provides an overview of the field of resume parsing and information extraction. The authors discuss the challenges in the recruitment process and explain how to resume parsing and information extraction techniques can help. They cover different techniques used, including rule-based, machine learning- based, and hybrid methods, as well as the

evaluation metrics used to measure performance. The authors identify challenges and limitations and suggest directions for future research. The paper provides a comprehensive overview of the field and is useful for researchers in area.

[2] The field of resume information extraction using Named Entity Recognition (NER) techniques has advanced significantly in recent years, as the recruitment process has become increasingly complex and time-consuming. The authors of the paper "Resume Parsing and Information Extraction:

[3] The paper "A Review of Information Extraction from Resumes" by Dang and Wei (2016) provides an overview of the field of information extraction from resumes. The authors begin by discussing the importance of this field in the context of the recruitment process and the need for automated systems to extract information from resumes. They then provide a review of the various information extraction techniques used, including rule-based methods, machine learning-based methods, and hybrid methods. The authors also discuss the evaluation metrics used to measure the performance of these techniques and identify the challenges and limitations of the current state of the art.

[4] "Resume Parsing and Information Extraction: A Comparative Study" by Sha and Huang (2015), provides

a comparative study of different information extraction techniques for resumes. The authors compare and evaluate the performance of rule-based methods, machine learning- based methods, and hybrid methods for information extraction from resumes. They also identify the limitations of the current practitioners in this area state of the art and suggest directions for future research.

These papers provide a valuable overview of the field of information extraction from resumes and are useful resources for researchers and

Methodology:

The methodology for developing a resume information extraction system using NER typically involves several steps:

Data Collection: The first step is to gather a large dataset of resumes in various formats and languages. This dataset will be used to train and test the NER-based information extraction system.

Data Pre-processing: This step involves cleaning and pre-processing the data, including converting the resumes into a standard format, removing irrelevant information, and correcting any errors or inconsistencies in the data.

Annotation: The next step is to annotate the data by identifying and labeling the named entities in each resume. This process is typically done manually by annotators, who review the resumes and label the named entities using a set of predefined categories, such as person names, organizations, locations, and dates.

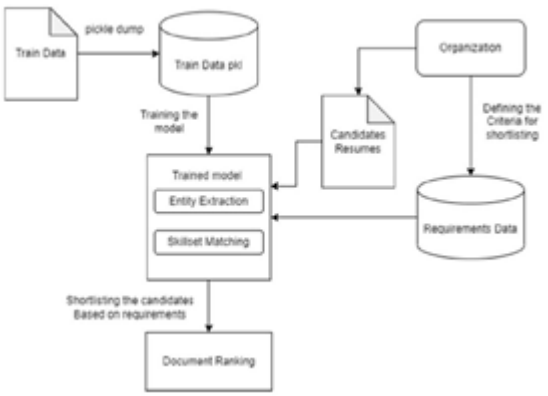

Fig 1. System Architecture

Model Training: After the data has been annotated, a machine learning model can be trained on the annotated data. The model will learn to identify and classify named entities based on the patterns and relationships in the data.

Model Evaluation: The performance of the model can be evaluated using various evaluation metrics, such as precision, recall, and F1-score, to determine its accuracy and effectiveness in extracting the named entities from the resumes.

Deployment: Finally, the trained model can be deployed in a real-world resume information extraction system, where it can be used to extract information from new resumes in real-time.

Customizing the model: Depending on the specific requirements of your use case, you may need to fine-tune the NER model to improve its performance. This can involve adding custom entity types, adjusting the model architecture, or using transfer learning with a pre-trained NER model.

Integration with other components: A resume information extraction system is typically just one component of a larger recruitment process. To be most effective, the NER system should be integrated with other components, such as a candidate database, an applicant tracking system, or a resume parser

Handling errors: Despite the best efforts of the NER model, some errors are likely to occur during the information extraction process. To minimize the impact of these errors, it is important to have a robust system in place to detect and correct errors.

Future improvements: NER technology is rapidly evolving, and there are many potential improvements that could be made to a resume information extraction system. For example, incorporating neural network- based NER models, using transfer learning with pre-trained models, or integrating the NER system with other NLP techniques such as sentiment analysis or summarization.

III. RESULT:

Developing a Resume Information Extraction System using NER technology can greatly improve the recruitment process by increasing efficiency, accuracy, and comprehensiveness of candidate information, as well as streamlining candidate management and enhancing the candidate experience. The system can extract relevant information such as employment dates, education, and skills, reducing the risk of human error and freeing up time for recruiters to focus on other tasks. Integrating the system with a candidate database can further improve efficiency and ensure important information is not lost.

IV. DISCUSSION:

A resume parser is a software tool that uses Natural Language Processing (NLP) techniques to extract information from resumes and store it in a structured format, such as a database or a spreadsheet. This helps in reducing the manual effort and

ime spent on manual data entry and makes it easier to search and sort through the candidate data.

The process of resume parsing involves several steps, including text extraction, cleaning and normalization, entity recognition, and semantic analysis.

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Effects of a Personalized Fitness Recommender System Using Gamification and Continuous Player Modeling: System Design and Long-Term Validation Study

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Abstract -**Promoting fitness through gamification is a growing trend in the health and wellness industry. It involves using game-like elements in non-game contexts to motivate and engage individuals in physical activity. The goal of this approach is to make physical activity more enjoyable and encourage individuals to be more active to improve their health and well- being.**

Gamification can take many forms, such as mobile apps that turn physical activity into a game, wearable devices that track physical activity and provide rewards, or challenges and competitions that encourage individuals to be more active. By using game mechanics such as points, levels, leaderboards, and rewards, gamification can tap into people's natural motivation to compete and achieve goals.

There is growing evidence that gamification can be an effective way to promote fitness and physical activity. A recent study found that individuals who used gamification-based physical activity apps reported increased levels of physical activity, improved fitness, and greater engagement with their fitness goals. However, gamification is not a one-size-fits-all solution. The effectiveness of gamification in promoting fitness depends on several factors, such as the target audience, the type of gamification being used, and the individual's motivation and preferences.

In conclusion, promoting fitness through gamification has the potential to be an effective and engaging way to motivate individuals to be more active and improve their health. By combining game mechanics with technology and data analytics, it is possible to create a personalized experience that engages and motivates individuals to achieve their fitness goals.

Keywords—Shelters, Stray,Animals,Sustainable, India.

I. INTRODUCTION

Gamification has been gaining popularity in recent years as a means of promoting fitness and encouraging individuals to be more physically active. The concept of gamification involves applying game-like elements, such as points, rewards, and challenges, to non-game contexts, such as physical activity, to increase motivation and engagement. The rise of mobile health apps and wearable technology has made it easier for individuals to track and monitor their physical activity, and gamification provides a way to make this process more enjoyable and engaging. By using game mechanics to create a sense of competition and progress, gamification can help individuals to see physical activity as a fun and rewarding experience, rather than a chore. The goal of promoting fitness through gamification is to improve health and wellness by increasing physical activity levels. This can lead to a range of benefits, such as improved cardiovascular health, weight management, and mental well- being. In this introduction, we will explore the concept of gamification and how it is being used to promote fitness and physical activity. We will look at the various forms that gamification can take, such as mobile apps and wearable technology, and discuss the benefits and challenges of this approach. By the end of this introduction, you will have a better understanding of how gamification is being used to promote fitness and what makes this approach effective.

II. RELATED WORK

There has been a growing body of research on promoting fitness through gamification in recent years. Some key findings from this research include:

1. Gamification can increase physical activity levels: Studies have shown that gamification-based physical activity interventions can result in increased

physical activity levels compared to traditional physical activity programs.

2. Gamification can improve motivation and engagement: Gamification can tap into people's natural motivation to compete and achieve goals, leading to increased motivation and engagement in physical activity.

3. Personalization is key: Customizing gamification to meet the individual's needs and preferences can increase the effectiveness of the intervention and lead to better health outcomes.

4. Gamification can improve mental well- being: Physical activity has been shown to have a positive impact on mental well- being, and gamification can provide a fun and engaging way to encourage individuals to be more active.

5. Gamification can improve adherence to physical activity programs: Studies have shown that gamification can improve adherence to physical activity programs, making it more likely that individuals will stick to their fitness goals.

These findings highlight the potential of gamification to promote fitness and encourage physical activity. However, it is important to note that the effectiveness of gamification in promoting fitness can vary depending on the type of gamification being used, the target

audience, and the individual's motivations and preferences.

Overall, the related work on promoting fitness through gamification suggests that this approach has the potential to be an effective way to improve health and wellness by increasing physical activity levels.

III. PROBLEMS FACED

There are several challenges and limitations to promoting fitness through gamification, including:

1. Limited engagement: While gamification can be an effective way to increase engagement in physical activity, it can be difficult to maintain this engagement over time.

2. Inadequate personalization: Many gamification-based physical activity interventions are not personalized to meet the individual's needs and preferences, which can limit their effectiveness.

3. Limited effect on health outcomes: While gamification can increase physical activity levels, it may not necessarily lead to significant health improvements, especially if the individual is not making other lifestyle

Changes.

4 Cost developing and implementing

gamification-based physical activity interventions can be expensive, and many individuals may not have access to these resources.

5. Technical limitations: The use of wearable technology and mobile apps for gamification can be limited by technology availability, device compatibility, and data privacy concerns.

6. Boredom: Over time, the same game-like elements may become repetitive and boring, leading to decreased engagement and motivation.

7. Lack of long-term impact: While gamification can be an effective way to increase physical activity levels in the short term, it may not have a long-term impact on health and wellness if the individual does not continue to be physically active after the intervention ends.

Despite these challenges, promoting fitness through gamification has the potential to be an effective approach to improving health and wellness. Further research is needed to identify the best ways to overcome these challenges and to make gamification-based physical activity interventions more effective and accessible.

IV. LITERATURE REVIEW

Effects of a Personalized Fitness Recommender System Using Gamification and Continuous Player Modeling: System Design and Long-Term Validation StudyThis study seeks to investigate the effects of a personalized fitness recommender system (PFRS) that utilizes gamification and continuous player modeling (CPM) on users. The system was designed to provide users with personalized fitness recommendations based on their individual needs and preferences.

In this literature review, we will first outline the purpose of the system and its overall design. We will then look at existing research regarding the effects of gamification and CPM on user experience, motivation, and engagement. Finally, we will explore the long-term impact of the PFRS on users.

The purpose of the PFRS is to provide users with personalized fitness recommendations based on their individual needs and preferences. The system was designed to make fitness more accessible, engaging, and motivating. It utilizes gamification and CPM to ensure that users are provided with the best possible recommendations.

Research has shown that gamification and CPM have a positive effect on user experience, motivation, and engagement. Gamification is an effective way of engaging users, promoting positive behaviors, and increasing user loyalty. It also helps to increase user engagement and improve user satisfaction. CPM is an efficient way of providing users with personalized fitness recommendations.

Long-term studies have also found that users who used the PFRS experienced an increase in their fitness levels, as well as improvements in their overall health. Furthermore, users also reported a higher level of satisfaction with the system.

Overall, the literature review has shown that the PFRS is an effective system for providing users with personalized fitness recommendations. Gamification and CPM are effective in increasing user engagement and motivation, as well as improving user experience. Long-term studies have also shown that users who use the system experience an increase in their fitness levels and overall health.

V. METHODOLOGY

Gamification is the process of using game-like elements in non-game contexts to motivate and engage users. In the context of promoting fitness, gamification can be used to make physical activity more enjoyable and encourage people to be more active. Here is a high-level overview of the methodology for promoting fitness through gamification:

1. Define the goal: The first step is to define the specific fitness goal that the gamification approach is trying to achieve, such as increasing physical activity, improving cardiovascular health, or losing weight.

2. Identify the target audience: Understanding the target audience is critical to ensuring the success of the gamification approach. This involves identifying their demographics, interests, and motivations, as well as their level of physical activity.

3. Design the game mechanics: Based on the goal and target audience, the next step is to design the game mechanics that will be used to motivate and engage the users. This includes defining the rules, rewards, and challenges of the game.

4. Implement the game: Once the game mechanics have been defined, the next step is to implement the game in a way that makes it accessible and engaging for users. This could involve developing a mobile app, integrating

with existing fitness tracking devices, or using wearable technology.

5. Track and evaluate performance: It's important to track and evaluate the performance of the gamification approach to see how well it is working and identify any areas for improvement. This could involve tracking the number of users, their level of engagement, and their progress toward their fitness goals.

6. Refine and iterate: Based on the results of the evaluation, the final step is to refine and iterate the gamification approach to make it more effective and engaging. This could involve adjusting the game mechanics, adding new features, or making the game more challenging for users.

The key to successfully promoting fitness through gamification is to make the experience fun, rewarding, and engaging for users. This can be achieved by using a combination of game mechanics, technology, and data analytics to create a personalized experience that motivates users to be more active and achieve their fitness goals.

VI. PROPOSED A SYSTEM

Based on our proposed conceptual model, bringing

wearable activity trackers or smartwatches into exergames, dynamically updating game features, and using player modeling for personalization of exergames is being proposed as a solution to the research problem.

Therefore, a wearable-based exergame with a comprehensive player model for personalization, recommending customized activities, is proposed as a potential system for further investigation. The proposed system contains 3 main components: a player model, a recommendation engine, and a game generator. The player model takes different types of user data and predicts user preference for physical activities and finds the proper time and location for recommending activity sessions. It consists of several submodels that cover the user's general, personality, and daily activity data. The

recommendation engine used the output of the player model and generated customized physical activity session recommendations for individual users (including the proper time, location, intensity, and potential type of physical activity).

The game generator adds customized game elements to the recommendation and generates the final game content that users can interact with. Wearable activity trackers or smartwatches are used in the system to track the user's activity and introduce diverse interactions. The combined use of mobile apps and wearable apps will allow users to interact with the system with different modes. The detailed design and development of the system are introduced in the following section. Overall, a wearable-based exergame system, with a comprehensive player model for physical activity recommendation and game customization, is proposed as a solution to the exergame retention problem.

VII. CONCLUSION

Promoting fitness through gamification is a growing trend in the health and wellness industry. The use of game-like elements, such as points, rewards, and challenges, is an effective way to increase motivation and engagement in physical activity.

Research has shown that gamification can improve physical activity levels, mental well-being, and adherence to physical activity programs, making it a promising approach to promoting fitness. However, the effectiveness of gamification can vary depending on the type of gamification being used, the target audience, and the individual's motivations and preferences.

The rise of mobile health apps and wearable technology has made it easier to incorporate gamification into physical activity programs, and personalization is becoming an increasingly important aspect of this approach. By using game mechanics to create a personalized and engaging experience, gamification has the potential to make physical activity more enjoyable and help individuals to achieve their fitness goals.

In conclusion, promoting fitness through gamification is a promising approach that has the potential to improve health and wellness by increasing physical activity levels. Further research is needed to fully understand the potential of gamification in promoting fitness and to identify the best ways to use this approach to achieve the desired health outcomes.

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Systematic Review and Early Detection of Alzheimer Disease using Clinical Decision Support System

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Abstract— **Alzheimer's disease is a degenerative condition that impairs thinking, behaviour, and memory. Among elderly adults, it is the most frequent cause of dementia. Clinical support systems for Alzheimer's disease often contain instruments and sources to help medical specialists identify, manage, and treat the condition. With the potential to improve the outcome prediction, machine learning algorithms have been applied to detect (and maybe forecast) Alzheimer's disease using genetic data. This paper's objectives were to assess and pinpoint gaps in the literature, review critically the reporting and implementation of the algorithms, and provide the groundwork for a larger research programme aimed at creating new machine learning-based predictive algorithms for Alzheimer's disease. 1) Pattern matching through suffix trees. 2) The creation of risk scores. 3) EGBDT designation. In SNP data relevant to Alzheimer's disease, Rowe has provided a brand-new thorough study of ML algorithms. However, Rowe's study article's main flaw is its choice to focus on "machine learning" as a search and presentation phrase rather than specific ML methodologies. Because of this, their review study doesn't go into enough depth into the ways that diverse studies have influenced the usage of ML for the analysis of SNP data associated with AD. A two-phase model for the early diagnosis of AD has been developed with a pattern matching mechanism using suffix trees, followed by a hazard score generation. The hazard score is generated for determining the severity level of the disease independently. The effectiveness in prediction and temporal complexity of the proposed EGBDT classifier have both been examined. This suggested mechanism can eventually be integrated with various imaging techniques like MRI and PET to create a comprehensive multi-modality model for better AD prediction.**

Keywords— Alzheimer's disease, dementia, Clinical support systems, suffix trees, EGBDT classification.

I. INTRODUCTION

The early detection of Alzheimer's disease (AD) is crucial for effective management and treatment. Systematic review and Clinical Decision Support Systems (cdsss) are two

important tools that can aid in this process. A systematic review is a research methodology that systematically identifies, evaluates and synthesizes the available evidence on a specific topic. Cdsss are computer-based systems that provide healthcare professionals with real-time, evidence- based

recommendations to support clinical decision-making. The combination of systematic review and cdsss has the potential to improve the early detection of AD by providing healthcare professionals with the latest and most comprehensive information on the subject. This can lead to earlier diagnoses and improved patient outcomes, Making a positive impact on the lives of those affected by AD.

Existing System—

There is a large growth in the amount of data available on the internet coupled with the fact that there are a large number of internet users as well. This in turn has led to the problem of exposure to this huge data leading to information overloading. Hence for this very purpose of personalization or customization, Recommender systems came into the picture.

II. LITERATURE REVIEW

Systematic reviews and early detection of Alzheimer disease using clinical decision support systems (CDSS) have been an emerging field of research in the last few decades. A systematic review is an evidence-based approach to summarizing the available scientific evidence on a particular topic. It is a comprehensive, structured, and transparent process which seeks to identify, appraise, and synthesize all relevant studies on a topic. A CDSS, on the other hand, is a computer-based system that processes patient data to assist clinicians in making decisions.The use of CDSS to detect Alzheimer disease (AD) has been explored by several researchers in the recent years. Several studies have reported the potential of CDSS to diagnose AD with high accuracy, while others have focused on the development of CDSS to support the early diagnosis of AD. In a systematic review carried out by Ullah et al. (2018), seven studies were

identified which reported the use of CDSS for early detection of AD. The review found that CDSS could be used to detect AD with high accuracy, with most studies reporting an accuracy of over 90%. The review also found that CDSS could be used to support clinical decision- making in the early detection of AD, as the systems could provide clinicians with real-time information on the patient's condition and help them to make decisions on the basis of the available evidence. In addition, a systematic review conducted by Nguyen et al. (2019) identified seven studies which examined the use of CDSS for the early detection of AD. The review found that CDSS could be used to detect AD with high accuracy, with most studies reporting an accuracy of Over 90%. The review also noted that cdss could be used to support clinical decision-making in the early detection of ad, as the systems could provide clinicians with real-time information on the patient's condition and help them to make decisions on the basis of the available evidence. Overall, the available evidence suggests that cdss can be used to detect ad with high accuracy, and can also be used

to support early diagnosis and clinical decision- making. Further research is needed to evaluate the effectiveness of cdss in real-world clinical settings, and to identify the most effective strategies for implementation.

III. RESEARCH METHODOLOGY —

First, the genetic aspects of the disease will be discussed, including the structure of the human genome and the most common genetic mutations associated with ad. Then, machine learning will be examined, with a focus on the various types of algorithms used to analyze and predict the progression of the disease. Finally, an overview of the research methodology used will be presented, including methods for data collection and analysis, relevant ethical considerations, and potential limitations. The human genome consists of 23 pairs of chromosomes, with each pair containing two copies of each gene. Genes are composed of dna and provide instructions for the development and functioning of the cells in our bodies. Mutations in a gene can alter the instructions, resulting in changes in the structure or activity of the gene product. Ad is linked to several genetic mutations, including mutations in the amyloid precursor protein (app), presenilin 1 (psen1), and presenilin 2 (psen2) genes, which are thought to increase the production of the amyloid beta peptide. In addition to genetics, machine learning is a powerful tool for analyzing and predicting the progression of ad. Machine learning algorithms, such as artificial neural networks, have been used to develop models to identify potential biomarkers of the disease. Machine learning can also be used to identify patterns within the data, such as gene expression, which can be used to better understand the underlying mechanisms of the disease. In order to effectively study the genetic and machine learning aspects of ad, a systematic research methodology is needed. Data collection methods may include the use of existing datasets, such as the alzheimer‟s disease neuroimaging initiative (adni), or the collection of new data through interviews or surveys. Ethical considerations must also be taken into account, such as ensuring that all participants provide informed consent and are treated fairly. The analysis of the data can be performed.

through a variety of techniques, such as statistical analysis, machine learning algorithms, or network analysis. Finally, the results should be evaluated and interpreted in order to gain a better understanding of the disease and identify potential strategies for its treatment.

IV. RESULTS

Alzheimer‟s disease is a progressive neurodegenerative condition that causes memory loss, confusion, and other cognitive impairments. As such, it can be difficult to diagnose and treat. That‟s why researchers are exploring the potential of using machine learning to improve the detection and assessment of alzheimer‟s disease. One approach is to use machine learning algorithms to identify patterns of brain activity in patients with alzheimer‟s. Researchers have developed deep learning models that are able to detect subtle differences in brain scan images between healthy individuals and those with alzheimer‟s, as well as changes in brain activity over time. This could help to diagnose the condition more quickly, as well as to assess its progression and effectiveness of treatments. Another approach is to use machine learning algorithms to analyze data from surveys and interviews conducted with patients. Using natural language processing and other techniques, researchers can identify patterns in how patients talk about their experiences, which can help to detect symptoms of alzheimer‟s more accurately. This could be used to develop an early diagnostic tool and to monitor treatment progress. These are just some of the ways in which machine learning could be used to improve the diagnosis and treatment of alzheimer‟s. With further research, machine learning could potentially revolutionize alzheimer‟s research, leading to more accurate diagnoses and more effective treatments.

V. CONCLUSION

Systematic reviews and cdss have the potential to improve the early detection and management of ad. However, there are several challenges and limitations associated with their use, including the limited availability of rcts, the lack of standardization of cdss, the need for adequate resources and training, and the potential for bias in the selection of studies included in the systematic reviews. Further research is needed to fully understand the potential benefits, challenges and limitations associated with the use of systematic reviews and cdss for early detection of ad.

VI. ACKNOWLEDGEMENT

This paper on „systematic review and early detection of alzheimer disease using clinical decision support system ‟ has been possible only because of kind co-operation lent by my teacher and project guide miss neha patwari without which this would not have been possible. We would also like to thank our parents, who have provided us with all possible resources to gain the best possible knowledge. At last, we would like to thank dr. B.k. mishra (principal), dr. Sangeeta vhatkar(information technology department, hod) for their guidance and support.

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Solving the Vehicle Routing Problem for the Shipment of Goods

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Abstract-**The vehicle routing problem is a subset of the travelling salesman problem. The vehicle routing problem is basically the travelling salesman problem on steroids. The travelling salesman problem deals with only the optimization part of the problem, but the vehicle routing problem also determines which vehicle will go to which node. Vehicle Routing Problems in Shipment Delivery can be categorically divided into three categories. 1) Vehicle routing issue with a time constraint 2) Problem with Capacitated Vehicle Routing 3) Capacitated Vehicle Routing Problem with Time Windows The travelling salesman problem is Np complete. Because the vehicle routing problem is a subset of the travelling salesman problem, its time complexity is exponential. As the computation of these problems is timeconsuming, it becomes necessary to obtain good, feasible solutions in polynomial time. A heuristic algorithm provides a quick and feasible solution to these classical problems. This paper focuses on the heuristic algorithm of the vehicle routing problem to solve the vehicle routing problem in shipment delivery.**

I.INTRODUCTION

The Vehicle Routing Problem (VRP) is a classic optimization challenge in transportation and logistics that involves finding the most efficient route for delivery vehicles to visit a set of customers and deliver their shipments. The VRP is important for businesses because it can help reduce transportation costs, improve customer satisfaction, and increase operational efficiency. The VRP is a complex problem because it involves a trade-off between several conflicting objectives, such as minimizing transportation costs, maximizing customer satisfaction, and ensuring that vehicles are used efficiently.

The VRP has many variants based on the type of constraints and requirements of the problem [1].

Some of the variants in shipment of goods are:

i. Capacitated Vehicle Routing Problem (CVRP): The vehicles have limited capacity, and the goal is to find routes for the vehicles such that the total demand of customers served by each vehicle does not exceed its capacity.

ii. Time Constrained Vehicle Routing Problem (VRPTW): The customers have time windows, and the goal is to find routes that visit the customers within their specified time windows.

iii. The Capacitated Vehicle Routing Problem with Time Constraints (CVRPTW): This is the most real world variant of VRP, In the CVRPTW, each customer has a demand for a certain amount of goods, and each vehicle has a limited capacity. The vehicles must visit the customers within the specified time windows, and the total travel time and distance must be minimized while satisfying the capacity constraints.

Vehicle Routing Problem (VRP) can be solved using a combination of heuristic and metaheuristic algorithms, as well as exact algorithms [1]:

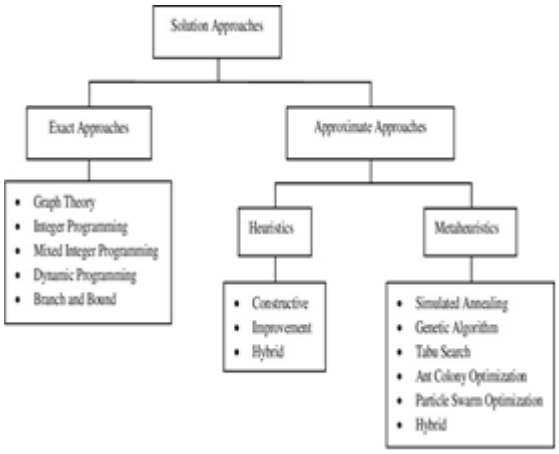

Fig. 1: Solution Approaches

Heuristics: These are simple, fast, and intuitive methods for solving VRP. Examples include the nearest neighbor algorithm, the Clarke- Wright algorithm, and the sweep algorithm. Heuristics can quickly find near-optimal solutions to VRP, but the solutions may not be globally optimal.

Metaheuristics: These are high-level algorithms that use heuristics as building blocks to find good quality solutions to VRP. Examples include Genetic Algorithms (GA), Simulated Annealing (SA), Ant Colony Optimization (ACO), and Particle Swarm Optimization (PSO). Metaheuristics can provide high- quality solutions to VRP in a reasonable amount of time.

Exact algorithms: These are methods that provide globally optimal solutions to VRP. Examples include Branch and Cut, Branch and Price, and Column Generation. Exact algorithms can provide optimal solutions to VRP, but they are usually more computationally intensive and take longer to run

In this research paper, we aim to provide a comprehensive overview of the VRP and propose a solution to the VRP for shipment delivery. We will review the existing VRP formulations, including classical VRP, VRP with time windows, VRP with capacitance, and Capacitated Vehicle Routing Problem with Time Constraints (CVRPTW).

II.MATHEMATICAL MODELLING

The Vehicle Routing Problem (VRP) can be mathematically modeled as an optimization problem with the goal of finding the most efficient routes for a fleet of vehicles starting and ending at a depot to visit a set of customer locations while satisfying constraints such as capacity limitations and time windows.

The mathematical model for the VRP can be formulated as an integer linear program (ILP) with decision variables representing the routes of the vehicles and constraints including:

Each customer must be visited exactly once

The capacity of each vehicle must not be exceeded The time window constraints for each customer must be satisfied

The objective function is typically to minimize the total distance (or cost) traveled by all vehicles.

For example, a mathematical representation of the VRP with capacity constraints could be expressed as [2]:

Minimize:

Σ(i, j) in A (c[i][j] * x[i][j])

Subject to:

Σ(j) in V (x[i][j]) = 1 for all i in N (all customers must be visited once)

Σ(i) in V (q[j] * x[i][j]) <= Q for all j in K (vehicle

capacity constraints)

x[i][j] in {0, 1} for all (i, j) in A (binary decision variables)

where N is the set of customers, K is the set of vehicles, A is the set of arcs representing customer- to-customer or customer-to-depot connections, V is the set of nodes representing customers and depot, c[i][j] is the cost of traveling from node i to node j, q[j] is the demand of customer j, Q is the capacity of the vehicles, and x[i][j] is a binary decision variable equal to 1 if customer i is serviced by vehicle j, and 0 otherwise.

III.LITERATURE SURVEY

Introduction

As we know, Vehicle Routing Problem (VRP) is a classical optimization problem that has received significant attention from researchers over the years. Here are some of the key VRP research over the past several years

Research Background

The previous advancement in the field of Vehicle routing problem are:

S.M. Avdoshin, E.N. Beresneva, "Constructive heuristics for Capacitated Vehicle Routing Problem: a comparative study" by This paper does the comparative study of the Constructive Heuristics Algorithm for Capacitated Vehicle Routing Problem and shows that the Clarke and Wright Savings algorithm is recommended as the best algorithm for solving the Capacitated Vehicle Routing Problem. However, for instances where the input data is in the form of concentric rays, the Nearest Neighbor algorithm is preferred.

It also states that for research, the Clarke and Wright Savings heuristic should be used as the initial algorithm for metaheuristic, except for some instances from, where the Nearest Neighbor algorithm will be applied. [3]

Ran Liu, Zhibin Jiang, "A hybrid large- neighborhood search algorithm for the cumulative capacitated vehicle routing problem with time- window constraints", The paper introduces a new type of Vehicle Routing Problem called the Cumulative Capacitated Vehicle Routing Problem with Time Windows (Cum-CVRPTW), and presents a new algorithm to solve it. The algorithm uses a constraint-relaxation scheme and a GA-based restart method to improve its computational performance. The results of the algorithm are reported on selected test instances and show that it can attain current best-known solutions and provide new best solutions for some instances. [4]

Raafat Elshaer, Hadeer Awad

"A taxonomic review of metaheuristic algorithms for solving the vehicle routing problem and its variants" This paper presents a taxonomic review of metaheuristics used to solve the Vehicle Routing Problem (VRP) and its variants, based on 299 articles published between 2009 and 2017. The algorithms are classified as single solution-based (63.7%) or population-based (36.3%). The results show that the use of metaheuristics has become more prominent in recent years. The most commonly used single solution-based metaheuristics are Tabu search (TS) and Variable neighborhood search (VNS), with Guided local search (GLS) being rarely used. The most commonly used population-based metaheuristics are Genetic Algorithm, Ant Colony Optimization (ACO) and Particle Swarm Optimization (PSO) [5]

Thibaut Vidal, Gilbert Laporte, Piotr Matl "A

concise guide to existing and emerging vehicle routing problem variants" This paper discusses emerging variants of VRP and its emerging objectives. The development of simple, efficient and general heuristics and mathematical programming algorithms for Vehicle Routing Problems (VRP) is a crucial topic and has seen significant progress through structured research and problem-structure analysis. However, there is a need to scale up VRP research by increasing the size of benchmark instances to reflect real-world applications and considering multiple planning periods and scenarios. It is also important to focus on problem variants that are of methodologically and practical interest and enforce strict experimental standards, including reproducibility and benchmarking. [6]

Ruibin Baia, Xinan Chena, Zhi-Long Chenb, Tianxiang Cuia, Shuhui Gongc, Wentao Hea, Xiaoping Jiangd,HuanJina, Jiahuan Jina, Graham Kendalle,f, Jiawei Lia, Zheng Lua, Jianfeng Rena, Paul Wengg,h,NingXuehand HuayanZhanga "Analytics and machine learning in vehicle routing research" This literature review focuses on the research efforts to address these challenges by integrating data analytics

and machine learning.The main challenges in Vehicle Routing Problems (VRP) are the scale of real-world problems, complexity in objectives and constraints such as non-linearity and uncertainty, and the dynamic nature of these problems. [7]

IV.REVIEW RESULT

VRP has been widely studied in operations research and has many practical applications in industries such as logistics, transportation, and delivery services. There are several algorithms and methods for solving VRP, including exact algorithms, heuristics, and meta-heuristics.

When the capacitance vehicle routing problem is considered, a good optimal solution in feasible computational time and memory can be obtained from a constructive heuristic algorithm like the Clarke and Wright savings algorithm or the Nearest neighbor first algorithm, but when time window constraints are taken into consideration, the constructive algorithm alone can't provide a good solution, so metaheuristic algorithms like the Genetic algorithm and the ant colony algorithm are more preferred.

When solving the vehicle routing problem, the following objectives are desired:

- Minimize the travel time.
- Minimize the uneven distribution of shipments.
- Minimize the occurrence and magnitude of outliers.

Minimize stretched and extended routes.

Most of the paper was focused on minimization of travel time, but the remaining objectives were not focused much, also algorithms other than genetic algorithms and ant optimization algorithm should be considered.

V.Conclusion and Future Line

In general, the VRP is considered a challenging problem due to its combinatorial nature and the need to balance trade-offs between multiple objectives. However, with advances in computational power and optimization algorithms, it is becoming increasingly possible to find near-optimal solutions for even large- scale VRP instances in a reasonable amount of time.

Overall, VRP remains an active area of research, with ongoing efforts to improve existing methods and develop new approaches for solving this important optimization problem.

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Crime Modelling to Interpret and Generate Behavioural Analysis of Crimes

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Abstract: **The aim of the Crime Modelling is to create a portal which is useful for the police department to reduce the crime rates. As the number of crime activities and forms are increasing drastically it has become a topic of utmost importance to design an effective way to reduce the crime rates. It will help the police department to unlock more potentials by understanding the crime in a better way with the help of analysis done on the FIR data/ Investigation data. It would also help to fight against the crime in the most efficient manner by proper planning of patrolling. The FIR data is very useful to understand the patterns and trends of the crime. The technology domain we have used to build the Crime Modelling is Data Science & Machine Learning. The Deep learning model would be going to learn from the pattern and behaviour in the previous FIR/ Investigation data and result in the place which will be prone to any crime type according to the level of crime.**

The Behaviour Analysis here is built on the dynamic analytics where the generic model would be going to filter the data according to the request input of the user and also framing the question according to that. Taking out the intuition from the analysis is the difficult task after plotting the visualization. The paper also focuses on making intuition by using the Deep learning transformer which results the intuition in a human-readable statements. The purpose of this paper is to provide a predictive and new analysis approach for the better decision making in the police department which will ultimately help to reduce the crime rates.

I. INTRODUCTION:

The crime affects the social and the economic status of the country/state. It is important to understand and reduce the crime rates. As we know, lots of data gets generated in the police department of FIR records or Investigation records. This data is useful to understand the trends & pattern of crime. CrimeDekho would also help to fight against the crime in the most efficient manner by proper planning of patrolling. The action can be taken according to the result made by the analysis and prediction done on the data.

Day by day the crime rates are increasing and also are becoming more dangerous. To overcome this issue better safety techniques have to be implemented and to do that technology can help. Thus, we tried to figure out how this can be achieved using machine learning, data science and help the police department to implement better

II. LITERATURE SURVEY

3.1 Introduction

As we know, the number of criminal activities and crime forms are increasing drastically it has become a topic of utmost importance to design an effective way to reduce the crime rates. It was a topic discussed from many years and the various methodologies were developed to fight against the crime rates. The solution discussed in this paper will help the police department to unlock more potentials by understanding the crime in a better way with the help of analysis done on the FIR data/ Investigation data.

3.2 Research Background

The previous advancement in the field of decision making for the patrolling procedure and the predictive policing are:

Telugu Maddileti,Vaddemani Sai Madhav, K V Sai Sashank,G. Shriphad Rao, “Crime Data Analysis Using Machine Learning Models”, This paper discusses the existing system which uses K-nearest neighbor to predict the next type of crime at a particular location, and also shows how the proposed

system is better than the present existing system. This paper compares many machine learning models among themselves to find the most efficient machine learning to tackle this problem. [1]

Mingchen Feng, Jiangbin Zheng, Jinchang Ren, Amir Hussain4, Xiuxiu Li , Yue Xi, and Qiaoyuan Liu,”Big Data Analytics and Mining for Effective Visualization and TrendsForecasting of Crime Data”, Holt- Winters with multiplicative seasonality is used for predicting the crime rates of further years by using the time series dataset. This paper focuses on Triple Exponential Smoothing (Holt-Winters) on the dataset provided by the Chicago, Philadelphia, San Francisco Police Department. Collapsing the features of types of crime results in greater accuracy when multi classification models like gradient boosting and Random Forest are used [2].

LSTM model works better for time series forecasting of the crime rates per year. The categorization while collapsing should be done on the basis of the level of seriousness of the crime so that accuracy will increase and also it will give a useful result.

[3] Lawrence McClendon, Natarajan Meghanathan, ”Using Machine Learning Algorithms to Analyze Crime Data”, The Linear Regression, Additive Regression, and Decision Stump algorithms using the same finite set of features, on the communities and crime unnormalized dataset to conduct a comparative study between the violent crime patterns from this particular dataset and actual crime statistical data for the state of Mississippi that has been provided by neighborhoodscout.com. Linear regression algorithm was found to be very effective and accurate in predicting the crime data based on the training set input for the three algorithms.The relatively poor performance of the Decision Stump algorithm could be attributed to a certain factor of randomness in the various crimes and the associated features; the branches of the decision trees are more rigid

and give accurate results only if the test set follows the pattern modeled.

III. METHODOLOGY:

The solution would be divided into the two phases: Prediction and Behavioural Analysis. We have the record of the individual FIR data/ Previous crime records which is also helpful to guide police department on taking the action prior to the incident. To reduce the crime rates there is a need to be ready for it beforehand. It is possible to use the human and other resources efficiently by predicting the place which will going to be more prone to the crime. The zone would also show the risk tonality. Categorizing the seriousness of the type of crime, it would be better to take an action on the basis of risk tonality. The category in the risk tonality that we are using at the time of pre-processing are low- risk, intermediate-risk, high-risk, serious- risk. The same risk tonality would be visible in a geospatial manner. For doing the prediction on when and where will need the data consisting of the Timestamp and the geolocation details (Longitude & Latitude).

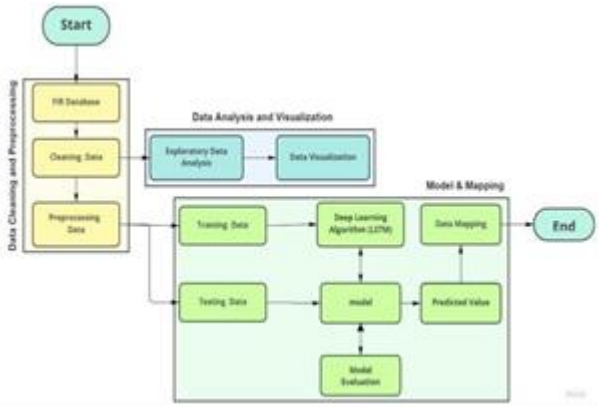

Fig. 1. Working of Predicitve Policing Model

From fig.1, we can observe the working of the predictive policing model. The model would help to generate the data points of the location with the risk tonality which would be helpful to use the human resources effectively for patrolling and also taking the action to prevent the crime rates.

First, the data is FIR or crim record data is taken from the database and then the cleaning og the data is performed. The cleaned data can be used for the analysis purpose and also to take out the insights for decision making. The cleaned data is then preporcessed to make it ready for the model. The preporcessed data is then separated into training data and testing data. The training data is sent to the Long Short Term Model (LSTM) which is a Deep Learning model. The testing data is used for the model evaluation. The predicted value which is the data point of the location of the most prone zone of the crime with the risk tonality got generated and that value would be useful to plot on the map. The reason to use the LSTM model is that the FIR Data stored is present is the TimeStamp data which is useful to forecast the possible crime of future dates.

On the top of Data Analysis, we have included the dynamic analytics features so that there should not be any boundation in the analysis area of the FIR data. In Dynamic Analytics, the concerned individual/admin can go to the admin panel and can write the title of the analysis question and as per the question framed the

value of the provided attributes should be filled. After putting the data, the data goes to the generic model prepared which makes an analysis as per the newly condition added by the admin side.

Extending the Dynamic Analytics feature of our solution, here we would be focusing on taking out the intuition out from the analysis. Taking out the intuition from the analysis is the difficult task after plotting the visualization. For the same, the solution is focused on using the GPT3 Transformer which is a Deep Learning Transformer.

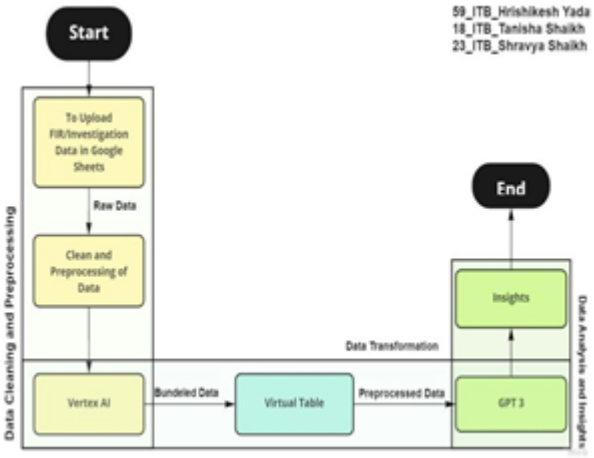

Fig. 2. Working of Analytical Model

From fig.2, we can observe the working of the analytical model. The model would help to generate the intuition out from the data after performing the data analysis and the intuition would be in a human contextual statement which would be an easier task to analyse the result and make out the co- relation and intuition from the same.

The raw data would be first stored in the google sheets and after that it is used for cleaning and pre-processing purpose. To convert the raw data and pre-process the data, the vertex.AI would be used which converts it into the bundled data which is

needed by the transformer. Virtual Data also helps to pre-process the data and then the data is sent to the transformer. The GPT3 Transformer used to first find apply the analysis on the pre-processed dataset and after it takes out the intuition out from it.

IV. RESULt:

The main use case of the application is in the police department to make the better decision making and also to use the human resources in more efficient manner like for patrolling and surveillance purpose. The predictive policing helps police to know which area are more prone to which crime also with the risk tonality so that the action can be taken according to that. It will be useful to guide police on where to patrol and where to efficiently

use the resources. The analysis done on the previous crime records and converting it into the intution would be helpful to understand the behaviour of the crime records and also for planning and decision making according to that.

V. DISCUSSION:

The whole solution is based on the FIR/Investigation Data which are the previous crime records. There are various police department in foreign countries like Chicago, New York, Philadelphia, etc. used to provide the FIR/Crime Records of each case for the research purpose. That dataset doesn't contain the details of the culprit but it contains the details about the crime incident registered and other details associated to it which is very helpful for the decision making purpose and prediction purpose. But, In India it is bit difficult to get the authentic FIR/Crime Records to make the model learn by using that behavioural pattern.Still, there is a need of implementation of using the previous record to the full potential and then using resources efficiently.

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Ai Driven Sentiment Analysis

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Abstract- **Sentiment analysis is a highly studied area within natural language processing (NLP). NLP has a variety of applications, including voice recognition, machine translation, product review analysis, sentiment analysis, and text classification, such as email categorization and spam filtering. Historically, sentiment analysis has relied on lexicon-based techniques, but with advancements in artificial intelligence, machine learning algorithms are increasingly playing a major role in sentiment analysis. Currently, deep learning techniques are widely used for sentiment prediction. There has been a significant amount of research into NLP using deep learning methods, including Convolution Neural Network (CNN) and Recurrent Neural Network (RNN), particularly Long Short-Term Memory (LSTM). The choice of method depends on the application domain, and these techniques can be used either in combination or as standalone solutions. This survey focuses on the various types of deep learning methods used in different sentiment analysis applications, both at the sentence level and aspect/target level. Additionally, the survey compares the advantages and disadvantages of these methods and evaluates their performance.**

I. INTRODUCTION

Sentiment analysis (SA) is a method of uncovering the emotions conveyed within a context. This technique allows machines to predict the emotions, attitudes, or personalities expressed by individuals through different aspects. It identifies the underlying human emotions in a context, giving machines the ability to accurately understand these emotions.

In the past, people used to share their knowledge and opinions in person, with family members, friends, and neighbors. However, with the evolution of technology, these exchanges have shifted to an online environment, making SA an important tool. Technology has given individuals the ability to be exposed to thousands of opinions in just minutes. For instance, someone might post their views on a recent product purchase or a social issue on a social media platform. These reviews also extend to movies, hotels, and restaurants.

As people become more fond of online communication, both the number of individual opinions and the need for sentiment prediction in business areas have increased. This allows organizations to better understand the needs, likes, and dislikes of the general public. Sentiment analysis and opinion mining (OM) are fields that have greatly benefited from these innovative approaches, which involve automated methods of perceiving and recognizing human feelings.

This paper aims to provide a comprehensive review of AI-driven sentiment analysis and opinion mining of emotions. It covers multiple approaches and methodologies, including implicit and explicit data extraction. The paper also includes a taxonomy of sentiment analysis, a discussion of the pros and cons of SA based on previous research, and a highlight of the various levels of SA, open issues, research issues, and future directions in the field

II. LITERATURE SURVEY

3.1 Introduction

Sentiment Analysis (SA), also known as Opinion Mining, is a field of study in Natural Language Processing (NLP) that aims to determine the sentiment expressed within a given context. With the rise of the Internet and social media, there has been a proliferation of opinions and reviews being expressed in digital platforms. These opinions often reflect the attitudes and sentiments of individuals towards products, services, events, topics, and more. As a result, the need for Sentiment Analysis has become increasingly important for businesses, organizations, and individuals who want to gain insight into the prevalent moods and dispositions of individuals concerning certain subjects.

The goal of Sentiment Analysis is to classify the expressed opinions into different categories such as positive, neutral, and negative. This classification enables organizations and individuals to understand the overall sentiment expressed towards a particular subject and make informed decisions. AI-driven Sentiment Analysis has become a popular approach in recent years, with the advent of machine learning and deep learning techniques. These techniques have allowed for more accurate sentiment analysis, and have been applied in a wide range of domains, including social media analysis, product reviews, and customer feedback analysis, among others.

This literature survey aims to provide an overview of the current state-of-the-art in AI-driven Sentiment Analysis, including the research methodology and techniques used, the various applications and domains, and the advantages and limitations of these approaches. The survey will also discuss the future directions for the field and provide an outlook for the future of Sentiment Analysis

3.2 Research Background

Sentiment analysis (SA) has been an active area of research for several decades now. The first use of computational methods in sentiment analysis was recorded in the 1960s with the use of rule-based systems and keyword analysis. However, with the advancements in natural language processing and machine learning, there has been a significant improvement in the accuracy of sentiment analysis. With the rise of social media platforms, there has been a massive growth in the amount of opinionated text data that has led to an increased demand for sentiment analysis.

The traditional methods of sentiment analysis include lexicon-based processing, which uses a predefined list of words with associated sentiment scores. However, this approach is limited in its ability to understand the

context of the text. With the advancements in machine learning, various algorithms have been proposed to overcome this limitation, including decision trees, support vector machines, Naive Bayes, and artificial neural networks.

In recent years, deep learning techniques such as Convolution Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) have emerged as the most popular methods in sentiment analysis. These techniques use large amounts of data and multi-layer neural networks to learn and predict the sentiment in text. Long Short-Term Memory (LSTM) is one of the most widely used RNNs in sentiment analysis and has shown remarkable performance in several benchmarks.

In addition to traditional and deep learning methods, there have also been efforts to incorporate transfer learning in sentiment analysis. Transfer learning enables sentiment analysis models to be trained on large datasets and then fine-tuned for a specific domain or task.

The research background section of a literature survey for AI-driven sentiment analysis would provide an overview of the history of sentiment analysis, traditional methods, recent advancements, and the current state-of-the-art techniques. The section should also discuss the challenges faced in sentiment analysis and the need for continuous improvement in the field

III. METHODOLOGY

AI-driven sentiment analysis uses various computational and statistical methods to analyze and categorize opinions expressed in text. Some common methodologies used in AI-driven sentiment analysis are:

Rule-Based Method: This is a basic approach where pre-defined rules are applied to the text to categorize it as positive, negative or neutral. The rules can be based on the presence of certain words, patterns, or expressions in the text.

Lexicon-Based Method: This method uses dictionaries or lexicons of positive and negative words to categorize the text. The sentiment score is computed based on the count of positive and negative words in the text.

Machine Learning Method: Machine learning algorithms, such as Naive Bayes, Support Vector Machines (SVM), and Random Forest, are used to train the model on a large annotated dataset to identify the sentiment of the text.

Deep Learning Method: Deep learning techniques such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN) are used for sentiment analysis. These models can learn complex patterns and relationships in the data, leading to improved performance in sentiment analysis.

The choice of methodology depends on the specific requirements of the sentiment analysis task and the availability of annotated data for training the models.

The methodology of AI-driven sentiment analysis can vary depending on the application and the research goals. However, the general steps in sentiment analysis typically involve

Data Collection: This involves gathering a large dataset of texts, such as social media posts, customer reviews, and online news articles, that express opinions and sentiments about a particular subject or entity.

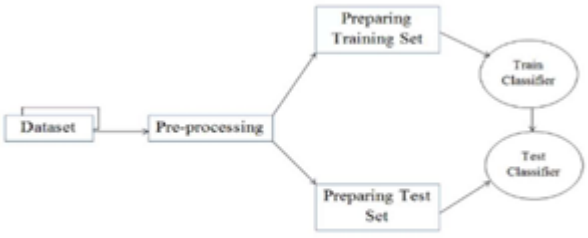
Data Pre-processing: This step involves cleaning and prepping the data for analysis. This includes removing duplicates, stop words, punctuation, and any irrelevant information from the data set.

Feature Extraction: This involves creating numerical representations of the texts for analysis. Commonly used techniques for feature extraction in sentiment analysis include Bag-of-Words (BoW) models, term frequency-inverse document frequency (TF-IDF) models, and word embeddings.

Sentiment Classification: This step involves training a machine learning algorithm on the feature-rich data to learn patterns and relationships between the features and the sentiment expressed in the texts. Common algorithms used in sentiment analysis include Naive Bayes, Support Vector Machines (SVM), and deep learning models such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN).

Model Evaluation: The final step involves evaluating the performance of the sentiment analysis model. This can be done using metrics such as accuracy, precision, recall, and F1-score. The evaluation helps to identify any biases in the model, and the results can be used to fine-tune the model or improve the feature extraction techniques.

It's important to note that the methodology of sentiment analysis can be adapted depending on the specific needs and goals of the research, and new techniques and models are constantly being developed to improve the accuracy of sentiment analysis.



IV. RESULT

The results of AI sentiment analysis can be evaluated in a variety of ways, depending on the specific application and the methods used. Some common evaluation metrics used in sentiment analysis include accuracy, precision, recall, and F1-score.

Accuracy measures the proportion of correctly classified instances compared to the total number of instances. Precision is the proportion of true positive predictions compared to all positive predictions, while recall is the proportion of true positive predictions compared to all

actual positive instances. The F1-score combines both precision and recall into a single measure of performance.

In addition to these metrics, other evaluation methods may also be used, depending on the task and the data. For example, in some sentiment analysis applications, it may be appropriate to evaluate the model based on the confusion matrix, which displays the number of true positive, true negative, false positive, and false negative predictions.

The results of AI sentiment analysis can also be visualized in a variety of ways, such as through bar charts, line graphs, or heat maps. These visualizations can help to highlight patterns and trends in the data, and can be used to inform further analysis or improvement of the model.

It's worth noting that the results of AI sentiment analysis are not always perfect and the model may make mistakes. However, with the advancements

in AI and deep learning techniques, the performance of sentiment analysis models is continually improving, and it is likely that their accuracy will continue to increase in the future.

Conclusion for AI Driven Sentiment Analyzer

The conclusion of the study of AI-driven sentiment analysis highlights the potential of this field in providing valuable insights into the attitudes and emotions of individuals. The study of AI-driven sentiment analysis has shown that this technique can be used to effectively analyze and understand the emotions expressed in text data. The results of the study demonstrate the potential of AI-driven sentiment analysis to provide a comprehensive view of the attitudes and emotions of individuals. The findings also suggest that AI-driven sentiment analysis can be an effective tool for decision-making in various domains, including marketing, customer service, and product development. The study concludes that further research is required to fully exploit the potential of AI-driven sentiment analysis and to develop new methods that can better handle the complexity of text data.

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Natural Language Processing for Sarcasm Detection

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Abstract— **Our research focuses on identifying sarcasm in news headlines by fusing extracted elements from machine learning with hand-crafted contextual variables. Before being coupled with meticulously created feature sets, a feature set is retrieved from a Convolutional Neural Network (CNN), Bidirectional Gated Recurrent Unit (GRU), and Bidirectional Long Short Term Memory (LSTM) architecture. These individually designed feature sets are developed based on their corresponding contextual justifications. Each feature set has been created expressly with the goal of detecting sarcasm in mind. The goal is to identify the best attributes. Some sets function properly even when used independently. In the absence of a combination, other sets are not particularly important. Accuracy, Precision, Recall, and F1-measure outcomes of the experiments are all favorable.**

Keywords: Sarcasm, headlines, CNN, GRU, LSTM, Accuracy, Precision, Recall, F1-measure

I. INTRODUCTION

Sarcasm is the art of use of words that mean the opposite of what you really want to say especially in order to insult someone, to show irritation, or to be funny. Though evinced in many ways, identifying sarcasm is a difficult yet important task in opinion mining. This is because the computational systems which rely on or exploit polarity of the text can be misled by sarcastic sentences where the literal sentiment of the text is different from the one that is implied, often involving a strand of hostility.

Consider this sentence "I am glad I am going to college while all my friends have a holiday." This sentence contains words like 'glad' which denote a positive sentiment.

However, the sentence in its entirety clearly has a negative sentiment. The inability of the most advanced sentiment analyzers to accurately identify sarcasm has a direct influence on NLP systems, ranging from review summarization systems to chat bots.

The work of Riloff et al. (Riloff, Qadir, Surve, De Silva, Gilbert and Huang, 2013), which demonstrates that sarcasm can be detected by the contrast between a positive sentiment word and a negative state, is the one that is most closely related to the work presented in this paper among the various computational linguistics studies on sarcasm detection. The SASI method developed by Tsur et al. (Tsur, Davidov, and Rappoport, 2010) finds semi-supervised patterns that indicate instances of sarcasm.

II. OVERALL ARCHITECTURE

According to [1]-Sarcasm as a restriction of sentiments, sarcasm can be communicated in five different ways: This category includes a variety of elements like sentiment and mood. It makes use of contrast and historical comparison. Multiple viewpoints are taken into consideration for sarcasm identification because it is a complicated style of expression. In comparison to the other categories, this demands more work. Sarcasm as a manner of expressing emotion: One of the most prevalent ways to express emotion is through sarcasm. It is frequently employed in unfavorable circumstances or to express aggression. Sarcasm as a function of familiarity: When compared to friends and family, strangers have a harder time recognizing sarcasm. Language familiarity makes the process easier as well. Written sarcasm as an expression: In addition to vocal communication, sarcasm is frequently utilized in writing, particularly on social media. We are debating the first, second, and fifth strategies among these.

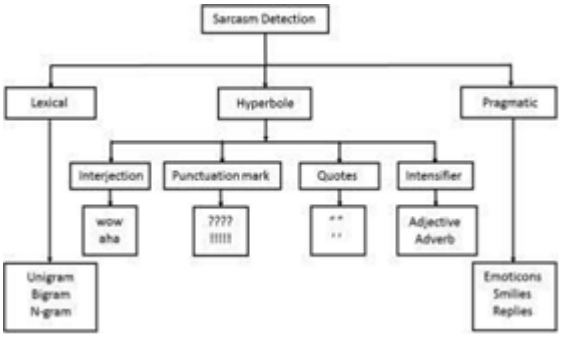


Fig. 1

III. RELATED WORK

Many researchers have conducted experiments and looked at the usage of various feature types in text datasets as well as various techniques for sarcasm detection. Generally speaking, there are two types of sarcasm detection techniques: supervised and semi-supervised. Additionally, new techniques for detecting sarcasm, such deep learning and bootstrapping, are being developed.

Satirical comments in product evaluations on Twitter and Amazon [11] were identified using the semi-supervised sarcasm identification algorithm (SASI) by Davidov et al. The first reliable algorithm for sarcasm detection is this one. In reviews and tweets, they employed punctuation- and pattern-based features. While Lukin and Walker used the Bootstrapping approach to use pattern-based characteristics [9] to detect rudeness and sarcasm in

online discourse. Sentiment-related, punctuation-related, pattern-related, syntactic, and semantic characteristics [2] are used in a pattern- based technique developed by Bouazizi and Ohtsuki to identify sarcasm. By utilising two classifiers—Support vector machine (SVM) and Logistic regression (LogR) [10]—Gonzalez-Ibáez et al. analysed lexical and pragmatic elements in tweets, retrieved using unigrams and dictionary- based for categorising sarcastic, positive, and negative tweets. In order to identify sarcasm and irony in Microblogs, Fersini et al. devised an ensemble method called Bayesian Model Averaging (BMA), which takes into consideration feature sets such pragmatic particles and PoS tags [7]. Cocea et al. used machine learning algorithms, n-grams, unigrams characteristics, coupled with extra features like emotion label, polarity label, amount of hashtags, etc. to identify sarcasm from student response on Twitter. [6].

By Kunneman , sarcasm recognition in Dutch tweets with the hashtags "#sarcasm," "#irony," "#cynicism," etc. was analysed and investigated. They confirmed the French tweets as well and discovered that the hashtag often denotes a polarity change.

Ghosh et al. reframed the sarcasm detection challenge as a literal/sarcastic sense disambiguation (LSSD) [5]. Unsupervised techniques and an SVM classifier with a modified kernel employing word embedding were used to analyse the twitter data. A big data strategy was developed using a framework based on Hadoop.

IV. METHODOLOGY

Rule-Based Methodologies:

Many academics employ rule-based methods to recognise sarcasm using particular data that may be described in terms of rules. These guidelines mainly rely on signs of sarcasm. Hashtags are frequently used to emphasise sarcasm and are a crucial signal of it. For instance, "Wow, you are very smart. Never use sarcasm. This method was utilised by Maynard et al. [8] to identify sarcasm in tweets. They tokenized hashtags in tweets using a lexicon- based method, and they developed a number of rules for hashtag pattern usage. Their tests show that the hashtag tokenization achieves 98% precision, sarcasm detection 91% precision, and polarity detection 80% precision. In their study on sarcasm, Bharti et al. [4] used two rule-based classifiers, i.e. Interjection word start algorithm (IWS), which makes advantage of the hyperbolic feature, and parsing-based lexicon generation algorithm (PBLGA), which builds parse trees of sentences incorporating sentiment and situation phrases. This method has the benefit of allowing for error analysis corresponding to many rules.

Statistical Approaches:

Based on this method, several learning

algorithms and characteristics may be used to identify sarcasm.

Most ways employ the feature known as "bag- of-words," which is a feature creation tool that represents a text as the bag (multiset) of its words while ignoring syntax and even word order. For sarcasm detection, however, statistical techniques encourage us to employ a variety of feature types and their combinations, including pragmatic, pattern-based, lexical, contextual, etc. For these methods, we may experiment with several classifier types, including SVM, Naive Bayes, Logistic Regression, etc.

The SVM classifier employed by Riloff et al. [18] used lexical characteristics such bigrams and unigrams to obtain 64% accuracy and 39% recall. While Dmitry et al. [11] combined k-nearest neighbours with pattern-based features and punctuation-based features (KNN).

Distributional Approaches:

This method takes into account the Distributional Hypothesis, which claims that words that often occur in related situations have comparable

meanings. The context vector that was created from the data therefore conveys the sense of the target word and serves as a stand-in for the meaning's purpose. Geometric methods like cosine similarity are applied to context vectors to determine how similar their meanings are.

This method was used by Ghosh et al. [5] and included the classification methodology and word embeddings. They have employed Cosine similarity as a geometric approach together with Distributional Semantic Models (DSMs), which follow the Distributional Hypothesis. They noticed that this method overcame the difficulties of an extra feature and the problem of classification strategy, achieving 7% to 10% F1-score

Deep Learning Approaches:

As a subset of a larger family of machine learning approaches based on learning representations of data and employing high level abstractions in data by using a deep graph, deep learning-based techniques are becoming increasingly popular for sarcasm detection. Think about a deep neural network.

A visual neural network was modified by Rosanno et al. [3] for picture datasets from Instagram and Tumblr. Deep network adaptation architecture was used to test the multimodal fusion of textual and visual data in order to identify sarcasm in the fusion. They found that by including image-related information, their method enhances sarcasm recognition.

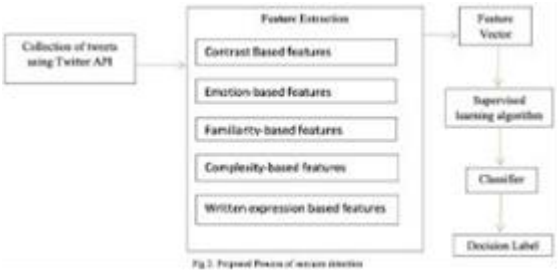
V. IMPLEMENTION

We assembled tweets using the Twitter API that had the hashtags for sarcasm (#sarcasm, #sarcastic), direct positive sentiment (#cheerful, #happy,

#delighted), and direct negative sentiment (#sorrow,

#angry, #grief), respectively. To remove quotes, retweets, spam, tweets in other languages, and tweets with URLs, we developed the appropriate filtering. The initial dataset was made up of Tweet IDs (individual identifiers that Twitter assigns to each tweet) and their corresponding classification tags, such as Sarcastic or Non-Sarcastic. Tweepy, a Python

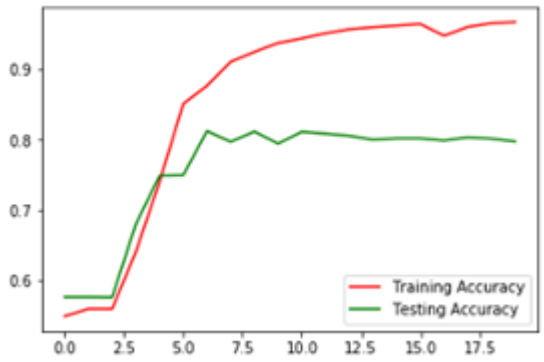
package created as a wrapper around the Twitter API to facilitate use of the same in Python, was used to further develop the dataset. Tweepy was used to harvest tweet information from the Twitter servers, including the text, date, and author name. Another dataset, available at http://thinknook.com/twitter-sentiment-analysis-training- corpus-dataset-2012-09-22/, was employed. It consists of 16 lac tweets with the tags "positive," "negative," or "neutral."

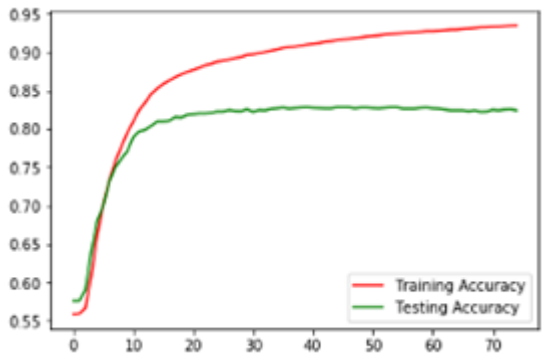


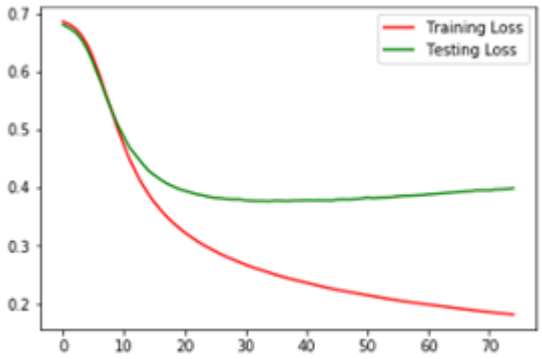
VI. RESULTS AND DISCUSSION

We used three models to get different results with varying accuracies.

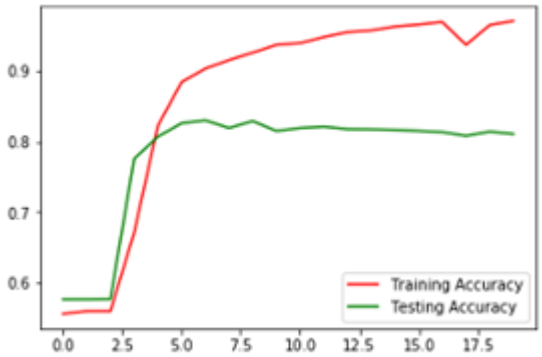
The results of all three are shown below

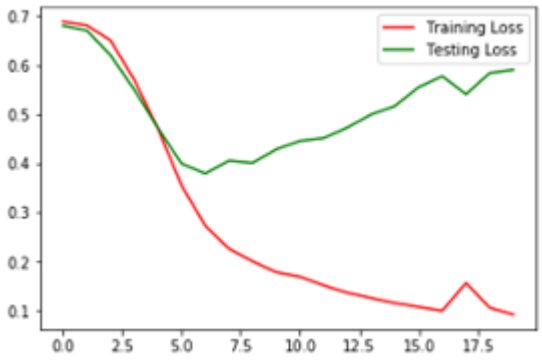






Convolutional Neural Network (CNN)





Bidirectional Long-short Term Memory (LSTM

VII. CONCLUSION

Over the past few years, sarcasm detection analysis has grown significantly, necessitating that we look back and assess the picture that these independent successes have presented. The study provided illustrations that included the techniques, datasets, and performance metrics. The results of even a limited implementation of the SCUBA framework are fairly reliable, as is clear from the results mentioned above. This demonstrates unequivocally that including variables that characterise the psychological and behavioural aspects of the user helps the process of automatically identifying sarcasm. Ensemble approaches consistently perform

better than singleton classifier algorithms, which is consistent with the theoretical prediction. For both the BigFeatureSet and each feature set separately, Gradient Boosting performs best. The results produced

by the multi- layered perceptron model are the most ludicrous, erroneous, and inconsistent. The train-test split of 10:90 typically produces the best accuracy results. Gradient Boosting with L1 and L2 regularised logistic regression produce results

that are nearly identical. The sparse nature of the data generated by feature set 3 is likely the reason why basic algorithms performed relatively better on it than on other feature sets

VIII. FUTURE WORK

Future effort could undoubtedly be directed toward increasing the feature set to include more features that are reflective of the user's behaviour in light of the good results obtained. Additionally, because tweets only contain short lines, it is difficult to identify sarcasm in them. The same method might be used to recognise sarcasm on additional social networking websites (To classify posts as sarcastic on face book for example). Due to individuals not recognising the posts as ironic, this could significantly reduce the propagation of bogus news. Finally, the current method only functions with static datasets. In the future, it might also be tried to include incremental categorization capabilities

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Legal Contract/Document Summarization using NPL and Machine Learning

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Abstract-**The process of reading legal documents can be overwhelming and challenging, particularly when specialized knowledge is necessary to understand their content. With the increasing volume of legal documents available, it has become more important than ever to extract essential information from these documents without having to read them in their entirety. This study seeks to enable rapid comprehension of large legal documents by providing a summarization method that offers flexibility and convenience for the reader. By leveraging natural language processing concepts, including vector representation, text ranking algorithms, and similarity techniques, the study presents a way to generate a summary that encapsulates the most critical information from the document in a concise and accessible manner. The paper provides a detailed explanation of each algorithm used at every step of the process to achieve the desired outcome. Ultimately, this study proposes a comprehensive approach to legal document summarization that alleviates the burden of reading complex documents in their entirety**.

Keywords:Natural Language Processing, Word Embeddings, PageRankAlgorithm, Text Rank Algorithm.

a. I INTRODUCTION

Natural language processing has brought us document summarization, a technology that is bound to revolutionize the way we approach reading. With the overwhelming amount of information available these days, people no longer have the luxury of reading a document from start to finish just to get the gist of it.

While human summarization is a tried-and-tested method, it's a time-consuming process. Enter automatic text summarization, which is the process of using computational techniques to shorten a large document and create a summary that contains only the most critical information. Two primary approaches are used in automatic summarization: extractive summarization and abstractive summarization.

In extractive summarization, the sentences are extracted from the original document but the extracted sentences are not modified in any way. Abstractive summarization constructs an internal semantic representation for the original sentences and then use this particular representation to obtain a summary that is closer to how a human being might express. Abstractive summarization is computationally much more complex and challenging than extractive summarization, It requires both natural language processing and a deep understanding of the domain of the original document. Most of the existing methods uses statistical methods such as frequency of occurrence, inverse document frequency or linguistic information such as term distribution, sentence position to extract the most relevant sentences from the document. However these methods ignore the relationship between different granularity information such as the relationships between the sentences. Hence the proposed system takes into consideration the similarities between different sentences before calculating the ranks of individual sentences in the document. Many researches are ongoing in the field of document summarization because text summarization becomes different and unique problem for each domain of research.

II. MOTIVATION

Very large volume of information in the legal domain is generated by legal institutions across the world. For example, a country like India having 24 high courts [97] (provincial courts) and

600 district courts [96] puts the legal proceedings in the public domain. This is of paramount importance as a huge number of cases are pending in different courts of India (as of 2011, High Courts 4, 217, 903, Supreme Court of India 57,

179) [77]). Also, this massive quantity of data available in the legal domain has not been properly explored for providing legal information to general users. Since most court judgments are generally long documents, headnotes are generated which act as summary of the judgments.

However headnotes are generated by experienced legal professionals only. This extremely time-consuming task involves considerable human involvement and cognitive effort. Automatic processing of the legal documents can help legal professionals quickly identify important sentences from the documents and thus reduce human effort. Text summarization can be applied in extracting important sentences and thus in generating headnotes.

III. TEXT SUMMARIZATION

3.1 Introduction to Text Summarization Automatic summarization is the technique of reducing a text document with a system in order to create a summary that retains the most important information of the original document. With increasing amount of electronic documents, use of such systems become progressively pertinent and inevitable. Substantial amount of research has been directed to explore different types of summaries, methods to create them and also the methods to evaluate them. Das et al. [13] surveyed some of the approaches both in single and multiple document summarization, giving importance to empirical methods and extractive

techniques. The authors discussed issues of automatic summarization, some techniques, and their evaluation that were attempted during

1991-2007. Nenkova et al. [73] provided an

overview of the most prominent methods of automatic text summarization. The authors discussed how representation, sentence scoring or summary selection strategies alter the overall performance of the summarizer. They also pointed out challenges to machine learning approaches for the problem. The paper surveyed the body of works published during 1995-2010.

3.2 Single Document Summarization

When a document is too long to go through in detail, and/or the user in a hurry to have a quick overview of its content, a summary of the document concerned seems immensely helpful. Single document summarization is, therefore, an important research issue. In extractive summarization traditional approaches deal with sentence level identification of the important content. Several techniques have been applied to select important sentences from a document. In the following we attempt to categorize some of the recent approaches. This classification is not a comprehensive list, for which one can refer to [13] [73] [65]. Instead we include the papers which were published after those surveys and are not therefore part of the surveys.

IV. LEGAL TEXT SUMMARIZATION

Legal text summarization is a process of generating summaries from court judgments. The summarization here is different from that of other genres.. On the other hand, in general text summarization, important information is extracted without the constraints. Legal documents are much longer than office memos or newspaper articles or magazine articles. They exhibit wide range of internal structure (sections, articles and paragraphs in statutes, sections and sub-sections in regulations). The importance of individual documents is determined, to a great extent, by their origin.

The same text would be interpreted differently if it occurs in a higher court opinion than in the opinion issued by a lower court. Citations play a major and crucial role in legal documents which indicate important information about the case. Due to the reasons, legal text summarization demands special attention and straightway application of successful techniques of general text summarization may not be effective here. Below we discuss a few classes of summarization techniques that have been tried till date. Although they may have similar groupings as with general text categorization for a few cases, there are differences at finer level of application.

V. PROPOSED SYSTEM

As stated earlier, the proposed system would be focusing on generating extractive summary from the

given document using different natural language processing techniques such as word embedding, similarity measures, and ranking algorithm

The overall flow of the system can be explained with the help of following steps:

1) Initially we will concatenate all the text present in the document.

2) Then we would split the text into individual Sentences This can be done using the tokenizer of the natural language tool kit package of python.

3) Then we would remove all the punctuations, numbers and special characters from all the individual sentences.This can be achieved with the help of regular expression and python packages.

4) Then all the alphabets are converted into lower case alphabets This is done so there would not be any problem because of character case sensitivity in the sentences.

5) Then we would remove all the stop words from the sentences because stop words do not

contribute any meaningful context to the sentences and would only waste processing time in the next step of vector conversion.

After all the above steps we would get clean sentences which are free from stop words and all other unwanted punctuations, numbers and special characters.

VI. CONCLUSION

Text summarization has been an active area of research for the last two decades, with more focus on extraction-based summarization than on abstractive summarization. However, there has been a recent shift towards automatic summarization of legal documents and other specialized texts. This survey paper provides an overview of text summarization techniques, with a focus on legal text summarization. It covers state-of-the-art techniques, datasets, and metrics, and presents a comparative study. The paper also discusses issues specific to legal text summarization, such as document structure and terminologies, and highlights the need for further research to improve comparative analysis of results.

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Smart Bin Waste Prediction using Machine Learning

Sushan Uchil, Aditeya Prajapati, Vishal Patwa

Abstract—Smart bin waste prediction is a method for forecasting the amount of waste that will be generated by a community or municipality. By using machine learning algorithms, the system can analyze patterns in waste generation and make accurate predictions of future waste levels. This information can then be used by waste management organizations to optimize their collection and disposal schedules, reducing costs, and improving efficiency. The use of machine learning in smart bin waste prediction has been shown to be a reliable and effective method for managing waste and has the potential to transform the waste management industry.

I. INTRODUCTION

Waste management is a critical issue for communities and municipalities worldwide, as the generation of waste continues to increase with the growing population and consumption patterns. In order to effectively manage waste and minimize its negative impacts, it is important to have accurate predictions of future waste levels. Smart bin waste prediction is a method for forecasting the amount of waste that will be generated by a community or municipality using machine learning algorithms.

The smart bin waste prediction system works by analyzing patterns in waste generation and making accurate predictions of future waste levels. This information can then be used by waste management organizations to optimize their collection and disposal schedules, reducing costs and improving efficiency. For example, by knowing how much waste will be generated, waste management organizations can adjust their collection routes to ensure that they are not collecting partially full bins, which can be a waste of resources and lead to higher costs.

Machine learning algorithms used in smart bin waste prediction can include decision trees, random forests, and neural networks, among others. These algorithms can analyze large amounts of data and identify complex relationships between different factors, such as weather conditions, population density, and waste generation patterns. This allows for more accurate predictions of future waste levels and helps to minimize the risk of waste being left uncollected.

In conclusion, smart bin waste prediction using machine learning has the potential to revolutionize the waste management industry. By providing accurate predictions of

future waste levels, waste management organizations can optimize their collection and disposal schedules, reducing costs and improving efficiency. Additionally, by minimizing the risk of waste being left uncollected, smart bin waste prediction can help to improve public health and reduce environmental impacts..

II. OVERVIEW OF SMART CITY IOT APPLICATIONS FOR WASTE MANAGEMENT:

Smart city IoT applications are playing an increasingly important role in improving waste management in cities. By integrating IoT technology with existing waste management systems, cities can collect and analyze data in real-time, making more informed decisions about waste collection and disposal.

One of the key applications of IoT in waste management is smart bins. Smart bins are equipped with sensors that can detect the fill level of the bin and transmit that information to a central management system. This allows waste management organizations to optimize their collection routes and minimize the number of partially full bins that are collected, reducing costs and improving efficiency. In addition, smart bins can also be equipped with other sensors, such as air quality sensors, that can provide additional information about the environment around the bin.

Another important application of IoT in waste management is route optimization. By collecting data on waste generation patterns and traffic conditions, waste management organizations can optimize their collection routes to minimize the distance traveled and reduce the carbon footprint of waste collection. This can also help to improve public health by reducing the amount of time that waste is left uncollected.

In addition to optimizing collection routes, IoT technology can also be used to improve the recycling process. For example, smart recycling bins can be equipped with sensors that can identify the type of material being deposited and sort it accordingly. This can help to increase the efficiency of the recycling process and reduce contamination of recyclable materials.

IoT technology can also be used to monitor the environmental impact of waste management. For example,

sensors can be used to monitor air and water quality near landfills and waste management facilities, allowing authorities to take action to mitigate any negative impacts. In addition, IoT technology can be used to monitor the emissions from waste management facilities, helping to reduce their carbon footprint and improve sustainability.

Finally, IoT technology can also be used to educate the public about waste management. For example, smart bin systems can provide feedback to users on the amount and type of waste they are generating, encouraging them to recycle and reduce waste. This can also help to raise awareness about the importance of waste management and encourage more sustainable behavior.

In conclusion, smart city IoT applications have the potential to transform the way waste is managed in cities. By collecting and analyzing data in real-time, waste management organizations can make more informed decisions about waste collection and disposal, improving efficiency and reducing the environmental impact of waste management.

III. MATERIALS AND MODELS

3.1 - A Intelligent Waste Management System. -is section introduces the intelligent waste management system that contains combinations of Internet of things and machine learning. Internet of things can be used for real time monitoring and collecting the waste. -e waste can be collected by placing sensor-based dustbins in different places. Arduino and microcontroller-based dustbins can collect the waste within small area, and it cannot be classified based on its characteristics. So, IoT based waste management system can be selected for continuously collecting and monitoring the waste.

But existing systems did not give concentration on hazardous waste that produces poor odor and poisonous gas. So, intelligent based waste management system can be proposed to monitor the hazardous waste and non hazardous waste. Sensor based dustbins can be placed in different places that contain sensors like ultrasonic sensor etc.

3.2 - Machine Learning Algorithms. IoT with machine literacy algorithm can be used in waste operation system to develop the smart megacity in effective manner. - e waste can be classified depending on its characteristics by using ML classifier algorithm. ML algorithm can be classified into three major types. - ese are supervised literacy, unsupervised literacy, and underpinning algorithm, which are shown in Figure 7. substantially, supervised learning algorithm is used for waste collection and operation to develop the effective smart megacity.

Because it provides better affair and to break bracket and retrogression challenge. So, this work substantially focuses on supervised literacy- grounded waste operation system. operations of Machine literacy algorithms shoot the

covered data through an android operation, and these kinds of android operation are well suited for deep literacy approach, and they collect the real time data with the help of Bluetooth technologies.

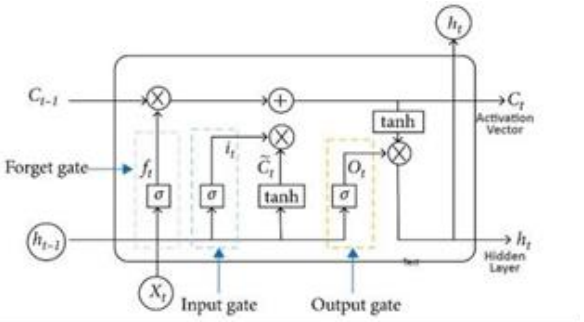
3.2.1 – LSTM – Long Short-Term Memory (LSTM) is a type of Recurrent Neural Network (RNN) that is widely used for time series analysis and sequence prediction problems, including smart bin waste prediction. LSTMs are designed to handle the problem of vanishing gradients in traditional RNNs, allowing them to remember information from long sequences and capture long-term dependencies.

In the context of smart bin waste prediction, LSTMs can be used to analyze time series data collected from smart bins and predict the fill level of the bins at future points in time. The LSTM network can be trained on historical data of bin fill levels and use that information to make predictions about future fill levels.

One of the key advantages of LSTMs for smart bin waste prediction is their ability to handle the unpredictability of waste generation patterns. By analyzing multiple historical sequences, the LSTM network can learn the underlying patterns of waste generation and make predictions accordingly. In addition, LSTMs can handle non-linear relationships between features, making them well-suited to the complex and non-linear relationships that often exist between bin fill levels and waste generation patterns.

However, it's important to note that LSTMs can be computationally expensive, particularly for large and complex data sets. In addition, the training process for LSTMs can be challenging, and requires careful selection of hyperparameters, such as the number of hidden layers and the number of neurons in each layer.

In conclusion, LSTMs are a powerful tool for smart bin waste prediction, allowing for the analysis of complex time series data and the capture of long-term dependencies in waste generation patterns. However, care must be taken in the selection and training of LSTMs to ensure accurate predictions and prevent overfitting. Due to the gradient difficulties in deep neural or recurrent networks, the LSTM architecture was introduced by Hochreiter and Schmidhuber to overcome the problems in training long-term dependencies. The LSTM design comprises a set of repetitively associated sub-networks denoted as memory blocks. The thought behind the memory block is to preserve its state over time and control the data stream through non- linear gating units. Figure 2 shows the structure of an LSTM block, which includes the doors, the input flag x(t), the yield h(t), the enactment capacities and peephole associations. The input block and all the gates are recurrently connected with the output block.



3.2.2 – Logistics Regression- Logistic regression is mainly focused on classification and prediction of data depending. on its characteristics. Here, the dependent variable is denoted as binary forms. It can be classified into binomial, multinomial, and ordinal. Figure 8 shows the types of

logistics regression. In binomial regression, the two types of dependent variables are possible, for example, pass and fail, win and loss, etc. In multinomial regression, the dependent variable must have the three or more possible values in unordered manner .

In ordinal regression, the dependent variable must have three or more possible values in ordered manner. -e following assumptions are considered in logistics regression.

These are binomial regressions representing the target values in terms of binary values. It does not have multiple collinearity, which means that the variables are independent of each other. -ese variables must have proper meaning. It can be used in huge model. Here, the input is linear function.

3.2.3 – Bidirectional LSTM Model - Due to its design, an LSTM network can execute only the forward passes on consecutive information, which eventually implies the unidirectional model of data processing.

An instinctive way to mitigate this confinement is to utilize a clone copy of the LSTM arrangement but in the opposite order proposed by Schuster and Paliwal . Hence,

combining the LSTM forward and backward networks, a

Bidirectional LSTM (BiLSTM)

is made, which can be utilized to show conditions bidirectionally. Figure 4 demonstrates

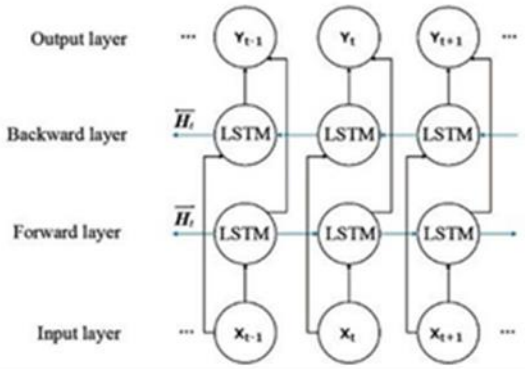
the structure of the BiLSTM network, which is an arrangement of handling sequence processing that comprises two LSTMs networks: one taking the input in a forward

layer and

the other in reverse order in a backward layer. The forward layer is accompanied by the

inputs coming from the input layer, and the backward layer generates the outcomes in the

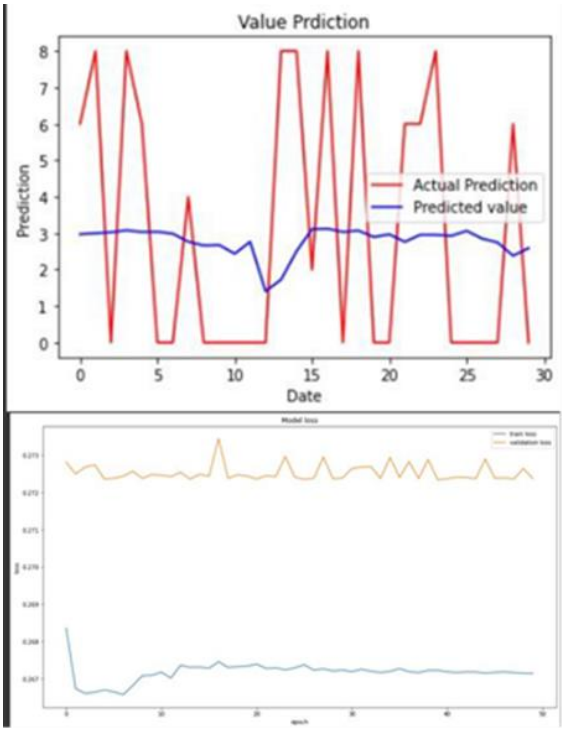
output layer.



IV. RESULTS AND DISCUSSION

This section presents the results and discussion for the all the machine learning algorithms and methodologies used in order to achieve accurate prediction of smart bin waste. As the the available data of smart bin prediction was a time series data (The data was obtained from Australian government website of the smart bin they have installed in their cities).

The data was a time series data consisting of the date and all the details regarding when the bin was full of waste with the help of the sensors attached to it. As it was time series data the ARIMA and SARIMA models were applied. but the predictions and accuracy were very poor and the irrespective of different it input it always gave a constant output so we understood that we would need a machine learning model that would consider/remember the past characteristic of the data and predict the values accordingly.So we implemented the LSTM models and as a result the results were satisfactory as we previously got the a constant output for any inputs here in lstm model the outputs were various according to the input but the accuracy was not satisfactory so for improvement of the accuracy Bi-lstm was used and it gave good results.



In future the for more accurate prediction we will be using

GRU, clustering and decision tree for better accuracy

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Precision Agriculture using Deep Learning

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Abstract—**Any country's ability to grow economically depends heavily on its agricultural sector. The task of meeting the current population's food needs has become difficult due to the growth in population, frequent fluctuations in the climate, and scarcity of resources. Smart farming, sometimes referred to as precision agriculture, has become a cutting-edge technique to address contemporary issues with agricultural sustainability. Machine learning is the engine that powers this cutting-edge technology (ML). The machine can now learn without being expressly programmed thanks to it. The next agricultural revolution will be largely driven by machine learning and IoT (Internet of Things) enabled farm equipment. Crop recommendations, fertiliser use, and plant disease detection in crops are the areas of focus. To measure crop quality and yield, ML with computer vision is examined for the categorization of various sets of crop photos. This strategy can be applied to improve livestock output by identifying reproductive trends, diagnosing eating disorders, and predicting the behaviour of cattle using data from collar sensors. Drip irrigation and other intelligent harvesting methods are also being evaluated, which greatly decreases the need for human labour in irrigation.**

Keywords—precision agriculture, deep learning, convolutional neural network , agricultural engineering, machine learning, recommendation.

I. INTRODUCTION

According to the data, almost 65% of all living things depend on agricultural products, either directly or indirectly. To meet the requirements of the expanding population, which has nearly doubled over the past 50 years, this sector has undergone different transformations. Population growth and climate change are viewed as being damaging to agriculture's ability to meet its needs. Additionally, agricultural goods are in danger due to a number of issues, such as a drop in pollinators, a variety of crop diseases, incorrect irrigation, technology, water scarcity, and many others. The adoption of cutting-edge technologies in the agricultural sector could make it possible to take preventative actions against this problem. It has been able to develop a sympathetic solution to this issue by combining computer vision with Deep Learning and Machine Learning, two branches of Artificial Intelligence. All of these technologies are combined in the field of precision agriculture, which views them as crucial elements in overcoming agricultural difficulties like those related to the environment, food productivity, sustainability, and quality. The most common form of sensing is satellite- based, while infrared and thermal imaging are utilised in a limited but expanding number of applications. The most widely used method of image analysis was machine learning with image processing. The most well-known machine learning techniques include K-means, SVM, artificial neural networks (ANN), and random forest.

II. OVERVIEW OF DEEP LEARNING

Deep learning (DL) is an extension of conventional machine learning because it incorporates complexity into the model and data that may be sent via a range of functions that allow hierarchical representation of the data through several levels of abstraction. Due primarily to its feature learning capabilities, deep learning is being employed more and more in a range of application fields. By combining lower-level characteristics into higher-level features, deep learning algorithms may automatically extract features from a given raw dataset. using deep learning to resolve difficult problems till the text has been styled and formatted, keep your text and graphic files apart. Avoid using hard tabs, and only use one hard return to mark the end of a paragraph. There should be no pagination added to the paper. No need to number text heads; the template will take care of that. Deep learning (DL) builds on standard machine learning by allowing for the hierarchical representation of the data through the use of a number of levels of abstraction, as well as the addition of complexity to the model and data that can be transferred via different functions. The primary driver of deep learning's rising adoption across a variety of application areas is its capacity to learn features. Deep learning algorithms have the ability to automatically extract features from a raw dataset and then compose higher-level features from the lower-level features. Deep learning systems are capable of resolving challenging issues.

Abbreviations and Acronyms

Artificial Intelligence, Machine learning, Deep Learning, Internet of Things, Global Positioning System, Unmanned Aerial Vehicle, Agriculture Supply Chain, Natural Language Processing, Swarm Intelligence, Artificial Neural Network.

III. PROPOSED SYSTEM

Remote sensing is used to manage a broader variety of resources through smart agricultural systems, which also reduce waste and increase productivity. a system that combines local sensors for temperature and insolation monitoring with smart irrigation and control that also monitors pH and other environmental factors. Because farmers have more time to focus on their farms' actual problems, such as using their expertise to solve pest problems, water in any location, and amend soil conditions through the use of sensing and automation, production yields can rise thanks to remote monitoring provided by smart farming systems The anticipated crop and the accuracy level would be displayed in the suggested system after gathering input data from users such as air temperature, soil humidity,soil pH, and rainfall. Support Vector Machine Learning Algorithm enables us to analyse data more effectively. When compared to other precision systems, ours also allows for users to buy and trade agricultural products directly.

IV. ADVANTAGES OF PROPOSED SYSTEM

1) Higher yields and more profitability

2) Less waste

3) Better quality produce

4) Better accuracy

5) More cost efficient farming

6) Improved farming procedure

7) Saves time

V. PRECISION AGRICULTURE

In agriculture, which dates back thousands of years, the environment is used to generate food. It is regarded as the primary source of employment in the majority of nations. Farmers made irrational farm alterations as a result of ignorance regarding soil types, yields, crops, and weather conditions, inappropriate use of intrants, issues with irrigation, and crop failures. The fact that the shipments were small and there were technical and financial shortages made this possible, though. Now, failing to keep track of this data could very well result in new issues and a rise in manufacturing costs. When the farms were expanded and divided into several hectare-sized sections, this situation needed to be changed. Modern digital technology's opportunities have significantly accelerated agriculture's move toward industrialization. Intensive agriculture is now a significant contributor to the efficiency of agricultural production processes, ushering in a new era of agriculture known as Agriculture 4.0 as a result of mechanization. The GPS, big data, internet of things, cloud computing, and picture feature extraction are examples of this. For instance, we can carry out modular interventions on farms depending on geographic locations. It is feasible to identify the crop disease from visual features. The precision agriculture notion, which refers to the right intervention at the right place and at the right time, was born out of this kind of thinking (Zimmerman, 2008; Zwaenepoel & Le Bars, 1997).

In reality, precision farming relies on the management of a parcel that incorporates information and communication technologies. It seeks to adjust farming methods in response to intra-parcel variability (soil texture, slope value, vegetation cover, etc.) in order to effectively manage the agricultural production cycle and maximize the farming interventions. The present issue is to increase agri-food production while maintaining environmental and human health standards as the world's population rises. Therefore, as a comprehensive agricultural system that focuses on information and production, precision agriculture meets the needs of farmers. Its objectives are to maximize production's long-term productivity, efficiency, and profitability while limiting unanticipated negative effects on the environment and animals (Tran & Nguyen, 2007). According to Gandonou (2005), precision agriculture is a group of technological advancements that have helped bring agriculture into the information age and are intended to provide farmers more control over their farming operations. Precision agriculture is essentially an improvement on the traditional decision support system for crop production.

Additionally, precision agriculture faces a number of agronomic, technological, and financial difficulties in addressing agricultural needs. Embedded instruments (such as biomass or chlorophyll sensors), aerial systems (such as satellites or drones), and mapping systems are used to address the technological problem. Enhancing input-yield ratios and choosing crop types that are suited to phytosanitary environments are the agronomic challenges. Limiting soil erosion and leaching losses of nitric nitrogen are related to the environmental problem. In order to promote optimal fertilisation while protecting the environment and human health, this is the goal. The economic side helps to ensure the farm's commercial profitability by lowering production costs, preventing the overuse of inputs, and preserving crop quality and yield.

Data gathered on plots of land, through connected objects, or by satellite technologies provide a wealth of information for precision agriculture. Therefore, there is a critical need to create tools and processes for storing, analyzing, interpreting, visualizing, and sharing the obtained data in order to extract new value from it. These agricultural applications serve as a means of generating knowledge relevant to decision support systems that can assist farmers and public or private decision makers (Wolfert, Ge, Verdouw, & Bogaardt, 2017). Artificial intelligence, machine learning, and deep learning have grown in popularity in scientific study since the industrial revolution and have a wide range of applications, including text mining, picture categorization, disease detection, and natural language processing. Many examples of deep learning's use in crop and soil management are available now (Liakos et al.,

2018). For these reasons, deep learning becomes a relevant answer that extends the traditional agronomic models to better help farmers in their position in the agricultural value chain.

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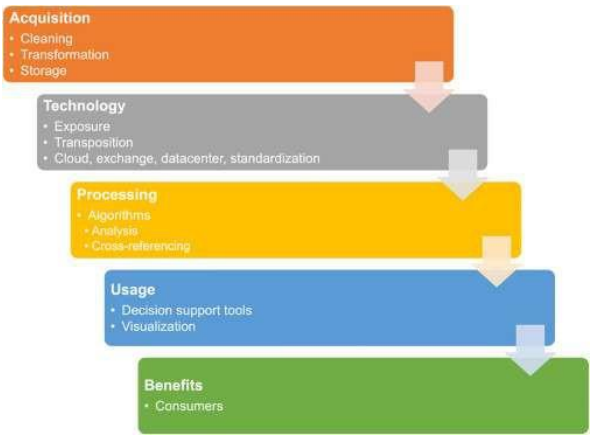

Fig. 1. Agricultural data processing.

Deep learning-enabled digital revolution in agriculture is a brand-new indicator of scientific and technological advancement. By offering a wide range of benefits to handle the frequent changes in external situations, it is beginning to alter farmers' perspectives. The new solutions have enhanced the agronomic and computer technologies already in use to boost output and modernize several aspects of precision agriculture. However, in order for farmers to practise sustainable agriculture, they must get technological support. As a result, deep learning has propelled the change and advancement of agriculture.

Digital agriculture has many advantages. Artificial intelligence and deep learning applications provide numerous chances to support the various stages of agriculture in order to overcome challenges and accomplish objectives (Gupta, 2019; N. Zhu et al., 2018):

1. Processing of agricultural information: It is essential for agricultural production to keep an eye on the health of plants and animals.

2. Models facilitate disease diagnosis, enhancing the potential for healthy crops to produce.

3. Optimal control of agricultural production systems: Agricultural production system control strategies frequently rely on the farmer's experience or professional expertise, which ignores the physiological state of the plants.

4. Crop management techniques have advanced to new heights, making it possible for farmers to manage crops with little effort.

5. Intelligent farm equipment: There are many different tasks involved in agricultural production.

6. Deep learning algorithms to assess agricultural data quickly and accurately.

7. Agricultural output alone is insufficient for agricultural economic system management. Numerous additional elements must be taken into account, such as agricultural product prices and quality. The forecasting of agricultural commodity prices is crucial.

8. AI has fundamentally changed how weather forecasting works, which is important for agriculture.

Deep learning methods have changed the landscape of the agricultural industry. Technology advancements have an impact on many agricultural operations. To manage the dangers brought on by the numerous technical integrations and information interpretation, humans must be the primary driving force behind this shift.

VI. EVALUATION METRICS

To train neural networks for deep learning, a sizable amount of training dataset is needed. They are taken advantage of by networks with intricate architectural designs and large training parameters. Additionally, training neural networks from scratch for hardware resources is an extremely expensive operation (computational speed and storage).

VII. DISTRIBUTION OF PAPER AND SOURCES

We began by studying the development of scientific productions. Fig. 3 displays the quantity of publications and their temporal distribution in relation to the use of deep learning in agriculture. We notice that starting in the year

2018, the number of publications began to rise dramatically

(with 74 publications). More specifically, publications continue to increase. It reached a peak of 495 in 2021 after increasing from 74 in 2018 to 337 in 2020.

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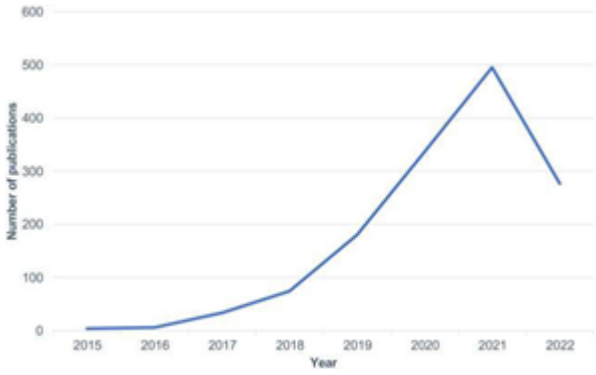

Fig. 3. Annual scientific publications.

First, we looked at the development of scientific productions. Fig. 3 displays the volume and temporal distribution of articles pertaining to the use of deep learning in agriculture. As of the year 2018, we can see that the number of publications has greatly increased (with 74 publications). Particularly, the quantity of publications continues. From 74 in 2018 to 337 in 2020 and 495 in 2021, it increased significantly.

VIII. RESEARCH DISTRIBUTION IN PRECISION AGRICULTURE

The potential of deep learning in agriculture to stop fungal infestations that lower agricultural output is summarized in this section. In other words, it draws attention to various literary works that discuss how to recognize pest insects, weeds, and illnesses in crops.

In agriculture, it takes time and is nearly impossible when farms are vast to recognize and identify issues and their hazards by the usual methods of expert visual inspection or biological analysis. In order to enable a machine to evaluate, process, and comprehend one or more images obtained from a data gathering system, neural networks use computer vision. Computer vision makes it easier to automaticallycount, locate, or recognize things, which greatly enhances the effectiveness of agricultural activities.

IX. FUTURE OF DEEP LEARNING IN AGRICULTURE

Due to modern technologies, agriculture has dramatically changed during the past few decades. Farmers benefit from improved operational efficiency

and profitability as a result of the new methods. Both the scientific and agribusiness sectors have become interested in the computational capacity of machines, the use of computer vision in IoT, and deep neural networks. We examined various works' experiments, network structures, or outputs to learn about their limits. While some research lack information regarding the experimental design, others are based on extremely few datasets (hardware, time, memory). The analysis's findings do, however, have certain drawbacks with regard to the usage of several classifiers and the display of the aspects that affect prediction.

First, statistical tests must be run to determine the significance of the obtained results if many classifiers are used in the experiments (Benavoli, Corani, Demar, & Zaffalon, 2017; Demar, 2006). Demar et al. investigated the safety, robustness, and applicability of various statistical non- parametric tests in machine learning to identify substantial variations in classification performance. The tests that have been suggested are the Friedman test with post hoc testing for the comparison of many classifiers on numerous datasets and the Wilcoxon signed ranks test for comparing two classifiers. For a clearer presentation of the test's results, Critical Difference (CD) graphs might be used.

X. CONCLUSION

The Precision agriculture is a recent science that is certainly still in its young phase. Deep learning can make a decisive contribution to the analysis of agricultural data, in this case by using computer vision to enable a machine to automatically analyze and understand the visual world. This offers the opportunity to develop intelligent systems, which appear to be one of the many possible ways to tackle the economic, environmental, and social challenges in agriculture.

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Land Cover Detection Using Deep Learning

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Abstract—**Land cover and its change are crucial for many environmental applications. This study focuses on the land cover classification and change detection with multitemporal and multispectral Sentinel-2 satellite data. To address the challenging land cover change detection task, we rely on two different deep learning architectures and selected pre-processing steps. For example, we define an excluded class and deal with temporal water shoreline changes in the pre-processing. We employ a fully convolutional neural network (FCN), and we combine the FCN with long short-term memory (LSTM) networks. The FCN can only handle monotemporal input data, while the FCN combined with LSTM can use sequential information (multitemporal). Besides, we provided fixed and variable sequences as training sequences for the combined FCN and LSTM approach. The former refers to using six defined satellite images, while the latter consists of image sequences from anextended training pool of ten images. Further, we propose measures for the robustness concerning the selection of Sentinel-2 image data as evaluation metrics. We can distinguish between actual land cover changes and misclassifications of the deep learning approaches with these metrics. According to the provided metrics, both multitemporal LSTM approaches outperform the monotemporal FCN approach, about 3 to 5 percentage points (p.p.). The LSTM approach trained on the variable sequences detects 3 p.p. more land cover changes than the LSTM approach trained on the fixed sequences. Besides, applying our selected pre-processing improves the water classification and avoids reducing the dataset effectively by 17.6%. The presented LSTM approaches can be modified to provide applicability for a variable number of image sequences since we published the code of the deep learning models. The Sentinel-2 data and the ground truth are also freely available**.

Keywords—machine learning; multi-class classification; long short-term memory network (LSTM);fully convolutional neural network (FCN); multitemporal; time series; Sentinel-2

I. INTRODUCTION

Information about land cover and its changes are essential, for example, in natural resource management, urban planning, and natural hazard assessment and mitigation. Land cover classification and change detection are two crucial tasks in remote sensing, which have been addressed widely in the last few decades [1–3]. The two main reasons for this focus are the increasing availability of remote sensing data and the possibility of largescale automatic land cover detection due to growing computing power and innovative machine learning (ML) approaches [4,5]. Additionally, modern multispectral satellites, such as the Sentinel-2 mission, provide data with high spatial and temporal resolutions [4]. The task of detecting land cover changes based on ML approaches with multispectral remote sensing data includes several challenges [6]. In the following, we briefly describe six of the main challenges. (1) The quality of the necessary land cover ground truth (GT) varies widely depending on the study region, the data source, available information about its creation, the spatial resolution, and the consistency of the class definitions [7].(2) Besides the GT quality, the occurring classes vary from region to region. Therefore, individual case studies need to be conducted in the unknown region, enabling the MLapproach to adapt to the local land cover characteristics. (3) Certain land cover classes differ mostly semantically. These semantic differences, for example, occur for urban classes, which include combinations of buildings with different purposes. (4) Concerning the temporal and spatial resolution of the satellite data, this resolution can be too coarse for some land cover classes. For example, the extent of buildings can be smaller than the size of one satellite pixel, which complicates the classification task of this specific class.(5) Another challenging task arises, for example, in the context of inland waters. During a year, the water levels can change, which results in a non-constant shoreline. (6) Our last considered challenge is about the validation of the land cover change detection. The distinction between land cover changes and possible misclassification requires appropriate measures to be defined and adapted concerning the specific study region [3,8]. In this study, we address these six challenges in the development and application of ML approaches on multispectral Sentinel-2 data. Our overall objective is to provide a methodological workflow, including deep learning approaches, that yields a robust land cover change detection addressing the six main challenges. Sentinel-2, as part of the Copernicus program, provides freely available multispectral data with adequate spectral and temporal resolutions for land cover change detection. The primary contributions linked to the study's overall objective, as well as the novelties, can be summarized as follows:

Novel Dataset: The majority of studies in remote sensing focuses on only a few available land cover datasets [9]. We present the first land cover change detection study based on a land cover dataset from the federal state of Saxony, Germany [10]. The dataset is characterized by a fine spatial resolution of 3 m to 15 m, a relatively recent creation date, and a representative status in its study region. Therefore, this dataset is highly valuable. Innovative Deep Learning Models: While there are successful artificial neural network approaches commonly applied in ML research, these approaches are often not popular in the field of remote sensing [11,12]. We modify and apply fully convolutional neural network (FCN) and long short-term memory (LSTM) network architectures for the particular case of land cover change detection from multitemporal satellite image data. The architectures are successfully applied in other fields of research, and we adapt the findings from these fields for our purpose.Innovative Pre-Processing: In remote sensing, there is a need for task-specific preprocessing approaches [5,13–15]. We present pre-processing

methods to reduce the effect of imbalanced class distributions and varying water levels in inland waters to

apply convolutional layers. Further, we discuss the quality and applicability of the applied pre-processing methods for the presented and future studies. Comprehensive Change Detection Discussion: No standard evaluation of ML approaches with sequential satellite image input data and a monotemporal GT exists. We present a comprehensive discussion of various statistical methods to evaluate the classification quality and the detected land cover changes. Reproducibility: The presented ML models are freely available in Python on GitHub [16]. The Sentinel-2 data and the ground truth are also freely

available [4,10]. In the following, Section 2, we commence by briefly presenting the related work in the context of land cover classification and land cover change detection. Subsequently, we introduce the used land cover dataset and satellite data in Section 3.1. In Section 3.2, the ML methodology is described before we present the results of our study in Section 4. The achieved results are discussed in detail in Section 5. Finally, we provide concluding remarks and an outlook for possible future studies in Section 6. 2. Related Work The classification of land cover based on multispectral remote sensing data is, in current research, mostly based on supervised ML approaches. If remote sensing images are classified pixel-by-pixel, it can be referred to as image segmentation. The ML approaches can be categorized according to their input data: pixel-based approaches, spatial approaches, individually based on the corresponding spectral data. Typical examples for pixel-based ML models in the classification of land cover from multispectral data are Random Forest [17,18], support vector machines [19], and self-organizing maps [6,9]. The main disadvantage of pixel-based approaches is that they ignore spatial patterns, including information about the underlying classification task. This disadvantage is relevant in land cover classification since land cover classes, such as farmland or water bodies, often cover coherent areas that are larger than one pixel. These correlations between neighboring pixels can not be used directly with pixel-based ML approaches. Spatial classification approaches not only use one pixel for the classification but also use the two-dimensional (2D) spatial neighborhood. A popular spatial approach is based on 2D convolutional neural networks (CNNs) [20,21]. These CNNs consist of filter layers that can learn hierarchically: low-level features are learned in the first layers, more high-level features in the last layers. Most CNN approaches can only be applied monotemporally, meaning on one satellite image. Monotemporal land cover classification is difficult for classes, such as farmland and some forest classes, since their spectral properties change significantly over one year. Sequence classification approaches are alternative approaches that are able to learn from a sequence of images. Deep learning examples for sequence approaches are recurrent neural networks (RNN), LSTM networks, and 3D CNN. The RNN and LSTM approaches are often combined with other approaches, such as 2D CNNs. The combination of CNNs and RNNs in the classification of land cover outperformed the studied pixel-based approaches in severall studies [22–24]. Qiu et al. [25,26] combine a residual convolutional neural network (ResNet) and an RNN for urban land cover classification. LSTM approaches, an extension of RNNs, are also applied in land cover classification [12,27], crop type classification [11,28], and crop area estimation [29]. Rußwurm and Körner [11] rely on an LSTM network with Sentinel-2 data and a GT, including a large number of crop classes. The proposed LSTM classifies some crop types inconsistently over two growing seasons. Besides, the study's results imply that the LSTM approach can handle input data with cloud cover, and, therefore, no atmospheric corrections need to be applied. The LSTM application of van Duynhoven and Dragi´cevi´c [27] demonstrates good classification performance even with few available satellite images. The LSTM approach of Ren et al. [28] achieves about 90% overall accuracy in a seed maize identification with Sentinel-2 and GaoFen-1 data. The LSTM network outperforms approaches, such as Random Forest. Hua et al. [30] and You et al. [31] combine LSTM networks with 2D CNN and deep Gaussian processes. Besides, 2D CNNs can be extended from their 2D spatial convolution to 3D CNNs with an additional spectral axis for the convolution [32,33]. Another architecture for detecting changes in images are Siamese neural networks, which are applied on optical and radar data by Liu et al. [34], Daudt et al. [35]. Recent approaches, such as self-attention, are becoming more and more relevant in the field of multispectral remote sensing [30,36]. The detection of land cover changes can be divided into spectral-based approaches and post-classification approaches. Spectral-based approaches analyze the difference between the spectra from two or more multispectral satellite images to detect changes [1,2,37,38]. In contrast, post-classification approaches classify satellite images separately and compare the classification results afterward to detect changes [3,8]. The presented study relies on a post-classification approach to detect land cover changes. 3. Materials and Methods In this section, we introduce the applied dataset and methods. We describe the dataset in Section 3.1 and the ML approaches for the land cover classification and change detection in Section 3.2. In Section 3.3, the evaluation methodology

1. Dataset For the presented land cover study, we use a land cover dataset consisting of GT and Sentinel-2 input data. We introduce the GT in Section 3.1.1, describe the Sentinel-2 data in Section 3.1.2, and explain our pre-processing in Section 3.1.3. 3.1.1. Land Cover Ground Truth As GT, we rely on land cover vector data from the region around Klingenberg in the federal state of Saxony, Germany [10]. Klingenberg is located in the district Saxon Switzerland-Eastern Ore Mountains in about 500 m above sea level and is a rural area in a low mountain range. This GT data covers an area of 234 km2 with a spatial resolution of 3 m to 15 m. Figure 1 illustrates the GT aggregated in 2016 [10]. The GT consists of two separated parts. We have manually selected these parts to obtain one area of interest (AOI), including various features, for example, dams. The land cover data consists of 14 land cover classes. In the following, only the seven classes with the largest class areas are considered: Forest/Wood, Farmland, Grassland, Settlement Area, Water Body, Buildings, and Industry/Commerce. The

class Settlement Area contains the areas inside a settlement, which are neither buildings nor industrial or commercial areas. The smallest seven classes are summed up as Excluded, including railway systems and tracks, gardening, allotment gardens, sports and leisure facilities, roads and traffic areas, wasteland, and areas without available cover or use. We present an overview of all considered classes and their spatial coverages in Table

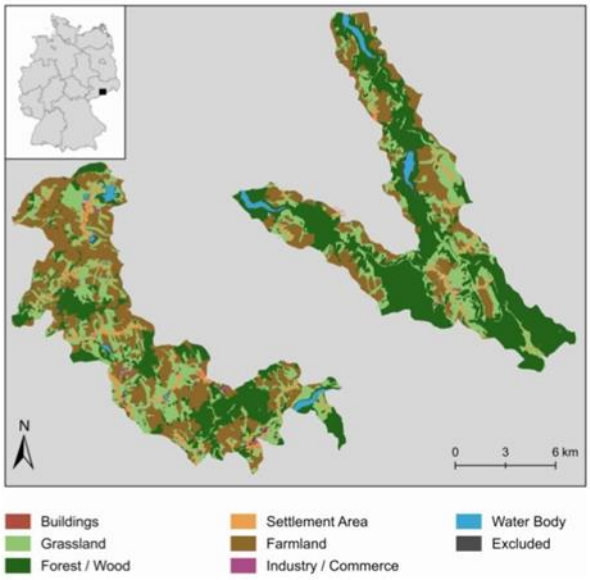

Figure 1. Visualization of the area of interest in Klingenberg, Saxony, Germany, and the land cover ground truth (GT)data

II. CONCLUSION

Land cover change detection is highly relevant for many applications and research areas, such as natural resource management. To address land cover change detection, we use multispectral Sentinel-2 data of 2016 and 2018 combined with a novel land cover GT. We rely on deep learning methods based on FCN and LSTM networks. These deep learning models are referred to as FCNB, LSTMF, and LSTMV. As pre-processing, we apply shoreline masking and the exclusion of small classes. The shoreline masking significantly improves the training and prediction of the ML approaches. Excluding the smallest classes prevents the dataset from a pixel reduction of 17.6% and makes the training much more meaningful. First, we train and classify satellite data of 2016. The overall best deep learning approach in the 2016 classification is the LSTMF, with an OA of 87.0%. Adding sequential information in the 2016 classification increases the performance by about 3 p.p. to 5 p.p. As expected, the classes Grassland, Forest/Wood, and Farmland benefit the most from adding sequential information, which show a significant variation over a year. Second, we classify satellite data from 2018 for the land cover change detection. Overall, our confidence measures consisting of a vote from classifications based on six different satellite image sequences are adequate. The most significant differences exist in Grassland and Settlement Area and the small classes Buildings and Industry/Commerce. We discover large coherent areas with land cover change near Farmland and Forest/Wood regions. As expected, confusion between urban classes occurs, which can mostly be explained by minor semantic differences. Grassland is confused with Farmland. In our presented LSTM approach, we build sequences from a fixed number of six satellite images. This choice increases the comparability of results. As the availability of Sentinel-2 satellite images per year has increased since 2018, future studies can modify our LSTM approaches to work with a variable number of images in a sequence. This modification would add more flexibility to the land cover change detection. Furthermore, future studies can focus on evaluating the GT quality, as described by Riese [6]. This evaluation can include comparisons with other imagery and OSM data. Besides, a possible exclusion of pixels along class borders can be evaluated (see Section 5.3). Finally, in a future study, the Excluded class can be further adapted and analyzed for the exploration of novel or unknown classes.

III. ACKNOWLEDGMENT

I would to like to thank Anil sir ,Vijay Sir, Aditya sir for guiding us throughout the research.they really support us in this research

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Security Analysis of Cloud Computing Authentication Frameworks

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Abstract- **Every aspect of our information is moved between smart devices in the digital world we live in thanks to cross-platform, external cloud services. To successfully execute our daily duties and official tasks that require access to all forms of essential data, smart technologies like smartphones are playing pivotal roles. Before the development of these smart technologies, protecting sensitive data posed several difficulties. Information security, however, has evolved into one of the most essential tasks for security experts since the introduction and widespread usage of such technology. Social media integration has increased the difficulty of completing this work successfully. There is various research that has been published to date suggests and creates a variety of authentication and security solutions for smartphone and cloud computing technologies. Multiple authentication threats and other associated problems in current smartphone and cloud computing technologies have been successfully handled by these studies. To the best of our knowledge, however, these studies are deficient in several areas, including logical authentication analysis, authentication implementation scenarios, and authentication assaults. These authentication ambiguities and inconsistencies prevent such studies from being fully taken into account for successful implementation. To explain current authentication dangers and issues in the literature, we undertook a thorough security analysis and assessment of several authentication frameworks and protocols for smartphones and cloud computing in this study. To show where the study is currently going, these authentication difficulties are further summarised and displayed in the form of several graphs. Finally, based on those findings, we highlight the most recent and current authentication uncertainties, dangers, and other relevant issues to address future directions and open research questions in the field of authentication for smartphones and cloud computing.**

Keyword: Handwriting popularity, Mobile Cloud Computing, Parallel classifier mixture.

I. INTRODUCTION

A digital environment where cross-platform, external cloud services are used to transport every informational detail from one smart device to another. Smart technologies, including smartphones, are playing vital roles in completing daily tasks and official assignments that call for access to many crucial data kinds. There are several research that suggests and develop various authentication and security techniques for Smartphone and cloud computing technologies. Multiple authentication threats and other applicable problems with contemporary smartphone and cloud computing technology have been efficiently solved by using those investigations [1]. The CCS dynamically arranges servers and VMs to function with several services, with each provider being broken down into several duties that might be done on VMs simultaneously. Although parallel execution and dynamic organization permit the CCS to deliver services efficiently, they also pose a severe threat to CCS security. As a result of the CCS being virtualized, VM security has emerged as a new security component that was absent from the conventional system. Similar elements of VM security include the isolation of distinct VMs and the simultaneous failure of co-located VMs because of an assault on the host server [2]. Cloud computing and Software-Defined Networks (SDN) have attracted a lot of interest from both academics and businesses. The network control plane and data plane are separated by SDN. A control program may quickly identify the real-time network status and configure high-level state approaches. The advancement of network functions is streamlined by the controller's centralization [3]. The core data plane in SDN can be effectively controlled through network programmability. The essential framework of SDN architecture is focused on applications and network services while network control is decoupled from forwarding capabilities and made programmable. SDN has made significant contributions to the networking paradigm for cloud computing [4]. Threats to data security are frequently used to describe data security. Because it is vulnerable to several dangers, the site of cloud computing is not exceptional. The main cause used for that cloud computation operates by fusing a variety of unique technologies. It is crucial to employ the threat control procedure to stabilize the advantages of safety risks and cloud computing. Reporting, designing, and implementing the management of patron security and internal security controls is the responsibility of the CSP [5]

II. BACKGROUND

To show where the study is currently going, these authentication difficulties are further summarised and displayed in the form of several graphs. Finally, using those findings as a basis, the author highlights the most recent and current authentication uncertainties, dangers, and other relevant concerns to address outstanding research questions and future directions in authentication for smartphones and cloud computing [1]. This study suggests a correlation metric for measuring the effectiveness of random services. This correlation statistic is more accurate and realistic since it fully

accounts for the impact of security considerations. The experimental findings illustrate the significant S-P correlation and the dynamic change in performance brought on by security considerations. Security must therefore be included while modelling and evaluating the QoS metric [2].

This paper proposes a novel methodology for trust assessment of cloud service security and reputation. The security of a cloud service is assessed using the security metrics that are specific to clouds using the security-based trust evaluation approach. Additionally, the reputation-based trust evaluation method uses feedback ratings on cloud service quality to analyse a cloud service's reputation. The proposed trust assessment methodology may more effectively and efficiently evaluate the trustworthiness of a cloud service than current trust assessment approaches, according to tests utilizing a real-world author service dataset and a synthesized dataset of security measures [3]. A thorough investigation of DDoS assaults in SDN and cloud computing settings was done by the author of this research. The author considers DDOS attacks in the context of SDN and cloud computing as far as their characteristics go, and they are examined in terms of new patterns and characteristics in distributed computing and SDN. The author then provides a thorough analysis of the defences against these attacks [4]. In this paper, the author provides a verification method that is mostly based on the concepts of BFT and blockchain technology to overcome those current issues. These CSPs are no longer required to work together or exchange information. These grab hash values can be examined by a customer to determine whether data manipulation has occurred [5].

III. PREVIOUS WORK DONE

To identify current authentication dangers and issues in the literature, the suggested technique undertook an extensive security analysis and assessment of major Smartphone and cloud computing authentication frameworks and protocols. To show where the study is currently going, these authentication difficulties are further summarised and displayed in the form of several graphs. Finally, using those findings as a basis, the author highlights the most recent and current authentication uncertainties, dangers, and other relevant concerns to address outstanding research questions and future directions in authentication for smartphones and cloud computing [1]. This study suggests a correlation metric for measuring the effectiveness of random services. This correlation statistic is more accurate and realistic since it fully accounts for the impact of security considerations. The experimental findings illustrate the significant S-P correlation and the dynamic change in performance brought on by security considerations. Security must therefore be included while modelling and evaluating the QoS metric [2]. In this paper, the author triumphs over those existing troubles by providing a verification scheme primarily based on the notions of BFT and blockchain technology. More than one CSP will be hired to save and perform computations on client information. Each CSP will need to periodically compute a grasp hash fee in their database to be stored on a public blockchain consisting of Bitcoin or Ethereum. These CSPs no longer need to collaborate or communicate with one another [5].

IV. EXISTING WORK DONE

Only a broad overview of the security model is given. The absence of any user-defined authentication roles in this framework posed the biggest authentication problem. Furthermore, the framework is dependent on external suppliers for brand-new services, and no external authentication scenarios are covered. Artificial neural networks are used to introduce a mobile biometric cloud framework. The presentation of a sophisticated mobile-based credential protocol [1]. STRAF is a brand-new methodology for evaluating trust in cloud services that is based on reputation and security. This framework, which is an expansion of the earlier work, may be broken down into three primary parts that collectively comprise [3].

Fundamentally, Mininet has been at the forefront of cutting-edge development and testing of novel controller applications. Mininet is used by some scientists as simulation equipment for lab tests. Each connected hub (switch, have, controller) in Mininet continues to function as a light-authority virtual computer. To only access the assets within its namespace, the virtual machine continues to run in its own Linux component namespace. Since it provides excellent authenticity and constant change from development to deployment, analysts have generally embraced it. These existing approaches are enhanced and developed by the simulation-based approach known as fs-Sdn [4].

The multi-CSPs, BC application, and client—whose functions are described below—will make up the three key components of the verification process, which correspond to the three main phases of the proposed verification method [5].

V. ANALYSIS AND DISCUSSION

The introduction of smartphones has eliminated the need for smartcards in several fields. In contemporary Smartphones like the iPhone and Samsung mobiles, Authentication is weak and is easily compromised via several breaches [1]. Results were obtained by way of analysing the primary and second experiments. The following optimization guidelines approximately balancing the safety and the carrier performance now are proposed.1) When the variety of to-be-had res theses (such as the CPU and the range of VMs) is restricted in CCS, and writer-depth safety mechanism may also convey a higher carrier overall performance.2) Deploying more VMs improves the service performance faster than enhancing the CPU processing creator of every VM. Three) To concurrently improve the safety and the service performance, making use of a writer CPU

with an excessive processing creator is better than deploying more VMs [2]. The method outperforms the opposite strategies, whilst the percentage of malicious remarks rating increases. As predicted, the above experimental consequences suggest that the STRAF combining the security-primarily based accept as true with evaluation technique and the reputation-primarily based believe evaluation technique is indeed beneficial in improving the considered assessment of cloud services [3]. Traditional networking devices determine the way to deal with an incoming packet primarily based on its IP destination deal, however, SDN pursues a float-based forwarding approach in which many header fields decide a way to take care of the approaching package. The idea of a centralized network manipulation plane is followed via SDN, and programmability is introduced. This can simplify community control and give the chance to organize protection methods at runtime. In this technique, SDN may respond quickly to malicious traffic and community irregularities [4]. The master hash for each CSP's database must be produced, and it is then kept on the BC. Clients will receive the block header for use in verification. The malicious CSP will be identified when the client checks the master hash values of each CSP since its hash value will be different from the others. As a result, customer data is not altered or destroyed without authorization or detection [5].

VI. PROPOSED METHOD

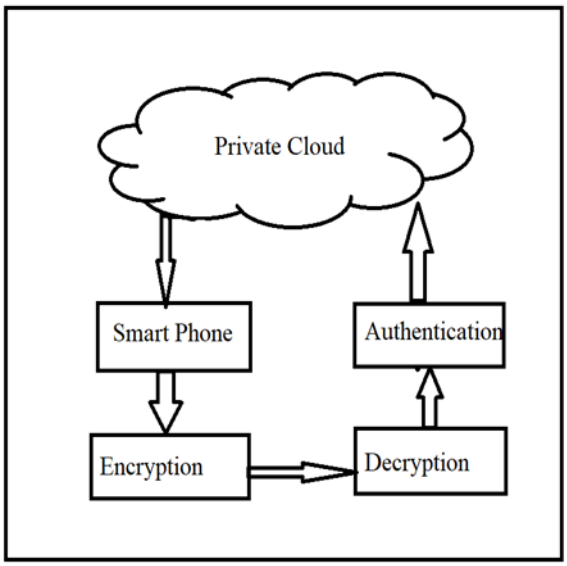

Figure 1: Proposed Method

A handwriting authentication system confirms the user's identification based on his biometric features to ensure secure access to cloud services. An application that serves as a conduit between the cloud and the mobile user is created on the client side. It is used to gather and encrypt biometric information (such as a handwritten password) in preparation for sending it to the cloud. The touch screen of the smartphone is used by the mobile user to enter his password. As a result, in addition to using the right password, the person can also be recognized by his distinctive handwriting. It is vital to encrypt the biometric data before it is delivered to the cloud to guarantee data security and privacy when using cloud services.

A. Pre-processing

The new image should be pre-processed before feature extraction because the input image comprises characters of various sizes and spacing.

B. Features Extraction

This module analyses and extracts the characteristics of handwritten characters for use in training and verification. It is a crucial phase since its efficient operation raises the verification rate and lowers misclassification. Handwritten digits can be used to extract two different sorts of information. Binary digit images are used to derive pixel density information. Each digit image is split into nine identically sized windows. Individual zones are the focus of feature extraction rather than the entire image. As a result, it provides greater details regarding the skeleton of the digits. To create the feature vector, the density of black pixels for each zone is calculated. For the remaining digit images, the same procedure is followed.

C. Classifier Process

The feature extractor's feature vectors are used by the classifier process to confirm the user's identification. Two inputs are needed for this verification: a real text test and an optional claimed human identity. After pre-processing and feature extraction on the written data, the system will compare the real feature values to those in the reference database before returning a result set.

VII. RESULT

The overall classification rate and error rate are the most typical metrics for classifier performance. A case's overall classification rate, also known as the recognition rate, is calculated as the proportion of cases that are correctly classified into all cases. A weighted voting rule and decision-making system achieve a higher recognition rate than a majority voting rule. The primary cause is that the majority vote rule provides all classifiers 329 identical weights without taking performance accuracy differences into account. The results of the overall performance evaluation, implementation evaluation, and validation evaluation from the related works, however. Whereas Figure 2 demonstrates the implementation problems that 94% of the authentication techniques have and shows how practically all authentication strategies fall short of adequately validating and verifying their security claims.

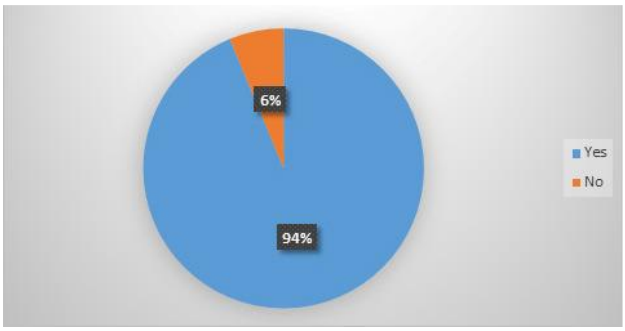

Figure 3: Implementation Analysis

VIII. CONCLUSION

In this contribution, a handwriting authentication device has been introduced. The manner permits comfortable get entry to confined facts in the cloud with the use of a cell telephone. It is composed of pre-processing, characteristic extraction, type, and authentication procedure. The classification procedure is primarily based on 3 one-of-a-kind classification strategies: ANN, KNN, and Euclidean Distance classifier. The classifier set of rules employs a parallel combination of classifiers to obtain first-rate accuracy on both recognition and error charges.

IX. FUTURE SCOPE

The underlined protection uncertainties, assaults, and future directions in existing smartphones and CC authentication frameworks have added a broader view and cognizance of the modern trend within the domain in addition to their practicality for implementation. Finally, this safety evaluation is anticipated to open similar study possibilities as part of future work to deal with the concerns raised in the area of Smartphone and CC authentication frameworks and protocols.

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An Approach Towards Securing Information Using Blockchain & Cloud Services

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Abstract— **Within this last few years Cloud computing emerged an evergreen revolution and biggest transformation in the way of accessing & storing the information in IT sectors , Banking , Businesses & Healthcare. It's consumption and management also promisingly improved cost efficiencies, accelerated innovation, faster time-to-market, and the ability to scale applications on demand. When it comes to storing & accessing the data, primary priority is security & above it how to provide it to such a biggest platform becomes the matter of concern. With this rapidly developing platform both and, conceptually the legal/contractual, economic, service quality, interoperability, privacy issues still pose significant challenges with security. In this paper the main focus is on one of the critical platforms where there is a need of Cloud computing along with blockchain is Healthcare There were many revolutions done based on the data available in healthcare & discussing one of the such model which is going to propose to increase the security with the use Blockchain.**

Keywords—Cloud Services, security ,Data Privacy

I. INTRODUCTION

A . BLOCKCHAIN & HEALTHCARE

Due to pandemic the Healthcare system is overburdened & become one of the complex field to understand the root cause of the disease. Although this health sector is made up of lot of physicians from over more than hundreds of medical specialities and sub-specialities including other practitioners, researchers and patients who face several challenges related to increased fragmentation of patient data. Also there were revolutionary changes in every field & people are focusing more on remote & digitised way of working & accessing the information. Healthcare is also not an exception to this, where the cloud-based electronic health records (EHRs) have gained significant attention to enable remote patient monitoring. Going towards the recent development of Healthcare 4.0 using the components of Internet of Things (IoT) along with cloud computing to access medical operations remotely has gained the researcher's attention from a smart city perspective. This will mainly focus on the Data collection , Data Storing , aggregation, Data transmission, Data processing , Data sharing. Running behind this rapid growth of the data biggest & the most critical challenge is to provide security & privacy to the sensitive information like personal & the medical history of the individual (patient) from the Hackers [1] .To accomplish the bridge for providing security for storage, sharing, and accessing in cloud service provider, several cryptographic algorithms were designed till date. But implementing these algorithms without the help of some parameter is barely impossible. So with the algorithm along with some trusted third party which will give computational efficiency, service side verification, user side verifications with strong security is Blockchain. For data storage, Blockchain is a decentralized node network. It is an excellent technology for protecting confidential data within the system. For exchanging the critical data, this technology is very useful and it also keeps the data secure and confidential.[11] Blockchain technology helps to perform all the sensitive task that need to be performed for the Healthcare such as to preserve and exchange patient data through hospitals, diagnostic laboratories, pharmacy firms, and physicians. Blockchain applications can accurately identify severe mistakes and even dangerous ones in the medical field. For marketers, Blockchain helps to maintain the overview of the products which were used in the medicine because of which the health & pharmaceuticals do not need to perform any counterfeit medications it trace all of these medicines. This helps discover the cause of falsification. Blockchain can guarantee the confidentiality of patient records; when medical history is developed, Blockchain can also store it, and this record cannot be modified.[2]. For Blockchain there wont be any central authority who can control the content added to the blockchain, which is one of the key attribute i.e decentralization. The various protocols with peer to peer network passed the entries on to the blockchain. The another key attribute is persistence. It is practically impossible to delete the entries after being accepted on the blockchain because of its distributed ledger. Blockchains make audit and traceability possible by linking a new block to the previous by including the hash of the latter, and in this way forming a chain of blocks. The transactions in the blocks are formed in a Merkle tree where each leaf value (transaction) can be verified to the known root. This enables the tree structure to verify the integrity of the data by only storing the root of the tree on the[10]. All the attributes of Blockchain helped in Healthcare for maintaining all the critical information. There is a classification of Blockchain networks based on its type, how network members reach consensus and validate transactions or what platforms they run on [23]. For type a blockchain network can be public, private or consortium. A public blockchain is an open blockchain

like Bitcoin [10] or Ethereum [19] that allows anyone to join, and the rules for participating including accompanying source code are public. A consortium blockchain on the other hand runs like a public blockchain but is only accessible to a closed group of approved network members [11]. On the contrary, a private blockchain has centralised ownership and management. Similarly, for other classification which is based on how network members reach consensus on which transaction to validate and add to the blockchain. There were many different consensus algorithms, but they all fall under two broad categories: proof-based or vote-based . Proof-of- Work, Proof-of-Stake, Proof-of-Authority, Proof of- Activity and variants of these are all proof-based

II. RELATED WORK

A. Basic

For Healthcare, the data should be kept in such a way that it will be stored in a mass manner & should be secured from the Hackers .At the same time that data should be accessed at any time & also it can be shared in a remote basis. Blockchain is a perfect combination which will provide all the above with its attributes. As a distributed-ledger-technology (DLT) which is a shared-ledger with a growing ordered list of records stored and persisted in a `giant computer database. This database is formed from several inter-connected devices (phones, computers or embedded systems) not restricted by geography [12]. It does not require network participants to trust one another because it has cryptographically enabled inbuilt trust mechanism [13]. Each entry in this ledger is called a block (composed of messages and transactions) linked and time- stamped through cryptographic hashes [14] and validated by network peers.

B. Detailed Literature on Healthcare & frameworks

Hemant Mahajan [1] , in “Integration of Healthcare 4.0 and blockchain into secure cloud-based electronic health records systems” presented the systematic study of modern blockchain- based solutions for securing medical data with or without cloud computing. They implemented & evaluated the different methods using blockchain . They mention the further research scope, the research gaps, challenges, and future roadmap will be the outcomes of emerging Healthcare 4.0 technology.

F. Tang et.al in "An efficient authentication scheme for blockchain-based electronic health records,” Worked on creating a new EHRs paradigm which can help in dealing with the centralized problem of cloud based EHRs and proposed an identity-based signature scheme with multiple authorities which can resist collusion attack out of N from N −1 authorities. Furthermore, our scheme is provably secure in the random oracle model and has more efficient signing and verification algorithms than all the other existing authentication schemes of blockchain-based EHRs [5]

V. Jaiman deployed the model on Ethereum blockchain and evaluate different data sharing scenarios which consists of the creation of an individual consent model for health data sharing platforms. This model guarantees that individual consent is respected and that all the participants in the data sharing platform are accountable.[6]

Waad Y in A Framework for Securing EHR Management in the Era of Internet of Things proposed the platform which secures and enhances the process of accessing and managing EHR in hospitals databases. Specified the future scope for a safer access control, especially if the patient is not healthy enough to provide the OTP, the framework can be enhanced to grant patients’ access to their specific domains in which both sides will have customized access to the domains. [9]

EMEKA CHUKWU in A Systematic Review of Blockchain in Healthcare: Frameworks, Prototypes, and Implementations proposed a review based on the study of various articles , technical & architectual analysis for Blockchain and explained that how it is useful to solve the trust, security and privacy constraints of traditional EHRs often at significant performance, storage and cost trade-offs.[11]

Yang Yang et.al in Conjunctive Keyword Search With Designated Tester and Timing Enabled Proxy Re-Encryption Function for E-Health Clouds introduced a novel cryptographic primitive named as conjunctive keyword search with designated tester and timing enabled proxy reencryption function (Re-dtPECK), which is a kind of a time-dependent SE scheme. It could enable patients to delegate partial access rights to others to operate search functions over their records in a limited time period. The length of the time period for the delegatee to search and decrypt the delegator's encrypted documents can be controlled.

Jian Shen et. al. in Block Design-Based Key Agreement for Group Data Sharing in Cloud Computing presented a novel block design-based key agreement protocol by taking advantage of the symmetric balanced incomplete block design (SBIBD), that supports multiple participants, which can flexibly extend the number of participants in a cloud environment according to the structure of the block design. Based on the proposed group data sharing model, presented general formulas for generating the common conference key IC for multiple participants. [17]

Rui Guo et.al in An attribute-based encryption scheme with multiple authorities on hierarchical personal health record in cloud presented a personal health record hierarch ciphertext- policy attribute-based encryption scheme with multiple authorities which is used to provide security to hierarchy structure of outsourced data.[20]

Ayush in his "A Comparative study on Securing Electronic Health Records (EHR) in Cloud Computing" [23] explained that for Healthcare , there were certain frameworks which were used to maintain the data such as the Personal Health Record (PHR) framework & EHR (Electronic Health Record). PHR will converts a general clinical history of paper into a web- based electronic record. In this framework, a patient could share, oversee and control his PHR with approved clients, for example, family members, companions and wellbeing care [20]. EHR is a source that focuses on capturing clinical history and treatment of patient health information. These important patient-centered records can be successfully accessed by all authorized medical service providers (research institutes, authorities etc.) [21]. The method empowers an individual to collect, store, oversee, and share his state of being information inescapably. But with the advantages of these PHR systems there are so many flaws related to security. To keep this data secure After applying different techniques, the data on the cloud is now much more secure different cryptographic techniques are used to encrypt the data.

ZHEN PANG et.al in Electronic Health Records Sharing Model Based on Blockchain With Checkable State PBFT Consensus Algorithm proposed a patient-controlled EHRs sharing scheme which is based on cloud computing collaborating blockchain technology. In this the medical abstract and the access strategy are stored in the blockchain to avoid being tampered with. To achieve the fine-grained access control, we propose the attribute-based encryption scheme and multi-keyword encryption scheme to encrypt EHRs. Their experimental results show that their proposed sc-PBFT algorithm has better handling capability and lower consensus latency. Compared with the PBFT algorithm in the case of Byzantine nodes, sc-PBFT not only improves the robustness of the consortium blockchain network but also improves the handling capability. This proposed scheme stores data on-chain and offchain, which can ensure the authenticity and integrity of the shared data.[24]

C. Outcomes

There were several algorithms for Blockchain using which the things can be proposed to get the more security , privacy & accessibility than the existing algorithms. there is still additional work to improve the proposed consensus algorithms. Although the existing algorithm is able to capture and isolate the Byzantine nodes, it needs to restart the consortium blockchain network when deleting the consensus nodes in the information center.[24]. There is still scope to optimize the consortium blockchain network by which system can improve the ability to dynamically add or delete the consensus node. For imposing this need to attempt to use the zero-knowledge proof and homomorphic encryption, etc., to encrypt the identity and EHR of the patient. The main challenge is to keep the identification accurate in the digital health space for the health institutions , providers & the uses.Trust is the main concern as a part of security but Blockchain proved that there won't be any trust problem. Based on the way the data to be maintained there were several consensus mechanism which Blockchain follows , it is based on the way the data entries are accepted onto the distributed ledger by a distributed consensus protocol validating the data entries. These are as follows : Proof-of-Work (PoW) is the consensus protocol most strongly associated with blockchain due to its integration in Bitcoin. With Proof of Stake (PoS), the selection of an approving node is determined by the stake each node has in the blockchain. with blockchain due to its integration in Bitcoin. Practical Byzantine Fault Tolerance (PBFT) is based on a Byzantine agreement protocol. In PBFT, all nodes need to be known to the network, which limits the usage of this consensus protocol in a public blockchain.

III. GENERAL SOURCES FOR DATA COLLECTION IN CLOUD APART FROM HEALTHCARE

According to Secure Overlay Cloud Storage[5] with Access Control and Assured Deletion implement FADE , a secure overlay cloud storage system that achieves fine-grained, policy-based access control and file assured deletion. It associates outsourced files with file access policies, and assuredly deletes files to make them unrecoverable to anyone upon revocations of file access policies. To achieve such security goals, FADE is built upon a set of cryptographic key operations that are self-maintained by a quorum of key managers that are independent of third-party clouds. Current research on cloud security is still in the early stages, and no universal model or set of techniques has yet emerged. Methods include segregating user resources during data processing to prevent widespread virus in fiction, the use of a third-party auditor to verify the integrity of data stored in the cloud[8][9] and access control based on data attributes and semantics[6][7] Some trust management experts recommend applying multiple security policies to authenticate users, manage identities, and protect data from unauthorized users. Amazon administrators, for example, log and routinely audit any access to customers' data or operating systems.[7]Each of these research efforts aims to develop a security solution for a specific threat, yet such methods are incompatible with cloud services, which sometimes have vastly different security requirements. Some services involve public information that needs only basic security. Many researchers have investigated cloud computing security. In the ticketing system and tracking of the status of the reserved ticketing, but it creates a number of Problems related to this newly implemented system, this paper is regarding the solutions of the Problems related in consumption of time during the Ticketing Process in Indian Railways and the mode of payment other than the specified by the Indian Railways while taking ticket from their Ticketing.The data from Gmail blog , this is a official site that provide the

information about the Gmail services . As we all know that the facilities provide by the Gmail these are Gmail account , Gmail apps is a Google Apps is a suite of communication and collaboration tools, including Gmail, Google Calendar, and Google Docs. For the security the Gmail is provide the custom signature services in this services Email signatures are automatically inserted at the bottom of every message you send, and can be a great place to add your title, contact information, and even the latest news from your company. Just go to Settings at the top of your inbox and enter your signature text in the box at the bottom. Another facilities is provide by the Gmail is manage the multiple account If you're like a lot of business owners, you probably regularly receive email in several different accounts. By centralizing your correspondence in Gmail, you'll be able to keep track of it all more easily. Embrace labels. Folders are familiar, especially when it comes to work email. If you want to organize your emails in a similar way, make sure you're using Gmail labels. Combined with filters, they can be a powerful tool to manage your mail. Create labels for projects, vendors, customers, weekly reports, launches, to-do's -- the list goes on. You can also add custom colors to your labels, order them based on priority, and search the contents of specific labels. And don't forget that you can drag messages into labels, just like you can with folders. Use offline Gmail anytime you're not online. Despite having Internet access almost everywhere, work may take you to places where you just can't get online. Turn on offline Gmail from the Offline tab under Settings, and Gmail will download a local cache of your mail which synchronizes with Gmail's servers while you're connected. When you lose connectivity, Gmail automatically switches to offline mode, so you can continue to work, and your replies are automatically sent the next time Gmail detects a connection. Create canned responses and quickly reply to common questions. When it comes to emailing at work, you're probably used to sending out weekly reports, or answering the same questions from customers or colleagues multiple times. That's where canned responses can save precious time: turn on this feature in Gmail Labs, compose your response once, save it, then use it over and over again.

IV. CONCLUSION

Getting the data anytime anywhere is only became possible due to various cloud services available. To access this data remotely without getting hacked is a biggest challenge. These are various domains like IT , Banking ,Businesses & Healthcare which have the huge amount of data generated everyday. But this paper focuses on the Healthcare along with the few general sources to get the data.Healthcare is a very sensitive domain to work with the information Keeping that information safe is the biggest challenge & Blockchain along with various cloud services will be able to main it to some extent .As the data is growing with the fastest rate there should be a provision to dynamically add or delete consensus nodes in the information centre. So to achieve this the different algorithms can be used to get the data encrypted for the identity & Electronic health record of the patient.

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Smart Waste Detection Using Different Sensors

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Abstract: **This waste management is one of the serious challenges facing cities, and the systems currently in use in cities continue to use old and outdated paradigms that no longer serve local governments. Overflowing trash cans are still found, and emit a pungent odor, causing serious health problems and air pollution. Sensor Based Smart waste management system is used to identify the status of waste and bins and detect the percentage of waste using ultrasonic sensors and it will also be able to segregate the waste into categories of Hazardous and Non-Hazardous waste using Gas sensors and Proximity sensors. The Smart Waste Management System uses a web application and a mobile phone to simplify the solid waste and water waste inspection process, as well as the management system throughout the collection process of this presentation. The proposed system is based on GPS. The proposed device and implementation track Garbage Depot and monitors vehicle garbage trucks.**

Keywords: Smart waste management, sensors, GPS-based, E-waste

I. INTRODUCTION

Garbage endangers the environment and human health. Trash that accumulates in sewers can cause flooding, while its toxic emissions can pollute groundwater and air. Garbage produces gases such as hydrogen sulfide (H2S), methane (CH4), and ammonia (NH3), causing breathing problems such as shortness of breath, chest tightness, morning sputum, morning cough, and chronic cough. May cause organ disease. Toxic gases can also cause other health problems as they are taken from the lungs to other parts of the body.

Today's waste management system involves a large number of employees dedicated to a specific number of bins. This is done regularly every day. Such management can make the whole system inefficient, creating a situation where some bins are overflowing with bins and many other bins are left unfilled. This is caused by fluctuations in city population density and other random factors that make it impossible to identify trash bins that need immediate attention.

The introduction of sensor-based bins is a highly effective system for controlling waste management in cities. An ultrasonic sensor is embedded in the top of the trash can, and the ultrasonic sensor is used to measure the distance. This allows you to measure the amount of trash in your trash can.

Alert is sent to the appropriate personnel when a certain number of bins fills past the threshold. Proposed an efficient garbage collection system in smart city, using smart bins and Android apps for garbage monitoring to manage the whole system, optimal optimization based on multiple parameters for truck drivers Smart Garbage Collection, and Creation GUI that other users can use. The smart trash can uses the node MCU and ultrasonic sensor to monitor the trash level in the trash can and upload the data to the server in real time. Using the shortest path algorithm, the Driver finds the optimized path/route used to empty the bin given the level of waste in the bin.

II. BACKGROUND

Waste disposal systems are facing many problems as population growth has significantly degraded sanitary and sanitary conditions in the region. All trash and spilled trash not only affect this particular area but also spread to surrounding areas. malaria, dengue fever, cholera, diarrhea, etc. in all his neighborhoods can lead to a number of serious diseases. The existing garbage collection system is inefficient due to factors such as delayed garbage collection, excess garbage spilled from the trash, inefficient garbage collection and disposal, lack of budget, and lack of resources. Removing or reducing litter and maintaining cleanliness requires a smart litter collection system. The system proposes intelligent garbage collection with a smart trash can and shortest path algorithm. This system uses sensors to check the level of trash in bins. The garbage truck driver is then notified that the garbage can is full and the route that the garbage truck needs to travel.

III. WORKING OF THE SYSTEM

This proposed system monitors trash bins in real time. The ultrasonic sensor detects the amount of trash in the system, the gas sensor detects if there is combustible material in the trash, the proximity sensor detects all metals and non-metals in the trash, this data is will be Uploaded to the Firebase cloud using a Node MCU with an integrated Wi-Fi module. Trash becomes the active node when the threshold is reached. A network is formed when a certain number of bins become active nodes. The system then applies route optimization to provide drivers with optimized routes and garbage collection. This reduces overall time, fuel and costs

IV. IMPLEMENTATION

1. Smart Bins - Bins are connected to multiple sensors and can report bin status to the garbage collector. On the admin side, bin data is collected from the cloud database and the cloud. - Database is available.

2. GPRS Vehicle Tracking - Garbage trucks can be tracked using GPS modules and RFID tags. When the vehicle reaches the location with the designated trash can, it reads the transmitted vehicle and trash RFID tags.and will give the current status to cloud Also, from the cloud, data is pushed to the user's app and the admin's dashboard.

3. Android App - The Android App acts as a bridge between the user and the municipality's cooperation partners. It may offer features such as:

B. The daily activity of a clean society, chasing garbage trucks. Users can also interact with members of the community and express their opinions on topics.

It consists of a sensor device that periodically sends readings from a sensor to a web server through a mobile router. Data received by the web server is stored in the database. Users can then view the data using a laptop or mobile device . Our sensor consists of three gas sensors. H. MQ-136 detects the presence of hydrogen sulfide (H2S), MQ-137 detects the presence of ammonia (NH3) and TGS-2611 detects methane (CH4). These sensors are wired to the Arduino Uno. Sensor readings are sent wirelessly to a web server using the WiFi module of the NodeMCU ESP8266 connected to the Arduino Uno via serial connection. Both the Arduino Uno and NodeMCU are battery powered.

V. CONCLUSION

The proposedsystem has an intelligent trashcan that constantly monitors the level of trash and sends it along with the type of trash to a cloud server, where each trash can is uniquely identified. The main component used in these smart bins is the Node MCU. This is not only readily available and cheap, it facilitates us with a built-in Wi-Fi module. It uses ultrasonic sensors to calculate thelevel of wastein the bin, and gas and proximity sensors to detect hazardous waste types and transmit them through the node MCU. Uses cloud technology to store real-timemonitored trash data. Android Application provides an optimized garbage collection route to the driver. Additionally, the fill level of the trash can is monitored n real- time. On submission, this trash only eds to be emptied whenthe trash level in the trashreaches the threshold and becomes the active node A network is formed when a certain number of nodes are active. The Web Application is responsible for overall control of the system and presents the Graphical User Interface (GUI) to the drivers.. Thus, easy data transfer is provided. The location coordinates of the trash cans are displayed on the map andafter the trash can is activated the route is determined and he is shown to the truck driver. This route is optimized by taking into account parameters such as roads, traffic, fuel consumptioand n, the capacity of trash cans and trucks.

VI. FUTURE SCOPE

The main goal of this project is to reduce manpower and labor costs, along with advancing the smart city vision. We often see rubbish spilling out of bins onto Street, and this was a problem that needed immediate attention.

Intelligent trash can help reduce pollution. Garbage bins are often overcrowded and many animals, such as dogs and rats, invade or near them.

This creates a bad scene. In addition, birds are trying to remove litter from garbage bins. This project can avoid such situations. Also, messages can be sent directly to the sweeper instead of the contractor's office.

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Performance Analysis of Diffusion Model for Cloud Removal in Satellite Imagery

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Abstract— **Remote sensing satellite images provide vital information for a plethora of applications including environmental monitoring, agriculture, urban planning, and resource management. However, the satellite images often suffer from missing information due to unfavorable weather conditions like heavy cloud cover and cloud shadows, rendering the data unusable. Hence, it becomes necessary to fill in the missing information by removing the dense clouds and cloud shadows in the image. The paper suggests utilizing Diffusion Models for satellite image reconstruction as a generative technique. The clouds from satellite images are removed by a mask and the removed regions are generated using unconditional Denoising Diffusion Probabilistic Model (DDPM) based inpainting approach. We compared the performance of the proposed method with other deep learning-based methods and achieved almost same results.**

Keywords— cloud removal, diffusion model, DDPM, cloud, image reconstruction, satellite imagery, image processing

I. INTRODUCTION

The acquisition of data for monitoring in a range of disciplines, which includes the identification of structures, the mapping of crops, and the detection of changes in land cover, depends heavily on remote sensing. Satellite images are also essential for keeping an eye on the earth's surface. Since these images are crucial for tracking mineral resources, forests, floods, droughts, urban planning, land surface, sea temperature, and other phenomena, they also have been widely employed in a wide range of fields, including environmental research, national defence, security, and weather monitoring. Approximately 67% of the Earth's surface is covered by clouds, as reported by Moderate Resolution Imaging (MODIS). Therefore, cloud elimination methods are being contemplated to address any unwanted issues that may arise in optical remote sensing. Unfortunately, this remote sensing data acquired from the satellite sensors suffers from missing information due to faulty satellite sensors or bad environmental conditions. Problems occur like images with cloud cover, shadows, etc. And solving these problems often requires multitemporal data or other pairs of data. Removing clouds from satellite images is a pervasive problem because clouds frequently obscure the surface and make it difficult to analyse satellite data. By identifying the cloud pixels in the image and substituting them out for clear pixels from other images that were either shot at a different time or from different sources, the cloud can be removed from the image. Both human and automatic techniques can be used to accomplish this problem. The majority of the time, the manual approaches entail manually modifying the cloud pixels as well as visual image inspection. On the other hand, automated techniques employ algorithms to recognise and eliminate the cloud pixels. The strategies used in automated cloud removal may be based on statistical or machine learning methods and may include thresholding, morphological procedures, or deep learning techniques. Depending on the quality and resolution of the satellite data, the complexity of the cloud structures, and the method used, the accuracy and efficacy of cloud removal can differ.

The aim of this work is to reconstruct the missing data in the satellite images due to cloud covering. We are not detecting the clouded regions but only reconstructing the missing areas when the clouded pixels are removed using masks. When viewing this issue more broadly, it may also be seen as a form of image inpainting where the clouded parts represent the areas that need to be eliminated. Many people have put out their own solutions for this issue in recent years, including deep learning and conventional image processing techniques. Based on extensive research and previous works, we used diffusion models approach as this is relatively new and has become very popular in recent times as compared to other deep generative models.

II. RELATED WORK

There are two types of techniques for reconstructing data currently available: conventional image processing approaches and deep learning techniques. Traditional image processing methods mainly utilize the basic characteristics of the image, but the models designed for this method often have restricted capability. With the advancement in computing power, deep neural networks have made significant strides in computer vision activities, such as image restoration, image denoising and image super-resolution reconstruction. A few scholars have attempted to apply deep learning methods to resolve the issue. Researchers in [1] built their model using two GANs. The first individual to recognise the intricate structures in SAR photos was trained using large datasets. The second method is employed to eliminate clouds while preserving the standard of areas that are cloud-free. They recommended dilated residual inception blocks (DRIBs) for generators based on dilated convolutions to

improve receptive view and prevent the missing information in satellite images.

Paper [2] proposed a texture complexity-guided sample generation technique that can produce training examples on its own with a balanced distribution of difficulty. The researchers investigated an SPL approach that could train a comprehensive network for cloud elimination across a variety of complexities by intelligently sorting training examples from the simplest to the most challenging. The experimental results indicate that when the size of the cloud is excessively large, the suggested method generates exceedingly impractical content. This is problematic as the cloud-affected region is too extensive to provide enough data for cloud removal.

A novel additive imaging model-based framework for thin cloud removal is proposed for multispectral remote sensing pictures [3]. U-Net has been used to obtain precise data on thin clouds. Slope-Net, a brand-new CNN architecture, is also planned. They proposed a novel thin cloud simulation method for training U-Net and Slope-Net. Compared to other thin cloud removal approaches, the suggested technique will result in cumulative estimation inaccuracy. Because the two kinds of cloudy photos are not totally consistent with one another, the results of eliminating thin clouds from real cloudy photographs are worse than those produced by removing thin clouds from simulated cloudy images.

Paper [4] cloud removal process has two stages. Cloud segmentation, which entails directly extracting the thick clouds using U-Net and segmenting the clouds, is the preliminary stage. The second part of the process is image restoration, which involves eliminating the dense cloud and reconstructing the irregularly missing regions that correlate to it using a generative adversarial network (GAN). When a sizable portion of an image is missing, the suggested method cannot reconstruct it with high accuracy. Another limitation of the two-stage approach is that the generator could provide erroneous images to fill in the gaps when the ratio of thick clouds is large.

Deep learning-based cloud removal technique for a multitemporal ZY-3 satellite image is described in paper [5]. The CNN architectures are made to both identify and get rid of clouds at the same time. The proposed approach cannot be used in scenarios where the land cover may vary dramatically.

In summary, even though there have been few other deep learning solutions for this problem, they have yet to apply a diffusion model approach for this problem, and depending on how it is implemented it can even perform better than previous models.

A. Diffusion Models

Diffusion models are based on non-equilibrium thermodynamics and employ a series of random diffusion steps in a Markov chain to introduce noise to data. The objective is to train the model to comprehend how to invert the diffusion procedure and construct preferred data samples from the noise. The DDPM is a generative model that learns the distribution of images in a training set, similar to other generative models. The procedure for generating new images involves selecting a random noise vector and gradually reducing the noise to arrive at a high-quality output image. In summary, diffusion models are neural networks that are trained to predict slightly less noisy images from a noisy input. At inference, they can be used to iteratively transform a random noise to generate an image.Generative models, such as GANs, VAEs, and flow-based models, have demonstrated significant success in producing high-quality samples, but each model has its own limitations. GANs are infamous for their potential for unstable training and limited diversity during generation due to their adversarial approach. VAEs use a surrogate loss function. Flow models require specialized architectures for reversible transformations. Diffusion models employ set methods during training and have a high-dimensional latent variable that matches the original data. There has been a surge in research into diffusion models in recent years, leading to them producing state-of-the-art image quality. Additionally, diffusion models don't require adversarial training like GANs. Although they may be more computationally demanding compared to other deep learning architectures, they outperform them in specific applications [8].

III. METHODOLOGY

This paper explores a new generative approach for removing clouds from satellite images and filling in the missing information through inpainting. A growing alternative to generative modelling, Denoising Diffusion Probabilistic Models (DDPM), are used in the process [6]. Recent research has demonstrated that diffusion models can even surpass the most advanced GAN-based image generation technique [8]. By reversing the diffusion process we train the diffusion model, beginning with a random noise sample and undergoing a specified number of iterations to produce the final image. DDPMs have shown they can produce a variety of excellent photographs despite being based on principled probabilistic modelling [6, 7, 8].

Our method employs an unconditional image generation DDPM in the same way as paper [9]. Rather than acquiring a mask-based generative model, we adapt the sampling procedure throughout the reverse diffusion iterations to condition the generation process. As a result, our model is not directly trained for the purpose of eliminating clouds. Nevertheless, with the alterations we make to the denoising procedure, we can employ it to address that problem. But for this we still need an unconditional image generation diffusion model which can generate satellite images from random noise. For this we use a pre-trained model which generates random bedroom images and fine-tune it on our dataset to

generate satellite images. This has an important advantage that we can use existing powerful DDPM which has been trained prior and reduce our training time as well as data required for training. We have implemented an enhanced denoising method that re-samples iterations to improve the conditioning of the image [9]. This technique enables the network to effectively integrate the generated image data of the cloud-covered regions throughout the entire inference process, resulting in better conditioning based on the available satellite image data. Since the original DDPM network remains unaltered, the model produces high-quality output for the generated area.

IV. IMPLEMENTATION

A. Dataset Details

We have used the cloud removal dataset from the paper [10]. It consists of two datasets: one that pairs a single cloudy image with a single clear image (singleImage, 97640 images), and the other that pairs three cloudy photos with a single clear image (multipleImage, 3130 images). We are not using the IR image and are instead using the singleImage dataset. The pictures have RGB channels with a size of 256x256px.

B. Model

We use the pretrained diffusion model which uses a UNet architecture from [7] which was trained on 256x256px LSUN Bedrooms class to generate unconditional images of bedroom. As we are only updating the weights during training the architecture of the model remains the same.

C. Training

For the fine-tuning of the model, we only need the clear satellite images without clouds as we need the model to generate clear satellite pixels without cloud for the inpainting part. The model takes a timestep t (random number during training) which determines the amount of noise in an image and a noisy image xt (generated by adding some noise in the clear image x0 based on t) then predicts the noise to be removed from the initial noisy image to give clear satellite image. The sampling part which does the image generation from predicted noise does not need to be trained and this part also does the inpainting of the clouded pixels.

D. Sampling

In the sampling part a mask of cloudy regions is used as a condition in the method to forecast missing pixels in the clouded portions of satellite images. As cloud segmentation is not the main aim of this paper we create the mask by simply doing the grayscale of the cloudy image and converting it to mask and inverting the mask to remove regions containing cloud pixels. This method does not give proper mask, but it is good enough to use in the sampling process to give a good result. To produce the removed regions, we are utilizing our trained unconditional denoising diffusion probabilistic model that makes use of the context of the known region during the sampling phase.

As the DDPM is trained to generate images resembling satellite images, it inherently strives to create structures that are coherent and consistent. We use this DDPM property to harmonize the input of the model to generate the regions which better harmonize with the satellite image. The sampling process is illustrated in Figure 1. The cloudy regions are removed using the generated mask which is later merged with cloud-free regions generated from model. Then we diffuse the output x_{t-1} (merged cloud-free image) back to x_t (image with t noise) by sampling from the model. Although this operation scales back the output and adds noise, some information incorporated in the generated region x_{t-1} is still preserved in x_t. It leads to a new x_t which is both more harmonized with x (input image) and contains conditional information from it. This resampling also increases the runtime of the reverse diffusion but as a result the generated region matches the neighbouring region and semantically correct.

E. Metrics

We quantitatively evaluated the performance of method using structural similarity (SSIM) and peak signal-to-noise ratio (PSNR) for pixel-level similarity between original clear image and cloud removed image. The PSNR computes the peak signal-to-noise ratio, between two images. The PSNR ratio is utilized to evaluate the quality of an image by comparing the original and reconstructed version. A higher PSNR value indicates a better quality of the reconstructed image. On the other hand, the SSIM is a perceptual metric that measures the degradation in image quality by evaluating the perceptual difference between two similar images. Unlike PSNR, SSIM is based on visible structures in the image. The SSIM metric has a range from 0 to 1, where a value of 1 signifies that the reconstructed image matches the original image perfectly. These scores are then compared to some of the previous works using different approaches.

V. RESULT AND DISCUSSION

Example results of our method is shown in the Figure 2. The images obtained can be seen to be almost same as the original cloud-free image. Although some of the generated regions seem to be different from the original clear image this is because no supplementary images were used to produce those regions unlike some of the previous works, so the region is randomly generated. This is not a problem if the cloudy regions are small but if there is cloud covering almost half of the region then the cloud-free image generated will be completely different from the ground truth image. The mask generation can also be improved to better detect the cloud pixels for proper removal of those regions.

We compared our PSNR and SSIM score with other deep learning-based models [2, 3, 4] in Table I. The PSNR of our method is 30.2501 and SSIM is 0.9153. When compared to other methods, our score is not the best, but it is still very good and can be further improved. This may be due to not using a supplementary image to get information for generating the missing regions as we are generating those randomly. The other reason may also be because the cloudy and clear images have problems such as time difference, light changes, and atmospheric disturbances. This results in lower score for pixelwise metrics as the image generated from cloud removal also have the same problem as original cloudy image. Our method can also automatically deal with dead pixels and deadlines in satellite images because of how the diffusion model works. It is currently challenging to utilize the DDPM optimization process for real-time applications because it is much slower than other methods. However, diffusion models have become popular, and new techniques have been developed to improve its efficiency.

Table I. Quantitative Evaluation Comparison

Methods	PSNR	SSIM
Method [3] (Thin Cloud)	34.2562	0.9832
Method [4]	20.1	0.807
Method [2]	30.4864	0.9351
Proposed	**30.2501**	**0.9153**

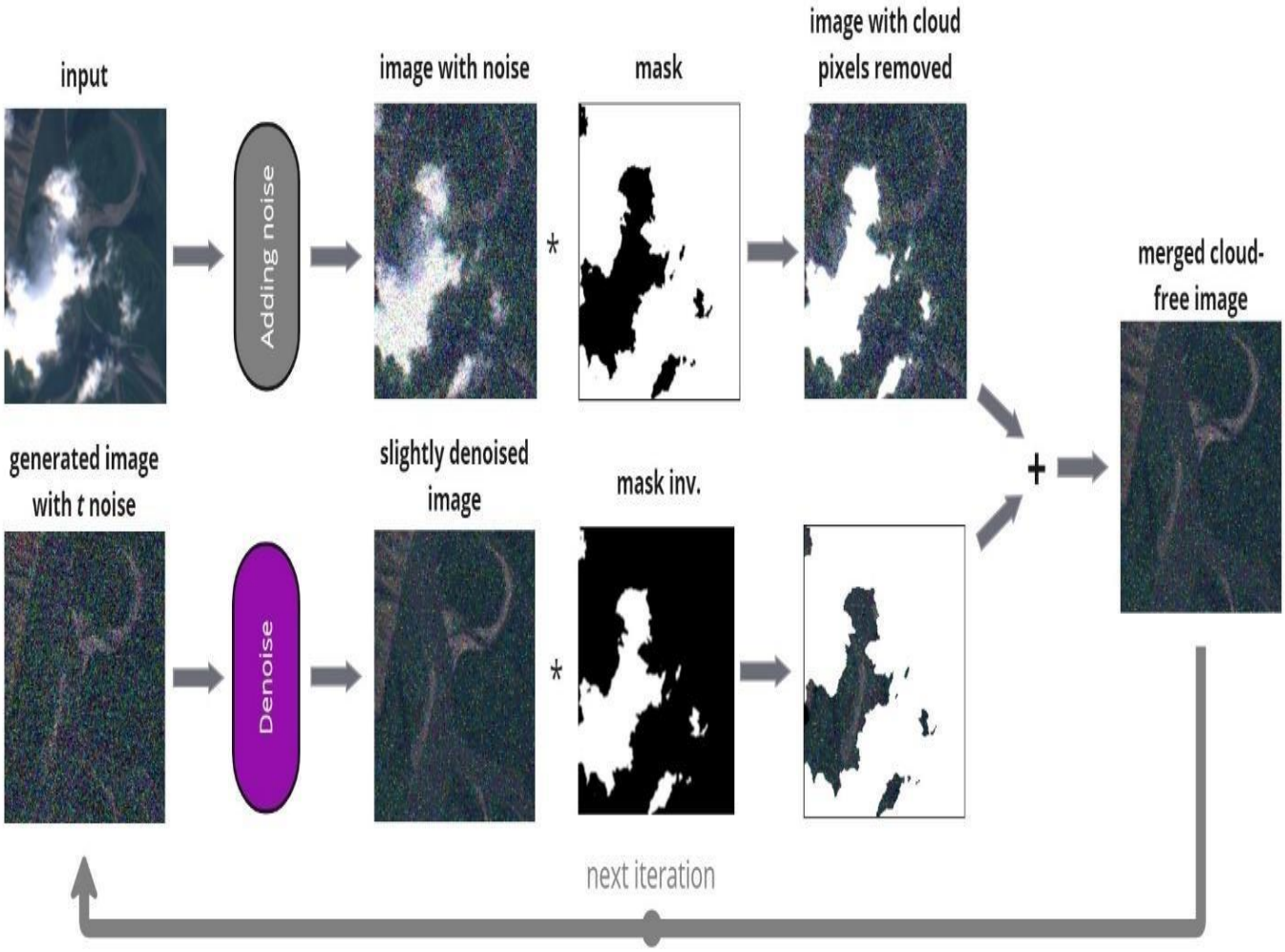

Fig. 1. Overview of Sampling process. Every few step, we merge the cloud-free region of the input and the inpainted part from the DDPM output (bottom) to create a cloud-free image.

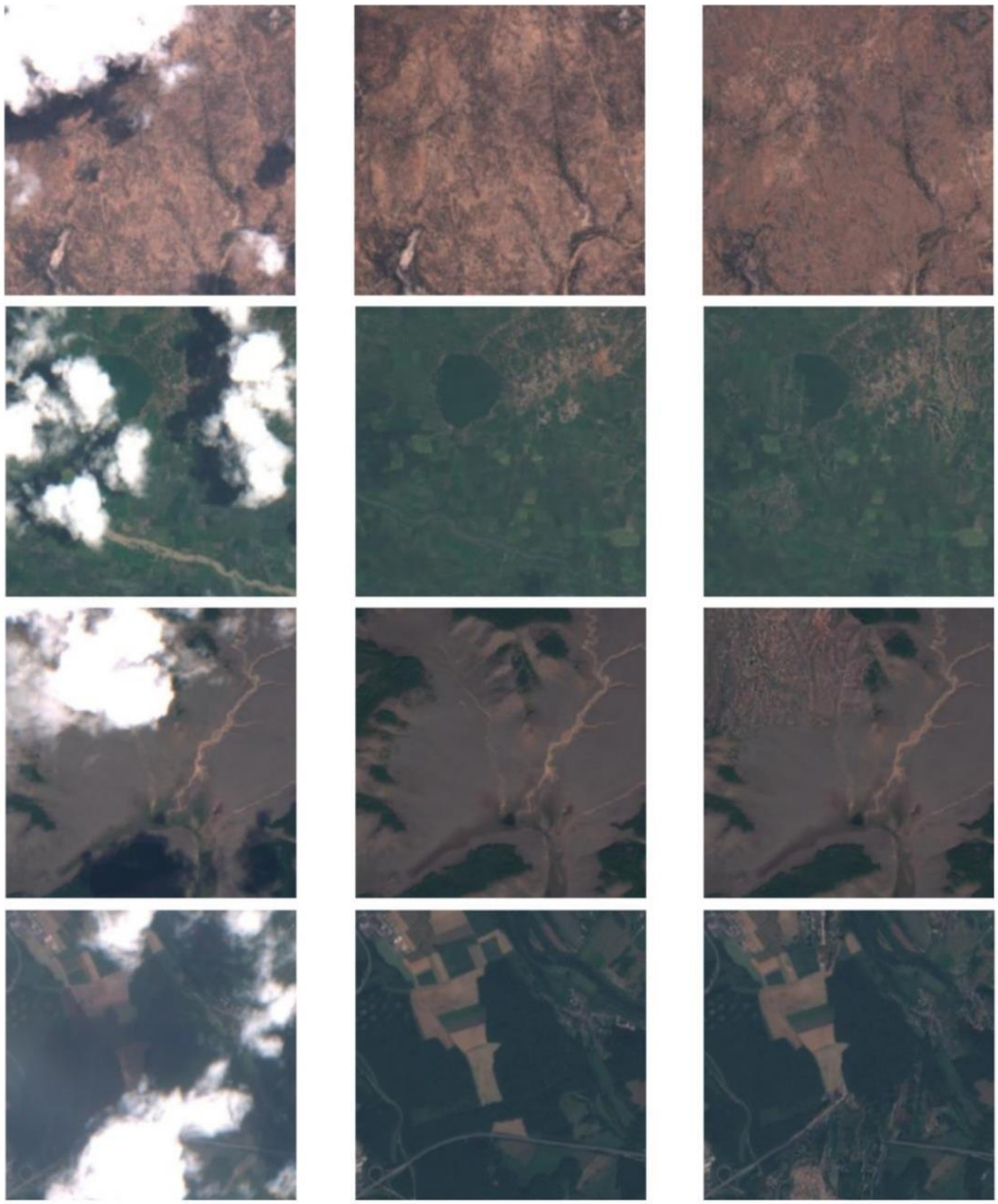

Fig. 2. Results of our cloud removal method. Columns from (left) to (right) show the original cloudy image, original cloud-free image and the cloud removed image from our method.

VI. CONCLUSION

In this paper, we have presented a novel approach of using diffusion models for reconstruction of missing data in satellite imagery due to cloud covering i.e., to remove clouded regions from satellite images. It is the most recent and popular approach towards image synthesis and never been used before for this problem. We can achieve same or better sample outputs compared to other methods. The proposed method only needs the cloudy image and mask of cloud regions to give cloud-free images. The results show that although the method performs well even for thick cloud removal, the output image is still a bit different from the ground truth image. The proposed method generates completely different region when the cloud-corrupted area is too large. Thus, for large cloud coverage there is a need to use another paired data which can provide sufficient information for the generation of the region.

VII. FUTURE SCOPE

The entire process can be better optimized with all the new techniques coming out recently for diffusion models and to note that we have used simple DDPM instead of the newer models which produce even better results with less time and processing. The reconstruction model can be utilized for data pre-processing and augmentation for various satellite image applications. The diffusion models

can be used in the missing data reconstruction of infrared and other types of satellite images, which is similar to proposed methodology. Data compression and image synthesis and reconstruction may potentially benefit from the diffusion model.

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CO_2 Emission Forecasting Using Sarima Model

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Abstract— The Time series is a collection of data points that are collected at constant time intervals. It is a dynamic or time dependent problem with or without increasing or decreasing trend, seasonality. Time series modeling is a powerful method to describe and extract information from time-based data and help to make informed decisions about future outcomes. This project explores how to retrieve csv times series dataset, visualizing time series dataset, how to transform dataset into times series, testing if the time series is stationary or not using graphical and Dickey- Fuller test statistic methods, how to transform time series to stationary, how to find optimal parameters to build seasonal Autoregressive Integrated Moving Average (SARIMA) model using grid search method, diagnosing time series prediction, validating the predictive power, forecasting 10 year future CO2 emission from power generation using natural gas.

Keywords: SARIMA, ARIMA, time series, emission, seasonality

I. INTRODUCTION

As a greater amount of Environmental change has been one of the top issues on worldwide politicalplans lately for an Earth-wide temperature boost. An unnatural weather change is perhaps of the most holding and convoluted issue confronting the world. It is by and large brought about by ozone harming substance - chiefly CO2 outflow in the climate. Carbon dioxide (CO2) is one of the Green House Gases (GHGs), for the most part begins from human exercises and is accessible in enormous amount in the environment that causes worldwide natural issue and climate change (IPCC, 2014). India is an emerging country on the planet and its quick monetary development has prompted high expansion in GHGs discharge. The central point liable for CO2 outflow in India are nuclear energy plant, deforestation, business and private structures, transportation, concrete and steel industry and so on. (IEA, 2010). Gauge of CO2 outflows has turned into an overall worry as the GHG demonstrated to contribute most effects on ecological issues. Determining CO2 outflows is likewise one significant key to make mindfulness among public on the most proficient method to take care of natural issues. Understanding India's previous CO2 discharge way and make a solid forecast of its future emission is fundamental. This exploration tries to display and gauge CO2 emanations in India utilizing ARIMA models.

II. LITERATURE SURVEY

According to the literature, three techniques were used often to forecast time series data.According to Elshaboury, N., Mohammed Abdelkader, E., Al-Sakkaf, A., and Alfalah[1], the PSO-trained ANN model beats the conventional ANN model.The ANN-PSO model may thus be acknowledged as a trustworthy model for predicting MSW amounts in Poland based on social and economic factors.J.K. Solano-Meza and others .[2] To anticipate the production of solid waste, three alternative prediction algorithms were used.The first step in the process was to investigate how to utilise decision trees of various depths to demonstrate the usefulness of this tool for conducting a comparative study. Given the likelihood of generating adequate results with this tool owing to the restricted quantity of data, vector support machines were also created to generate regression models based on local radial functions, employing points (support vectors) in a particular neighbourhood as a supplementary alternative. Finally, neural network-based techniques were used to project the points' trajectories. A conclusion that SVM is the approach with the best behaviour in terms of the local trend of the points and assuming a high reliability in the recorded values can be drawn on the basis of this quantitative data. Noha EL KHATTABI, Zouhair EL HADRI, and Ismail BOULAHNA [3] Given that the SARIMA parameters (p, q, P, and Q) are chosen based on autocorrelation of Xt to its previous values, the resultant model allows us to claim that the monthly trash production in the city relies on that of the previous month as well as in the same month of the previous season.

III. OBJECTIVE

The principal objective of this framework is to foresee whether an individual or an administration body will actually want to foresee the carbon dioxide emanation on certain boundaries that sounds taken as information, truly. Further, if potential, we might attempt to test a couple of other AI models as well, so then we would have the option to concentrate on how different models fill in when contrasted with the ones we are utilizing.

IV. RELATED WORK

As per addressed measurements, the emanation of this gas is in an unacceptable level that jeopardizes ecological circumstances as one of the significant components to accomplish supportable turn of events. In this way, staying with responsibilities related on peaceful accords and local participation for public arrangements on manageability issues and accomplishing objectives like expanding worth of life quality, have changed over climate as one of the significant parts on connection to full scale approaches presently which different exercises areaffected. Thus, concentrating on the expectation

ofCO2 discharges is fundamental for legitimate preparation to accomplish monetary targets andstrategies for progressing development andpractical turn of events.

V. TEST STATIONARY

Initially, we need to produce a plot of the time series dataset. From the plot, we will get an idea about the overall trend and seasonality of the series. Later, we will use a statistical method to assess the trend and seasonality of the dataset. After trend and seasonality are assessed, if they are present in the dataset, we need to remove them from the series and convert non-stationary dataset to stationary dataset. A stationarity time series is one who's properties do not depend o the time at which the series is observed, thus, time series with trends or with seasonalities are not stationary as it affects the value of the time series at different time. A stationarity time series has constant variants and it always returns to long run mean. When forecasting or predicting the future, most time series models assume that each point is independent of one another because stationarityhas a tremendous influence on how data is perceived and predicted. A trend stationary process is not strictly stationary, but can easily be transformed into a stationary process by removing the underlying trend, which is solely a function of time. Similarly, processes with one or more unit roots can be made stationary through differencing. An important type of non-stationary process that does not include a trend-like behaviour is a cyclo-stationary process, which is a stochastic process that varies cyclically with time.

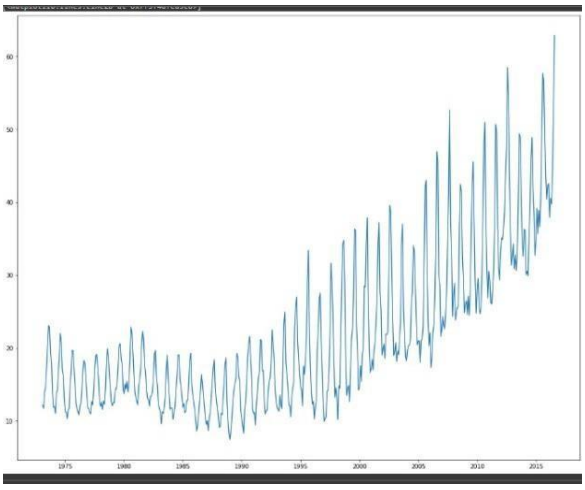

Fig. 5.1 Trend showing that data is not stationary

TEST STATIONERY USING DICKY-FULLER

A formal way of testing stationarity of a dataset is using plotting the moving average or moving variance and see if the series mean and variance varies with time. This approach will be handled by the TestStationaryPlot() method. The second way to test stationarity is to use the statistical test (the Dickey-Fuller Test). The null hypothesis for the test is that the time series is non-stationary. The test results compare a Test Statistic and Critical Values (cutoff value) at different confidence levels. If the 'Test Statistic' is less than the 'Critical Value', we can reject the null hypothesis and say that the series is stationary.

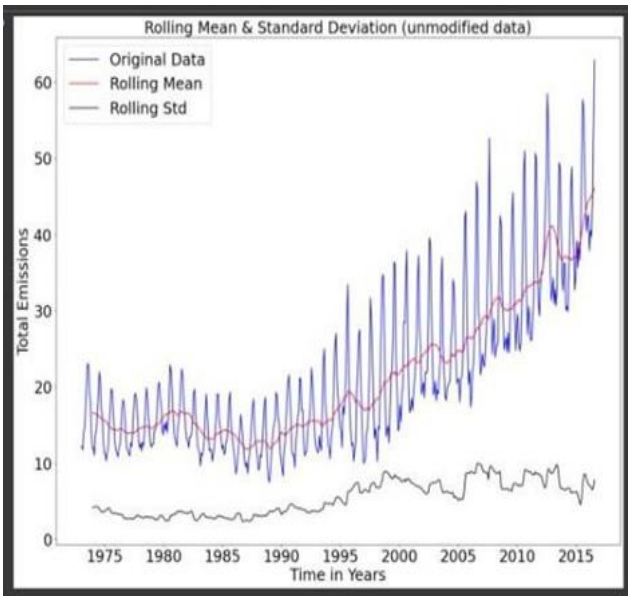

Fig. 5.2 Time Series has a unit root, indicating it is non- stationary

TRANSFORM DATA INTO STATIONARY

Most common technique trend ad remove them from the time series are:

- Aggregation: Taking average for a timeperiod like monthly average
- Smoothing: Taking rolling averages
- Polynomial fitting: Fitter regression model

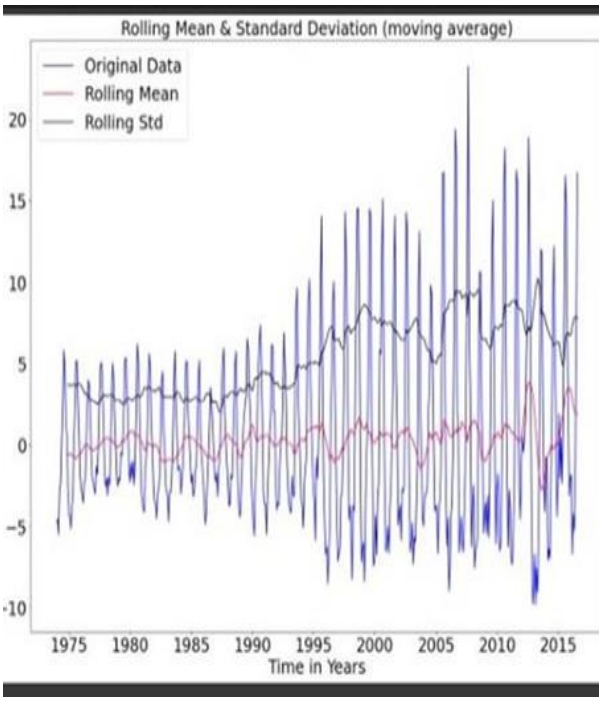

Fig. 5.3 Moving Average

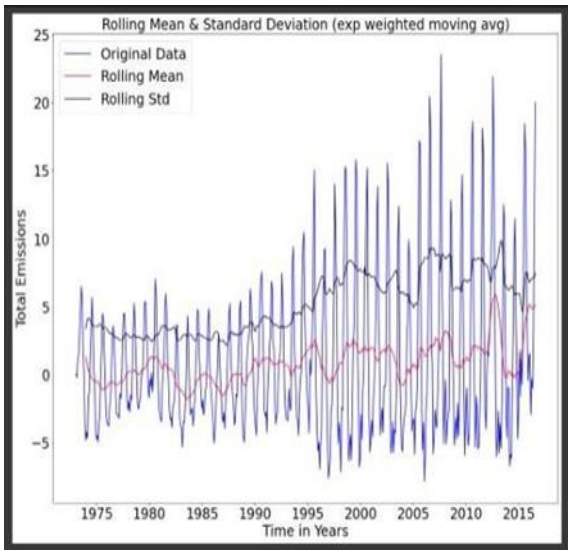

Fig. 5.4 Exponential Weighted Moving Average

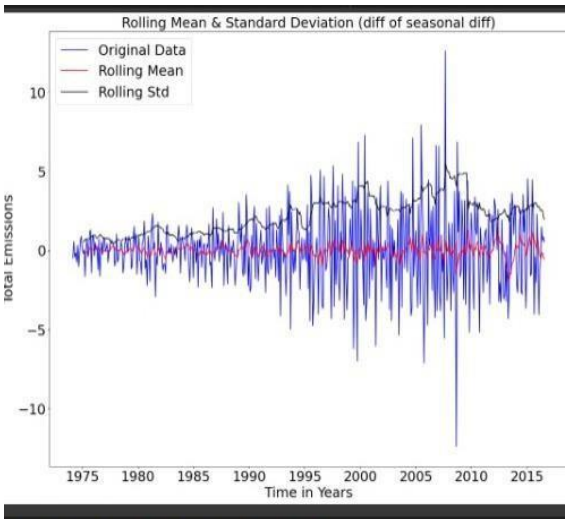

Fig. 5.5 Differencing

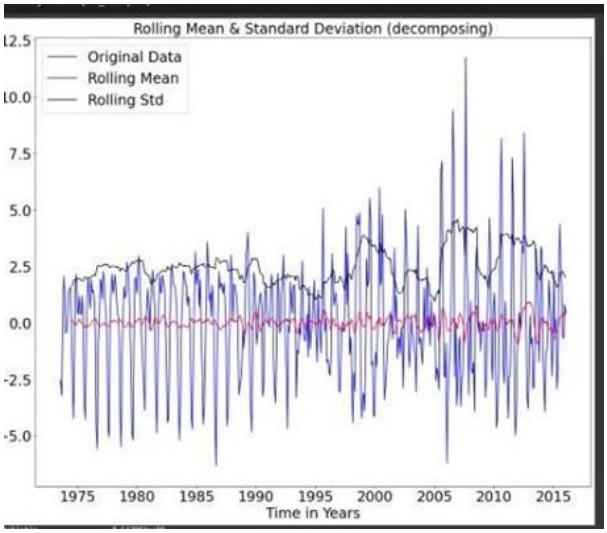

Fig. 5.6 Decomposing

MACHINE LEARNING ALGORITHM

When looking to fit time series dataset with seasonal ARIMA model, our first goal is to find the values of SARIMA(p,d,q)(P,D,Q)s that optimize our metric of interest. Before moving directly how to find the optimal values of the parameters let us see the two situations in stationarities: A strictly stationary series with no dependence among the values. This is the easy case wherein we can model the residuals as white noise. The second case being a series with significant dependence among values and needs statistical models like ARIMA to forecast future outcomes.Auto-Regressive Integrated Moving Average (ARIMA): The ARIMA forecasting for a stationary time series is a linear function similar to linear regression. The predictors mainly depend on the parameters (p,d,q) of the ARIMA model.

Autocorrelation Function (ACF): It is a measure of the correlation between the time series (ts) with a lagged version of itself. For instance at lag 4, ACF would compare series at time instant 't1'…'t2' with series at instant 't1-4'…'t2-4' (t1-4 and t2 being end points of the range).

Partial Autocorrelation Function (PACF): This measures the correlation between the ts with a lagged version of itself but after eliminating the variations already explained by the intervening comparisons.To find the optimal parameters for ARIMA models using the graphical method is not trivial and it is time consuming. We will select the optimal parameter values systematically using the grid search (hyperparameter optimization) method. The grid search iteratively explore different combinations of the parameters. For each combination of parameters, we will fit a new seasonal ARIMA model with the SARIMAX() function from the statsmodels module and assess its overall quality. Once we have explored the entire landscape of parameters, our optimal set of parameters will be the one that yields the bestperformance for our criteria of interest.

When evaluating and comparing statistical models fitted with different parameters, each can be ranked against one another based on how well it fits the data or its ability to accurately predict future data points. We will use the AIC (Akaike Information Criterion) value, which is conveniently returned with ARIMA models fitted using stats models. The AIC measures how well a model fits the data while taking into account the overall complexity of the model. A model that fits the data very well while using lots of features will be assigned a larger AIC score than a model that uses fewer features to achieve the same goodness-of-fit. Therefore, we are interested in finding the model that yields the lowest AIC value. We have obtained a model for our time series that can now be used to produce forecasts. We start by comparing predicted values to real values of the time series, which will help us understand the accuracy of our forecast. The get_prediction() and conf_int() attributes allow us to obtain the values and associated confidence intervals for forecastsof the time series.

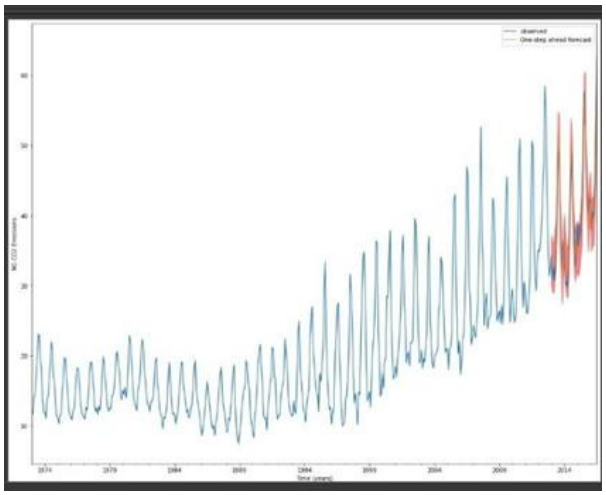

Fig. 5.7 Forecast aligns with the rue values showing an overall similar behaviour.

VI. RESULT AND ANALYSIS

Machine To find the ideal boundaries for ARIMA models utilizing the graphical strategy isn't inconsequential and it is tedious. We will choose the ideal boundary esteems deliberately utilizing the matrix search (hyperparameter streamlining) technique. The matrix search iteratively investigates various mixes of the boundaries. For every mix of boundaries, we will fit another occasional ARIMA model with the SARIMAX () capability from the details model's module and survey its general quality. Whenever we have investigated the whole scene of boundaries, our ideal arrangement of boundaries will be the one that yields the best presentation for our models ofrevenue.

Note: bigger scopes of p, d, q boundaries bring about dramatically longer inquiry time. Assuming you attempt bigger than 2, be ready to pause. I've found better AIC results with bigger worth reach; however, end model is basically something very similar.

While assessing and contrasting measurable models fitted and various boundaries, each can be positioned against each other in light of how well it fits the information or its capacity to precisely foresee future data of interest. We will utilize the AIC (Akaike Data Rule) esteem, which is advantageously gotten back with ARIMA models fitted utilizing details models. The AIC estimates how well a model squeezes the information while considering the general intricacy of the model. A model that fits the information very well while utilizing heaps of highlights will be doled out a bigger AIC score than a model that utilizes less elements to accomplish a similar integrity of-fit. Consequently, we are keen on finding the model that yields the most minimal AIC esteem.

The request contention indicates the (p, d, q) boundaries, while the occasional request contention determines the (P, D, Q, S) occasional part of the Occasional ARIMA model. In the wake of fitting each SARIMAX () model, the code prints out its particular AIC score.

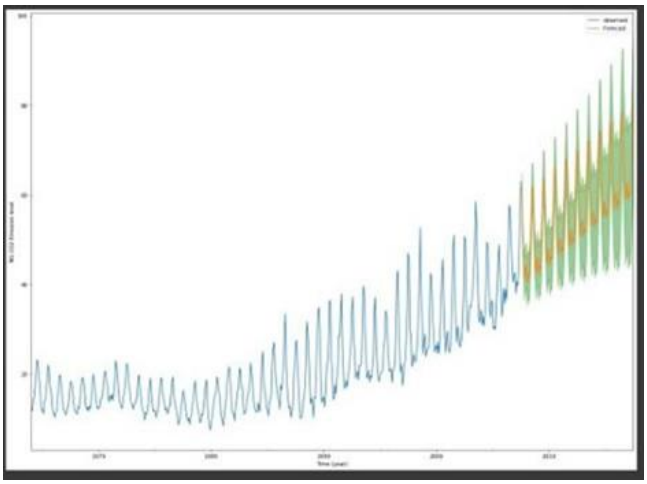

Fig. 4.8. CO2 emissions from natural gas expectedto rise

VII. CONCULSION AND FUTURE SCOPE

In this paper, we have investigated how to recover CSV dataset, how to change the dataset into times series, testing in the event that the time series is fixed or not utilizing graphical and Dickey-Fuller test measurement strategies, how to change time series to fixed, how to track down ideal boundaries to construct SARIMA model utilizing lattice search strategy, diagnosing time series expectation, approving the prescient power, determining 10-year future CO2 emanation from power age utilizing gaseous petrol.

The review shows that the ARIMA (2, 2, 0) model isn't just steady yet additionally the most appropriate model to estimate yearly complete CO2 in India for the following 13 years. The model predicts that by 2025, India's yearly absolute CO2 outflow will be around, 3.89 million kt. This is an admonition sign to Natural Financial experts in India, especially with respect to environmental change and an Earth-wide temperature boost. The consequences of this study are vital for the Indian government, particularly with regards to medium-term and long haul arranging.

For a huge progress in decrease of carbon dioxide outflows, it stays the obligation of each and every resident and each industry while the public authority stays the main regulator and initiator of cooperating to deal with the climate into what's to come. Since an unnatural weather change really do influence the world at large, the review results might be applied to each country, particularly the plan and execution of the energy review idea, energy the board and the energy preservation rehearses.

Future work: fostering a period series model of natural gas determining.

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Point of Interest Recommendation for Location Promotion in Location-Based Social Networks

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Abstract: **Point-of-interest (POI) suggestion has grown to be one of the primary services in location-based social networks (LBSNs) due to the widespread use of LBSNs. Users' primary behaviour in LBSNs is checking in to POIs, and this checking-in behaviour is influenced by the user's behaviour patterns and his or her social circle. Social influence is frequently employed on social networks to assist businesses draw in more customers. Each target user in social networks has a unique impact on several POI. The list of POIs with the greatest impact on recommending users is chosen in this study. Our objectives are to meet the service needs of the target audience while simultaneously promoting the locations of businesses (POIs). The problem of POI recommendation for location promotion is defined in this study. In addition, we tackle the optimization problem using submodular characteristics.**

Keywords: - location-based social networks (LBSNs), Point of interest (POI).

I. INTRODUCTION

Location-based social networks (LBSNs), including Foursquare, Gowalla, and Jiepang, have emerged as a new category of social networks due to the rapid expansion of mobile internet. Numerous academics have recently started working on location-aware systems. Users of LBSNs can upload images, remark on places or things to do, and invite others to check-in at places that interest them. Points of interest are these locales (POIs). POI recommendations are currently one of the primary location-aware services in LBSNs. Based on the personalities, preferences, and behavioral patterns of the user, POI recommendation systems often entail presenting users with some locations in which users may be interesting. In light of POIs, POIs (such as restaurants, hotels, and markets) must investigate checking-in data in order to draw more consumers; more people (For example, friends of users who visited these POIs) will be persuaded to visit these places. In this essay, we approach the impact on the firm as a location marketing The goal is to promote as many of these K recommended POIs to the target user as possible in order to impact as many users as possible. It does not apply to our POI recommendation problem because the authors of the prior study [1] developed a location-aware influence maximization problem to identify a group of seed users in social networks for maximizing influence spreads. Our issue has a set of POIs as its output result.

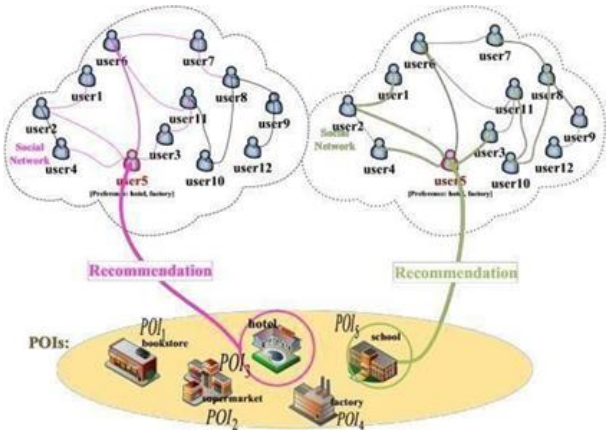

Fig. 1: An POI recommendation example

The following categories apply to existing POI suggestions based on the data source used [2]: User profiles, location histories, and trajectory data are the first three categories. By the methodology used, POI suggestions are divided into three categories: 1) content-based, 2) link analysis-based, and 3) collaborative filtering (CF)-based [2]. Several academics [3] [4] have determined how similar users are to one another based on where they resided, and researchers have used that information as the input for classic CF. The correctness of the advice is the primary factor considered by the majority of current studies. However, both users and retailers value recommendation systems equally. It not only assists a business in gaining more clients, but also connects people with locations that pique their interest. According to a social survey conducted by Marketing Letter, people are more likely to get knowledge from their friends when seeking it out in the real world. Businesses leverage social connections to increase revenues and their impact scope (IS). Online marketing and information sharing make full advantage of the influence of user or friend contact consider viral marketing. Social relationships are used in existing research to help resolve the sparsity and cold-start issues in recommendation systems [4][5][6]. According to the thorough analysis above, typical POI recommendations hardly ever consider how social interactions affect the promotion of a business' location through the POI suggestion process. in comparison to current functions, we take a look at an illustration in Fig.1 where a heterogeneous network with users and POIs is present (e.g., a bookstore POI1, supermarket POI2, hotel POI3, factory POI4, and school

POI5). The social impact over various POI types varies as a result of differences in people's authority and influence under various information categories. When user5 is the intended user, conventional recommendation techniques use users' checking-in behaviour to deduce the preferences and personalities of the individuals. The system's recommendation output is then a list of POIs that the user might be interested in, with recommendations that are guaranteed to be accurate. Friends are inextricably linked, hence this article makes the assumption that the target user's friends are successfully impacted by them under specific POI categories or POI. User 1, User 2, User 3, User 4, User 6, User 7, User 8, User 11, and there are eight users who have been persuaded. User 5's IS regarding POI 3 is not, however, the maximum. The users' IS concerning a unique POI (POI category) is referred to as the individual POI's IS in this study. As a result, POI3's IS is the aforementioned userset, and its influence scope gain (ISG), without taking into account user5's friends, is made up of users 7, 8, and 11. The right side of Fig. 1 shows that POI5 has an IS larger than POI3 and an ISG of users 7, 8, 9, 11, and 12. The system ought to suggest the target user with the POI5 while promoting the goods and services of enterprises. In order to promote POIs, this study suggests a POI recommendation system. Our suggested approach goes beyond being a tool used by companies to advertise their goods and draw in more clients. although it also suggests users visit select POIs that suit their preferences. To conclude, the following are our main contributions:

1. To explain the geographical impact between users, we model user mobility and define the user's IS under specific POI categories over the whole social network.

2. We offer a POI recommendation method due to IS overlaps under various POI categories. The algorithm successfully gets rid of the overlaps.

3. Lastly, we undertake extensive experiments on two sizable real datasets, and the results indicate that our algorithm's accuracy is on par with cutting-edge methods. Our approach has important benefits for location promotion.

II. POI RECOMMENDATION

In this section, we define POI recommendation problem for location promotion (POILP) in LBSNs.

A. Definition

Definition 1. (LBSN) A LBSN < G,C > consists of a social network G = < U,E >, where U is users set,

E = {(ui,uj)| one social connection from ui to uj, ui,uj ∈

, and check-in records C = {(u,l,t)}, (u,l,t) represents one check-in record where user u checks in a location l at time t. l = (lon,lat,a), lon is longitude, lat islatitude, a is one POI category, POI set in a given region $POI_{region} = \{\ell_1, \ell_2, \cdots, \ell_M\}$, POI category set in a given region POICregion = {a1,a2,⋯ ,am}.

Definition 2. (POILP) Given a LBSN < G,C >, a target user uT, a target location region Rtarget, the geography center of R_{taraet}: ℓ_{center}: $< lon, lat, POI_{reaion} >$, and a constant value K, the POI recommendation problem is to select a listof POIs POIre,POIre ⊆ POIregion, |POIre| = K, and thesystem recommends the target user uT with POIre, in orderto maximize the number of expected influenced users whowill check in Rtarget. Since existing researches [9] indicate different topics have different diffusion results. Similarly, every users' IS in LBSNs is different under different POI categories, since users have different topic preferences. This paper firstly discovers users' top-N influential POI categories in LBSNs.

B. Top-N Influential POI category Extraction

Definition 3. (Top-N IPOIC) Give a LBSN < G,C >, the targetuser uT ∈ U and his/her POI category preferences set POIuT = {a(1),a(2),⋯}, a constant N, this problem is to select a list of POIs pre,pre ⊆ POIuT . The number of the expected influenced users ϕ(uT,ai) by uT (as information source) is the maximum under POI category ∀ai ∈ pre. Then, we select top−N POI categories pre = {a(1),a(2),⋯ ,a(N)} according to the arrangement of the size of ϕ(uT,ai).

Learning influence between users This paper researches two aspects of influences between users in LBSNs : (1) geography influence; (2) topic-aware influence. The user u influences user) to check in the POI , which may denote, and the parameter β(∈ [0,1]) is a tradeoff between geographical influence and semantic influence , when v prefers to go the nearby place, β is bigger; when v prefers to go to places of interest, β is smaller.

The geographical influence [8] between users denotes $P^G_{u,v}(\ell) = \sum_l p_l^{(v)} f^{(v)}(d(l,\ell))$, wherein $f^{(v)}(d(l,\ell)) =$

. The topic-aware influence between users denotes For each POI category ai, the influence on ai denotes Pu,vai = ωu,v · Puai · Pvai. Puai is the probability of POI category $a_i.\ \gamma_\ell^{a_i} = P(T = a_i|\ell)$ Moreover, for each in LBSNs, we have a probability distribution covering the POI categories.

Computing User's Influence Scope This paper focuses on user's IS under special POI category. Thus, the definition of computing user's IS problem is that given a LBSN < G,C >, user , if ∃ a path from u to v, so that called as theuser u can arrive at the user v, and Path(u,S) denotes theset of users who u can arrive at. Our goal is to compute u'sinfluence scope under special POI category.

Actually, comparing with strangers, people are more easily influenced by friends. Path(uT,S) also represents the user uT influence scope of social network without

considering POI category preferences. Path(uT,S) is the results of the ideal state. Considering the influence between users in Path(uT,S),

we firstly identify users that are successfully influenced. paper supposes each user has an activated threshold value λujuniformly at random from [0,1]. When λuj, the user uj is very likely to visit the POI belong to the category ai. We regard this situation as ujis affected completely. In this paper, we set λuj as the probability expectation based on uj's history check-in POI categories recorders in advance. This paper selects the influenced users satisfying into the user set . Next, we select POI category a with the maximization IS about POIuT . Then, we select top based on the order of IS. Solving User Overlaps Problem Since each user has different influence scopes in social network under different POI categories, these different influence scopes have overlaps. The overlaps result in these top-N POI categories' ISG is not the maximum. The key is that how to design an appropriate objective function to eliminate these overlaps. represents ISG of the recommended POI category a. , wherein σ(·) denotes the number of the user set, and represents the friends of the target user uT.

C. POI Recommendation Algorithm

Firstly, POILP problem could be formulated as an optimization problem:

$$POI_{re} = \arg \max_{\ell_j \in POI_{region}} \gamma_{\ell_j}^{a_i}, \quad \forall a_i \in RC_{u_T}$$
$$s.t. \quad |POI_{re}| = K.$$

For the problem, we find out the recommended POI categories RCuT as the following: RCuT = argmax s.t.|RCuT | = K. Wherein POIuT = {a(1),a(2),⋯ ,a(K)}, K is a constant in advance. Since the function F(·) is monotone and submodular [9]. We give a greedy algorithm with a (1−1e) approximation [10]. It is stated by the Algorithm 1 in detail. Algorithm 1 POILP algorithm

Input: An LBSN $< G,C >$, the target user u_T, T_{uT} , K, $POIu_T$ = $\{a_1,a_2,\cdots\}$

Output: A list of POIs, $POIre$, and the corresponding recommended POI categories $RCre$, $|POIre| = |RCre| = K$

1: Initialize $RCre \Leftarrow \varphi$
2: Compute $\gamma_{\ell_j}^{a_i}(U_{u_T}^{a_i})$ for each $a_i \in POIuT$;
3: for $j = 1$ to K do
4: $a_j \leftarrow \arg \max$;
5: $\ell_j \leftarrow \arg \max_{\ell_j \in POI_{region}} \{P_{\ell_j}\}$
6: $RC_{re} \leftarrow RC_{re} \cup a_j$
7: $POI_{re} \leftarrow POI_{re} \cup \ell_j$
8: return $POIre, RCre$.

III. PERFORMANCE EVALUATION

The two authentic LBSN Foursquare and Gowalla datasets are used in this study. The checking-in behaviours of 36,907 users and 4,163 users are recorded in these datasets, respectively, along with location data, check-in time, check-in times, and friend relationships.

A. Comparative Methodologies

In this study, POILP is compared to other, more effective POI recommendation techniques. Ye.etc [4] offered a system for recommending locations based on users' interests, social connections, and geographic location. This method is known as location suggestion based on USG and uses the power-law probabilistic model and collaborative filtering (CF) as its technical components. Bao, etc. According to their weights in the category hierarchy, users' similarity in the category-based k-Nearest Neighbors algorithm (CKNN) suggested by [2] was calculated using user-based CF. On location features and user choices, Yin.etc [11] emphasized UP-based technique for POI recommendation with LDA is used. The aforementioned techniques, however, hardly ever take into account users' impact inside a certain POI category for an entire social network. The promotion of the location benefits from this influence.

B. Evaluation Method

Influence Scope Gain Comparison: Under the unique POI categories of POIre, POIre based on the function F() can maximise uT's ISG. Efficiency of Procedures: Comparing the proposed method to the methods outlined above allows us to confirm its efficacy. We make use of the recall ratio: and the precision ratio:to assess each method's ability to provide recommendations. The three metrics are calculated by taking the average of each of their values for 2000 users (the target users, abbreviated uT).

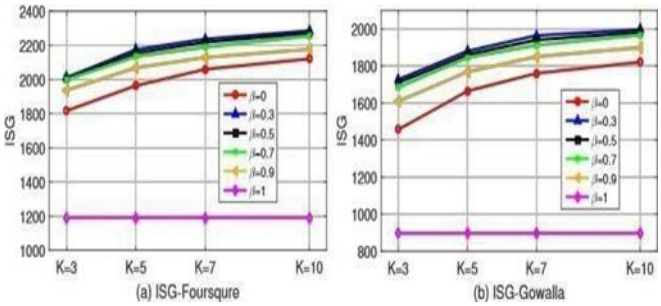

Fig. 2: Influence Scope Gain with Different β Values

C. Experimental Results

Fig.2 shows how well our technique performed on two datasets. K is assigned to a value between [3,5,7,10]. We establish the given target region range of the target geographic centre or location in order to ascertain whether a user actually wishes to check in the specified region or not. The visiting regional probability is computed using the region range. The target centre or location's radius is predetermined for our research. FIG. 2 shows

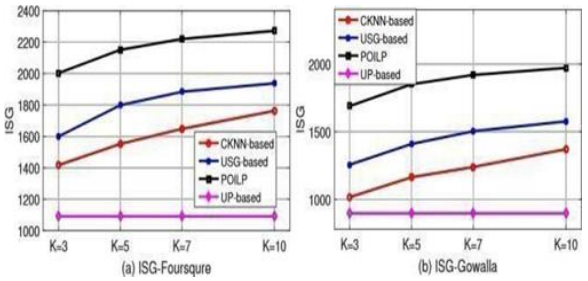

Fig. 3: Influence Scope Gain for Different Methods

Algorithms with β = {0, 0.3, 0.5, 0.7, 0.9, 1} on two datasets. β = 0represents users are only influenced by POI preferences; β 1 represents users are only influenced by spatial distance. In Fig. 2, we know ISG with β = 0.3 is the maximum. The performance of β = 0.5 is closed to β = 0.3. As our method is based on both geographical and topic influence, we give the two aspects of influences the same weight. Thus, this paper sets β = 0.5 throughout the following experiments. Our approach has significant advantages in the aspect of ISGunder the lists of recommended POIs in Fig.3. In Fig.4, UP- based

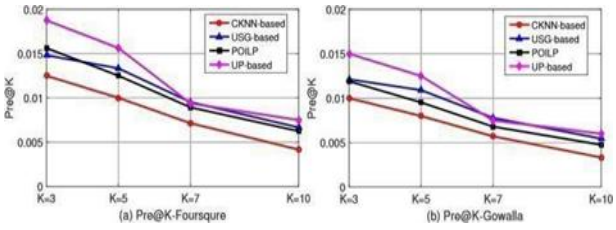

Fig. 4: Pre@K for Different Methods

Compared to the other methods, method produces more accurate recommendations. The UP-based method's suggestion performance is better because it is primarily focused on the target user's preferences. Our method outperforms the CKNN-based method in terms of recommendation precision, while POILP and USG-based methods have similar levels of recommendation precision. Recall ratio comparison results are shown in Fig. 5.

The USG-based, UP-based, and POILP methods are all superior

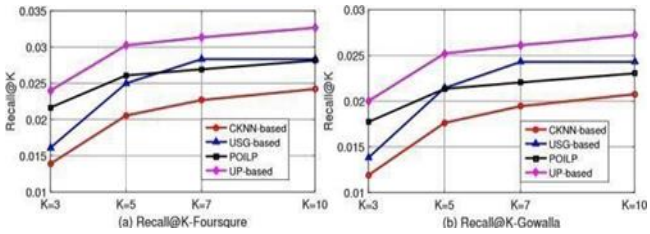

Fig. 5: Recall@K for Different Methods

than the CKNN-based approach. These findings show that the recall ratio of our suggested method and the USG-based method are comparable. The efficiency of our method is marginally lower than the UP-based method since it is based on both geographical and topic-aware impact. But most all, our POILP's ISG out performs cutting-edge techniques.

IV. CONCLUSIONS

We discussed the issue of location advertising in LBSNs in this study. The issue is framed as one optimization problem, specifically an ISG maximisation problem under a specific POI category. The Experimental analysis demonstrates that, in terms of location promotion, our strategy greatly outperforms other cutting-edge methods in terms of POI suggestion.

V. ACKNOWLEDGMENTS

We sincerely thank our guide Mr. Rahul Khokhale for his guidance and constant support and also for the stick to our backs. We also thank the project coordinators for arranging the necessary facilities to carry out the project work. We thank the HOD, Dr. Sangeeta Vhatkar, the Principal, Dr. B. K. Mishra, and the college management for their support.

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Brain Magnetic Resonance Images Classification Using Wavelet Transform and SVM

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Abstract—**Accurate and automatic computer system for classification of brain MRI images is very much needed in todays era in the medical field for analysis and prediction of the diseases. Since the invention of MRI scanning system many researchers have developed and presented numerous methods for systematic disease detection. This examination work exhibited another system of order for MRI Brian image in two kinds, for example, ordinary (normal) and irregular (abnormal). In this framework right off the bat discrete wavelet transform is applied on pictures for significant trademark extraction, at that point, the standard segment investigation method is utilized to expel the repetitive information, at last, it gives the measurement diminished element vectors. These highlights at that point given as a contribution to a portion support vector machine for the order of images. In this work, seven normal cerebrum infections pictures are considered as irregular. Altogether 160 MRI pictures have alluded for preparing and testing the framework. This proposed system is tried with four sorts of SVM pieces, and it is discovered that the SVM-GRB portion outflanks the arrangement and its precision is 99.38%.**

Keywords—MRI, Classification, Brain-disease, KSVM, DWT, Feature Reduction.

I. INTRODUCTION

Magnetic resonance imaging (MRI) technique is very important tool in medical field for detailed analysis of human body, it produces high resolution images of the anatomical structures, specifically in the brain, and generates rich information for disease diagnosis as well as for further research work [1–3]. The computer oriented automatic and perfect classification of the brain MRI images plays a major role in diagnosis of brain related diseases, specifically brain tumors [5–8].

Because of its multi-goals expository property, wavelet change can be utilized for include extraction from MR cerebrum pictures, as it gives the office to examination of pictures of different goals. Along these lines, it is computationally costly and requires enormous sum stockpiling [9]. The chief part examination (PCA) was utilized to lessen the element vector measurements and to improve the discriminative power [10]. PCA hence diminishes the computational expense of dissecting new information as it viably lessens the dimensionality of the information [11]. At that point, the information arrangement issue emerges .Many scientists have proposed different ways to deal with accomplish this objective, which can be separated into two classifications. The first is administered characterization, with help vector machine (SVM) [12] and k-Nearest Neighbors (k-NN) [13] and the other is unaided arrangement [14], with self-association highlight map (SOFM) [12] and fuzzy c-means [15]. The unaided classifier has lower execution than regulated one as far as grouping precision . Be that as it may, the grouping exactnesses of most existing techniques were lower than 95%, so the point of this paper is to locate an increasingly precise strategy. The regulated strategies for grouping, the SVMs depend on AI hypothesis [16–18]. Contrasted and different techniques, for example, counterfeit neural system, choice tree, and Bayesian system, SVMs have noteworthy favorable circumstances as it needn't bother with countless preparing tests to stay away from over-fitting [19].

In this paper, the portion SVMs, which stretches out unique straight SVMs to nonlinear SVM classifiers is created. This rendition of SVM classifier is acquired by applying the bit capacity which replaces the dab item structure in the first SVMs [20]. The change might be nonlinear and the changed space high dimensional; however the classifier is a hyperplane in the high-dimensional element space, it might be nonlinear in the first info space. The KSVMs enable us to fit the most extreme edge hyperplane in a changed component space [21].

II. PREPROCESSING

This proposed method consists of following steps:

1. Pre-processing of image
   a. feature extraction
   b. feature reduction;
2. Training the kernel Support vector machine classifier
3. Testing the new MRI image on the trained kernel SVM, for classification.

The detail schematic of the work is shown in Fig.1 as a standard classification method [22].

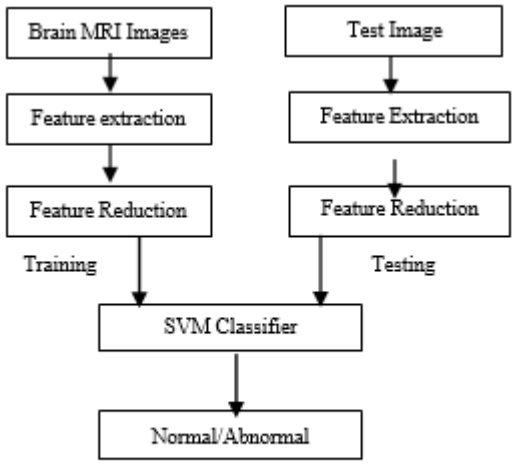

Fig. 1. Methodology of our proposed algorithm.

A. Feature Extraction

The Fourier transform is utilized for signal investigation, which separates a period space signal into constituent sinusoids of various frequencies. This changes the sign from time area to recurrence space. As FT has a disadvantage of disposing of the time data of the sign. Therefore, the nature of the grouping diminishes as time data is lost. Breaking down just a little segment of the sign at a time is called windowing or brief time Fourier change (STFT), utilized by Gabour [23]. It includes a window of a specific shape to the sign. STFT gives some data about both time and recurrence area however the accuracy of the data is constrained by the size of the window. The following stage is Wavelet change (WT): a windowing system with variable size. It jams both time and recurrence data of the sign. Another advantage of WT is that it produce rather than a time-frequency view of the signal. A time-scale view is a more natural and powerful way, because compared to "frequency", "scale" is commonly used term.

B. Discrete Wavelet Transform

The discrete wavelet transform (DWT) developed with the help of dyadic scales and positions which makes it powerful for implementation of the WT [24].

The important aspects of DWT are given as follows. Suppose x(t) is a square-integrable function, then the continuous WT of x(t) relative to a given wavelet ψ(t) is defined as.

$$W\psi(a,\ b) = \int_{-\infty}^{\infty} x(t)\psi a,b(t)dt \quad (1)$$

where

$$\psi_{a,b}(t) = \frac{1}{\sqrt{a}}\psi\left(\frac{t-a}{b}\right) \quad (2)$$

Here, the wavelet ψa,b(t) is calculated from the parent wavelet ψ(t) by translation and dilation: a is the dilation factor and b the translation parameter (both real positive numbers).

The most basic and important wavelet is the Harr wavelet, which is the simplest one and often the preferred wavelet in a lot of applications [25–27].

Equation (1) can be discretized by restraining a and b to a discrete lattice (a = 2b & a > 0) to give the DWT, which can be expressed as follows.

$$ca_{j,k}(n) = DS\left[\sum_n x(n)g_j^*(n-2^jk)\right]$$
$$cd_{j,k}(n) = DS\left[\sum_n x(n)h_j^*(n-2^jk)\right] \quad (3)$$

where caj,k and cdj,k refer to the coefficients of the approximation components and the detail components, respectively. g(n) and h(n) denote for the low-pass filter and high-pass filter, respectively. j and k represent the wavelet scale and translation factors, respectively. DS stands for down-sampling. Equation (3) is the fundamental of wavelet decomposes. It decomposes signal x(n) into two signals, the detail components cd (n) and the approximation coefficients ca(n). This is called one-level decompose.

The process of wavelet decomposition is depicted with the help of decomposition tree, as shown in Fig.2. The above down sampling process can be iterated with successive approximations being decomposed in all turn, so that one signal is down sampled into many levels of resolution.

C. 2D DWT

In case of 2D images, the DWT is applied to each dimension separately. Fig.3 shows the schematic diagram of 2D DWT which results in 4 sub-band (LL, LH, HH, and HL) images at each scale. The sub-band LL is used for next 2D DWT.

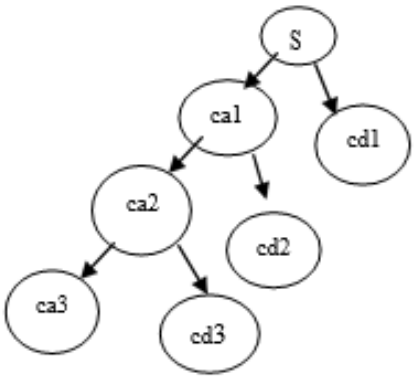

Fig. 2. A 3-level wavelet decomposition tree.

An image is segmented in various sub bands, the LL subband can be approximation component of the image, while the LH, HL, and HH are high frequency components of the image. As the level of decomposition increased, but coarser approximation component was

obtained. Wavelet transform gives a simple hierarchical framework for interpreting the image information. In this algorithm, level-3 decomposition is done via Haar wavelet which was utilized to extract features.

In this system symmetric padding method [28] was utilized to calculate the boundary value. When we filter the image, the mask will extend beyond the image at the edges,

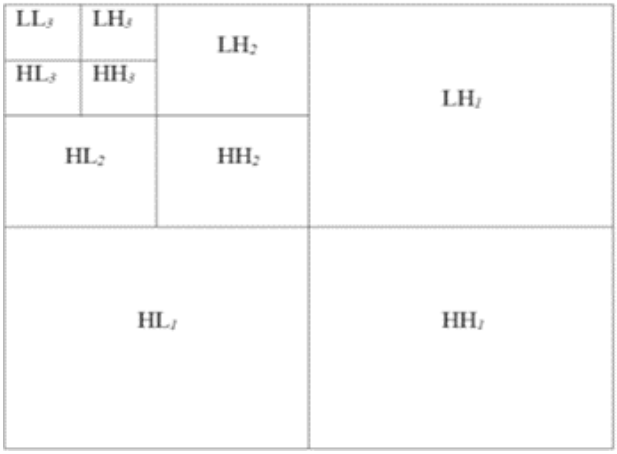

Fig. 3. 2D DWT decomposion

so the solution is to pad the pixels outside the images. As the border distortion is a technique issue related to digital filter which is commonly used in the DWT.

D. Feature Reduction.

Exorbitant highlights make characterization progressively muddled just as increment calculation times and capacity memory. It is required to diminish the quantity of highlights. PCA is best to diminish the element of an informational collection. It is accomplished by changing the informational collection to another arrangement of requested factors as indicated by their differences or importance. PCA comprising of countless interrelated factors while holding the vast majority of the varieties. This works by three way first, it orthogonalizes the segments of the info vectors so uncorrelated with one another, second requesting of the subsequent symmetrical parts so that those with the biggest variety start things out, lastly takes out those segments with least variety in the informational index.

III. KERNEL-SVM

The appearance of the support vector machine (SVM) is a milestone inside the subject of the framework contemplating. The gifts of SVMs incorporate inordinate exactness, rich numerical tractability, and direct geometric elucidation [29]. As of late, two or three ventured forward SVMs have developed quickly, among which the part SVMs are the most well known and successful. Piece SVMs have the accompanying advantages [30]: (1) well working by and by and have been surprisingly fruitful in such various fields as common language arrangement, bioinformatics and pc inventive and judicious; (2) have barely any tunable parameters; and (3) preparing routinely involves raised quadratic advancement [31]. Subsequently, arrangements are worldwide and for the most part explicit, as needs be keeping off the assembly to close by minima displayed by methods for various factual acing structures, comprehensive of neural systems. Information is seen as a p-dimensional vector, and our undertaking is to make a (p 1)- dimensional hyperplane. One sensible decision as the best hyperplane is the one that speaks to the biggest contrast between the two classes, for better conduct because of concealed information during preparing, i.e., better characterization.

Hence, in this work the hyperplane method is used so that the distance from the computed classification line to the closest sample data point on each side is maximized [32]. Fig. 4 shows the schematic of linear SVMs, where H, H1, H2 are three hyper planes lines, it can classify the two classes successfully, however, but H1 and H2 does not have the largest margin, so they will not give good results to new test data. The H hyperplane has the maximum difference value to the support vectors, so it is selected as the best vector for classification [33].

A. Principles of Linear SVMs

Given a p-dimensional N -size training dataset of the form

$$\{(xn, yn)|xn \in Rp, yn \in \{-1, +1\}\}, \quad n = 1, \ldots, N \quad (4)$$

where yn is either - 1 or 1 corresponds to the class 1 or

2. Each xn is a p-dimensional vector. The maximum-margin hyperplane which divides class 1 from class 2 is the support vector machine we want cconsidering that any hyperplane can be written in the form of

$$w \cdot x - b = 0 \quad (5)$$

where it denotes the dot product and w the normal vector to the hyperplane. It is needed to choose the w and b to maximize the margin between the two parallel (as shown in Fig. 5) hyperplanes as large as possible while still separating the data. So we define the two parallel hyperplanes by the equations as

$$w \cdot x - b = \pm 1 \quad (6)$$

In this manner, the errand can be changed to an improvement issue, i.e., we need to amplify the separation between the two parallel hyperplanes, subject to avoid information falling into the edge.

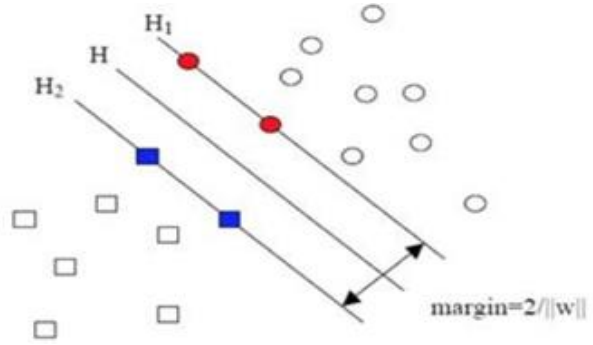

Fig. 4. Schematic of linear SVMs (H denotes for the hyperplane, S denotes for the support vector) [43].

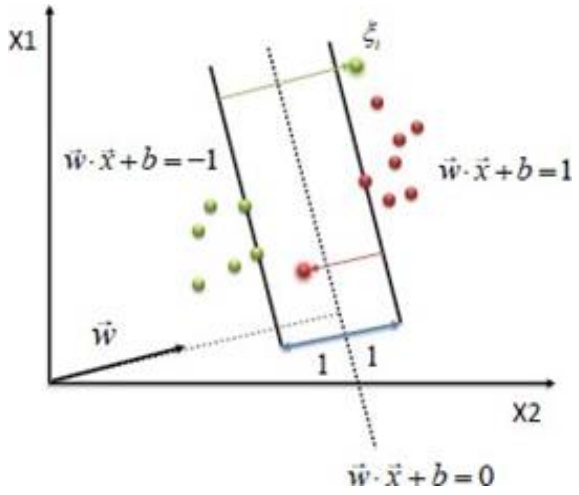

Fig. 5. : The concept of parallel hyperplanes (w denotes the weight, and b denotes the bias).

Using simple mathematical knowledge, the problem can be formulated as:

min ||w||

w,b

s.t. yn (w · xn − b) ≥ 1, n = 1, . . . , N (7)

In practical situations the ‖w‖ is usually be replace by

min 1 ‖w‖2

w,b 2

s.t. yn (w · xn − b) ≥ 1, n = 1, . . . , N (8)

The reason is that the ||w|| is involved in a square root calculation. After it is lowered with formula (8), the solution will will remain as it is, but the problem is altered into a quadratic programming optimization that is easy to solve by using Lagrange multipliers [34] and standard quadratic programming techniques and programs [35, 36].

Regular SMVs gives a hyperplane to classify data, so it cannot deal with classification problem of which the different types of data located at different sides of a hypersurface, the kernel strategy is applied to SVMs [37]. This algorithm is similar, except that every dot product is replaced by a nonlinear kernel function. The kernel is related to the transform ϕ(xi) by the equation k(xi, xj) = ϕ(xi)ϕ(xj).

The value w is also in the transformed space, with

w =∑ i αiγiϕ(xi).

Dot product with w for classification can be computed by

w · ϕ(x)=∑ i αiγik(xi, x).

By the other side KSVMs allow to fit the maximum-margin hyperplane in a transformed feature space. The transformed space is higher dimensional and the transformation may be nonlinear and; thus though the classifier is a hyperplane in the higher-dimensional feature space, it may be nonlinear in the original input space. For each kernel, there should be at least one adjusting parameter so as to make the kernel flexible and tailor itself to practical data. Three common kernels [38] are listed in Table 1.

TABLE I.THREE COMMON KERNELS (HPOL, IPOL, AND GRB) WITH THEIR FORMULA AND PARAMETERS.

Name	Formula
Homogeneous Polynomial	$k(xi, xj) = (xi \cdot xj)^d$
Inhomogeneous Polynomial	$k(x_i, x_j) = (x_i \cdot x_j + 1)^d$
Gaussian Radial Basis	$k(x_i,x_j)=\exp-\gamma\|\|x_i.x_j\|\|$

IV. CROSS VALIDAION

As for training of classifier some data set is used, so there is possibility to achieve high accuracy for classification only for this training dataset not yet other independent datasets. For this overfitting avoidance, we need to incorporate cross validation into our method. Cross validation will not improve the final classification accuracy, but it will make the classifier reliable and can be generalized to other independent datasets. Cross approval incorporates three sorts of strategies: Random subsampling, K-fold cross approval and forget about one approval. The K-overlay cross approval is executed because of its straightforwardness, effortlessness, and utilizing all information for preparing and approval. The philosophy is to make a K-fold segment of the entire dataset, K times rehashed to utilize K- 1 folds for preparing and a left overlay for approval, and finally, the normal mistake is determined for K tests.

The K folds might be absolutely haphazardly partitioned, as, a few folds may have been dispersed differently when contrasted with different folds. Subsequently, stratified K - crease cross approval was actualized, in which each overlay has appropriated about in comparative classes [39]. The following test is to locate the number of folds. In the event that K is set excessively enormous, the calculation will be tedious on the grounds that the inclination of the genuine mistake rate estimator will be little, and the change of the estimator will be huge. On the other hand, if K is set excessively little, the fluctuation of the estimator naturally turns out to be little, yet the inclination of the estimator will be enormous, henceforth the calculation time will diminish, [40]. In this study, initially K is determined as 5 for working on trial-and-error basis, which means that with increasing step as 1and if parameter K varying from 3 to 10, we can train the SVM by each value. At the end we will select the optimal value of K belonging to the highest classification accuracy.

V. EXPERIMENTAL RESULTS

A. Databaset

The datasets used for experimentation consists of brain MRI images having resolution 256 by 256. The abnormal brain MRI images of the dataset consist of the seven types of diseases viz: glioma, meningioma, Alzheimer‟s disease, Alzheimer‟s disease plus visual agnosia, Pick‟s disease, sarcoma, and Huntington‟s disease. The samples images of each disease are given in Fig. 6. The confusion matrix for training and validation purpose of images is given in Table 2.

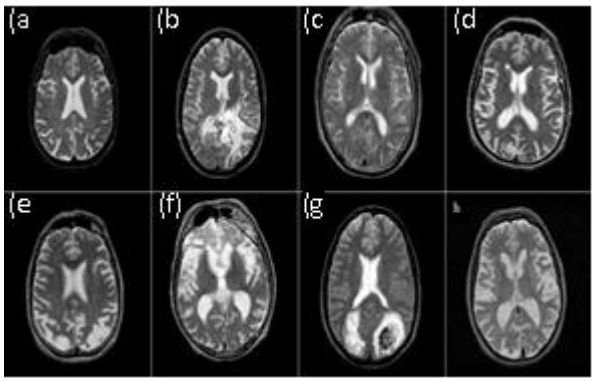

Fig 6 :Sample of MRI images: (a) normal brain; (b) glioma;(c) meningioma; (d) Alzheimer‟s disease; (e) Alzheimer‟s disease with visual agnosia; (f) Pick‟s disease; (g) sarcoma; (h) Huntington‟s disease[43].

B. Feature Extraction

To extract features from MRI images. wavelet transform is applied to the third level, it gives different characteristics, first level transform is shown in Fig. 7. The approximate coefficient matrix is used for input to get the prominent features only.

C. Feature Reduction

After getting the approximate wavelet coefficient image, PCA is applied to reduce the dimensions of features.

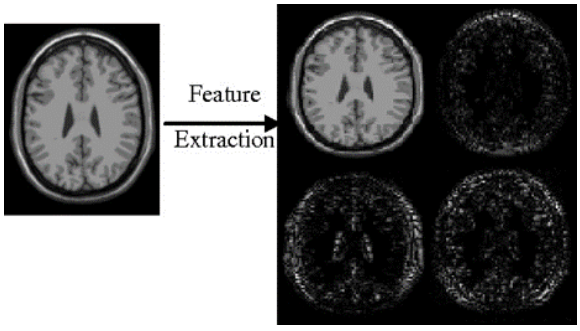

Fig 7: The procedures of 1-level 2D DWT: Brain MRI; level-1 wavelet transformed coefficients.

TABLE II. CONFUSION MATRIX OF OUR DWT+PCA+KSVM METHOD (KERNEL CHOSE LIN, HPOL, IPOL, AND GRB [13].

LIN	Normal(O)	Abnormal(O)
Normal (T)	17	3
Abnormal (T)	5	135
HPOL	Normal(O)	Abnormal(O)
Normal (T)	19	1
Abnormal (T)	4	136
IPOL	Normal(O)	Abnormal(O)
Normal (T)	18	2
Abnormal (T)	1	139
GRB	Normal(O)	Abnormal(O)
Normal (T)	20	0
Abnormal (T)	1	139

D. Classification Accuracy

SVM is tested with four different kernels (LIN, HPOL, IPOL, and GRB). Result indicates that the case of using linear kernel, the KSVM degrades to original linear SVM Hundreds of simulations are computed in order to estimate the optimal parameters of the kernel functions, such as the order d in HPOL and IPOL kernel, and the scaling factor γ in GRB kernel. The confusion matrices of our methods are listed in Table 2. The element of ith row and jth column represents the classification accuracy belonging to class i are assigned to class j after the supervised classification. The empirical study shows that the proposed combined DWT+PCA+KSVM method obtains good results on training and validation ofimage data. For LIN kernel, the classification accuracy is 94.58%; for HPOL kernel, it is 96.88%;for IPOL kernel, it is 98.12%; and for the GRB kernel, it is 99.38%. It indicates that, the GRB kernel based SVM is giving better results than other three kernels These methods are compared with other techniques given in literature like DWT+SOM [12], DWT+SVM with linear kernel [12], DWT+PCA+ANN [41], DWT+PCA+k NN [41]. The comparative results are shown in Fig. 8. It indicates that the method DWT+PCA+KSVM with GRB kernel performed best than other ten methods.

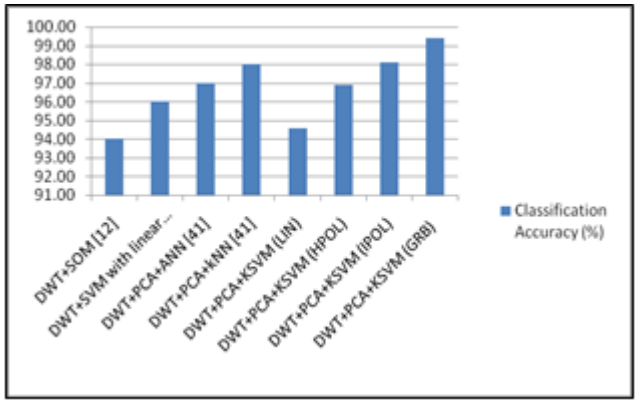

Fig 8: The comparative results of the existing systems(first four) with implemented methods (las four).

VI. CONCLUSION AND DISCUSSION

There are many techniques developed based on wavelet transforms, PCA, and kernel SVMs. The wavelet transform extracts the features from brain MRI images. The major contribution of this research paper is to present a novel method which uses DWT+PCA+KSVM for classification of normal MRI or abnormal MRI images. Four different SVM kernels as LIN, HPOL, IPOL and GRB are implemented. The experimental results indicates that the SVM-GRB kernel gives 99.38% classification accuracy on the dataset. It is better than the other existing techniques.

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Solving Capacitated Vehicle Routing Problem Using NSGA-II Algorithm

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Abstract: **The Vehicle Routing Problem (VRP) is multi-objective optimization problem. The main objective of vehicle routing problem is to determine the set of optimal routes for the number of vehicles to service the group of customers. In this paper, we have selected the Capacitated Vehicle Routing Problem (CVRP) with objectives to minimize the total travelled distance and number of vehicles which are used in the tour. We applied Non-dominated Sorting Genetic Algorithm - II (NSGA-II) for the selected capacitated vehicle routing problem. The proposed work has been tested on standard VRPLIB instances. The computational results obtained are nearer to the standard optimal solutions.**

Keywords: Capacitated Vehicle Routing Problem, NSGA-II, Multi-objective Optimization, VRPLIB

I. INTRODUCTION

In supply chain management, logistics and transportation are major problem in product delivery. The vehicle routing problems are one of the NP- hard problems in the transport and distribution [1]. The vehicle routing problem (VRP) is similar to Traveling Salesperson problem (TSP). The primary objective of vehicle routing problems is to find the smallest set of routes, means to minimize total travel costs or total distance. All vehicles must have fixed load and some limited time window in which vehicle needs to fulfill the customer's request [2].

The objective of Capacitated Vehicle Routing Problem (CVRP) is to minimize the total travelling distance, and does not consider loading procedure in optimization. The classic model of CVRP is customer's demands are transfer in vehicle, when transferring a customer's demand d is greater than total capacity Q, then new vehicle is selected for further operation, and the whole d, is transfer into the new vehicle. This procedure continues, until all customer's demands are loaded in vehicle. In the CVRP, we can consider the transfer procedure in different way to reduce the number of vehicles [3].

There are various metaheuristics approaches to solve capacitated vehicle routing problem such as Genetic Algorithms, Ant Algorithms, Deterministic Annealing, Constraint Programming, Tabu Search, 2-Phase Algorithm, Simulated Annealing and Constructive Methods, etc. [4]. In [5] Enrique Alba et al. introduced cellular genetic algorithm (cGA), where the search model work with static and dynamic decentralization in which individuals are allocated in a particular topology and interact only with their neighbors. This approach improves the efficiency and accuracy of the existing results found in the literature. In [6] Ilgaz Sungur et al. proposed a robust optimization approach to solve the selected multi-objective problem such as VRP. This technique gives the routes that reduces the total vehicle costs and satisfy all customer requests in given constraints. The authors show that robust optimization is an effective developing routing problems including uncertainty as it does not contain distribution hypothesis on the basis of uncertainty or a cumbersome represents based on this technique. In [7] Maryam Razavi et al. have proposed ant colony approach to solve capacitated vehicle routing problem. In this paper two objectives are considered like minimize total distance and number of used vehicles. Ant colony approach evaluated using Solomon's standard benchmark problems.

Other heuristic approaches, were presented by Christodes [8], Toth and Vigo [9], Bodin et al. [10], Golden et al. [11], Fisher [12] to solve CVRP.

There are different datasets available to solve capacitated vehicle routing problem. There are three types of Solomon instances such as random, clustered and mix of both random and clustered. The geographical data are randomly generated, the instances R1 and R2 are random data, C1 and C2 instances are clustered data, and RC1 and RC2 instances are mix of both random and clustered structures. The instances R1, C1 and RC1 have a small scheduling problem and they allow only a few customers per route (around 5 to 10). In opposite, the instances R2, C2 and RC2 have a large scheduling problem and allow many customers (greater than 30) to be services

by the same vehicle. Researchers have considered below 100 customers as a small scale datasets and more than 100 customers considered as a large-scale dataset. The standard VRPLIB data set contains different instances. In this paper, we have used instance from VRPLIB dataset with 22 customers and maximum capacity 6000.

This paper presents application of Non-dominated Sorting Genetic Algorithm – II to solve multi-objective capacitated vehicle routing problem. This algorithm was proposed by researchers to eliminate the drawbacks of NSGA, particularly its non-elitist behavior and properties of the sharing parameter. The NSGA-II sorts the non-dominated individuals in the population same as in NSGA, and individuals ranked based on this process. The new selection process introduced in NSGA-II algorithm,

called tournament selection, where selection process is done based on crowding distance. To implement elitism, the offspring and parent population are combined and the non- dominated individuals from the combined population are considered to the next generation [13].

II. RELATED WORK

In [14] Ricardo Fukasawa et al. proposed Robust Branch-and-Cut-and-Price algorithm to solve the Capacitated Vehicle Routing Problem. They obtain lower bounds by using Lagrangean relaxation. This algorithm give the better performance as compared to existing results found in literature. In this paper CVRP contains equality and non-equality constraints to satisfy the objective function. The computational results show that the new lower bound is better than existing bound when the number of vehicle are more.

In [15] Habiheb Nzif et al. implemented genetic algorithm to solve CVRP. This algorithm uses new crossover operator designed by undirected graph to find the minimum routes to satisfy the requirement and to minimize overall transportation cost. The proposed work tested on benchmark instances and compared with other heuristics technique and they found that this technique is better than previous technique in the literature.

In [16] Alkin yurtkuran et al. proposes hybrid electromagnetic-like algorithm (HEMA) and it is based on population-based techniques. This algorithm improves the local search method and tested on benchmark instances. This algorithm proposed to minimize the travelling cost and minimize the distance. This algorithm is tested on Solomon datasets to obtain the best results. HEMA algorithm is very useful and compatible as compared to classical metaheuristics techniques. This algorithm requires more time to reduce the computational efforts.

In [17] Chou-Yuan Lee et al. implemented the framework known as enhanced ant colony optimization. This technique has advantages of simulated annealing and ant colony optimization. The simulated annealing technique provide good solution for ant colony optimization. This paper gives the better solution as compared with ant colony optimization algorithm. The objective of CVRP is to minimize the cost of vehicles with restrict capacity. The simulated annealing separately implemented on 14 small scale instances and 20 large-scale instances. The small-scale instances give the better performance than large scale datasets.

In [18] Glaydston Mattos Ribeiro et al. proposed large neighborhood search heuristic technique to implement CCVRP problem. The objectives of CCVRP are to minimize all customer's arrival time including the total travelling costs. This heuristic technique applied to standard benchmark instances and compared with two memetic algorithms. This technique gives optimal solution as compared to existing results found in the literature.

In [19] RanLiu et al. focuses on mathematical modeling and graph model for selected problem. The objective of selected problem is to optimize the empty vehicle. The authors take this problem as a large-scale problem. The proposed algorithm gives the two-phase method first phase method give the directed cycles and second phase created chains that makes the cycles. The performance of vehicle distance span and the location of the vehicle is explored.

In [20] Gilbert Laporte et al. implements the CVRP with stochastic demand in that minimize the cost of required routes. They give penalty for failure related to the return depot constraints. This paper implements the new lower bound with including failure for constraints. This problem implemented on 100 customer's instances and some vehicles. The proposed approach is heavily dependent on large bound and generate more effective lower bounds. This problem is taken into the large-scale problem and difficult to solve it.

In [21] Silvia Mazzeo et al. considered Ant Colony Algorithm with VRP. The objective of the selected problem is to minimize the weight of each vehicle that are loaded. This algorithm is based on mataheuristics techniques and gives the competitive results as compared with other heuristics solved by CVRP. The ACO technique gives the better performance up to 50 nodes.

In [22] Angel A. Juan et al. authors proposed SR- GCWS to solve selected VRP problem. The objective of selected problem is to minimize the vehicle and minimize the distance with satisfy the customer request. This algorithm is implemented on small and large scale datasets. 100 customers are included in small instances and more than 100 customers is gives large-scale dataset. This algorithm gives best solution compared with other benchmark problems.

From the above literature, we found that heuristics techniques are mostly used to solve selected problem. The primary objective of CVRP is to minimize the distance and other objective is depend on different capacitated problem.

III. PROBLEM DEFINITION

The objectives of CVRP are first to minimize the total travelling distance and second objective is to minimize distribution vehicles.

The vehicle can be divide in three sets V: $V0 = \{V0|\ d0 = 0\}$, $Vs = \{Vi|\ 0 < di \leq Q\}$, $VL = \{Vi|\ di > Q\}$, where $V0$is initialize depot,$VL$is the group of customers with large capacity and $Vs$is the group of customers with small capacity. The demand of each customer in VLmust be divide for transportation. These customers were served more times by different other vehicles. Each customer in Vs they not allow to divide their capacity, it allow the customer is services only one time by a vehicle. The total customers' capacity of each route should not be greater

than total capacity Q. The vehicles start and end with same depot [3].

pik denotes the ratio that belongs to customer i transported by vehicle k to dv , $0 \leq pik \leq 1$.

cij denotes the travelling distance between customer i and customer j.

xij =1 represents the vehicle k leaches from coordinate i to coordinate j, otherwise $xij = 0$

The mathematical model of CVRP is the follow [3]:

$$\min \ |Veh| \quad (1)$$

$$\min \sum_{k \in Veh} \sum_{j \in V} \sum_{i \in V} c_{ij} x^k_{ij} \quad (2)$$

Subject to

$$\sum_{k \in Veh} \sum_{j \in V/\{V_0\}} x^k_{0j} = K \quad (3)$$

$$\sum_{i \in V/\{V_0\}} x^k_{0j} = 1 \quad k \in Veh \quad (4)$$

$$\sum_{i \in V} x^k_{ih} - \sum_{j \in V} x^k_{hj} = 0 \quad h \in V/\{V_0\}, k \in Veh \quad (5)$$

$$\sum_{k \in Veh} p_{ik} = 1 \; i \in V_L \quad (6)$$

$$p_{ik} = \begin{cases} 1, & transported\ by\ vehicle\ k \\ 0, & otherwise \end{cases}$$

$$i \in V_s, k \in Veh \quad (7)$$

$$\sum_{i \in V/\{V_0\}} d_i p_{ik} \leq Q \qquad k \in Veh \quad (8)$$

$$\sum_{j \in V} x^k_{ji} \geq p_{ik} \qquad k \in Veh, i \in V/\{V_0\} \quad (9)$$

where equation (1) is the objective function to minimize no. of vehicles K = $|Veh|$, whendiless than Q then capacity cannot be divide, the second function is to minimize the total travelling distance of all vehicles, and it is denoted by equation(2), equation (3) to (9) are conditions (constraints), equation (3) represents that K number of vehicles depart from the initial depot, equation (4) it allow exactly one upcoming node for each vehicle leaving from the initial depot, equation (5) represents is relationship between constraint, equation (6) represents the capacity of the customer in VL must be satisfy, equation (7)denotes the capacity of the customer in Vs is transferred by a vehicle, equation (8) denotes that the total quantity transfer by each vehicle is not greater than the whole capacity, and equation (9) represents that each customer is visit the vehicle and those customer will be selected.

IV. NSGA-II ALGORITHM

A general NSGA-II procedure to be implemented in routing problem is considered in the below steps, which is given in [13]:

Step 1: Generate a random parent population $Pt$of size N.

Step2: Sort the random parent population based on non-domination sort.

Step3: For each non-dominated solution, assign a rank equal to its non-domination level (1 is the best level, 2 is the next best level, and so on).

Step 4: Create offspring population,Qt of size N using selection, crossover and mutation operators.

Step 5: From the first generation, onwards, creation of each new generation considers the following steps:

a) Create the new population Rt of size 2N by combining the parent population $Pt$and the offspring population Qt.

b) Sort the new population Rt according to the fast non dominated sorting procedure to find all non-dominated fronts (F_1 , F_2 , F_3 , ... F_l)

c) Generate the new parent population Pt+1 of size N by adding non-dominated solutions starting from the first ranked non-dominated front F1. When the total non-dominated solutions greater than the population size N, avoid some of the lower ranked non- dominated solutions. This is achieved by sorting process which is based on the crowding distance

d) Perform selection, crossover and mutation operators on the newly generated parent population Pt+1 to create the new offspring population Qt+1 of size N

Step 6: Repeat Step 5 until the maximum number of iterations is reached.

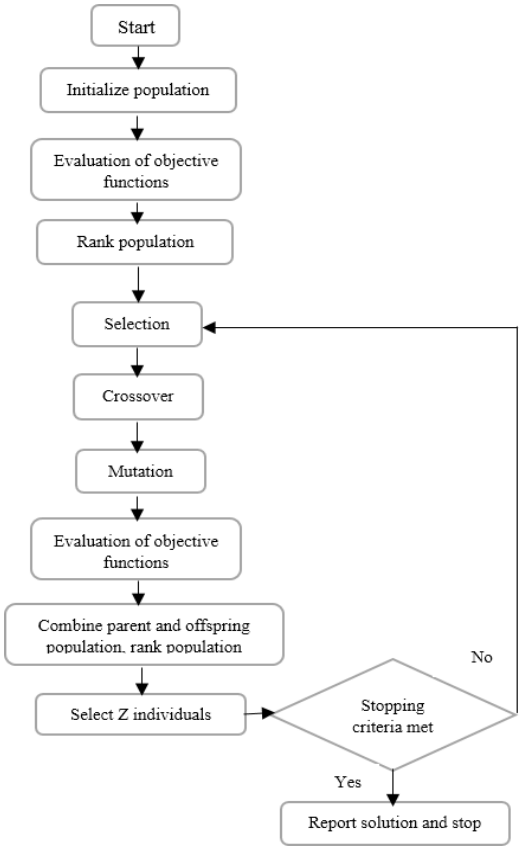

Fig 1: The Flowchart: NSGA-II Algorithm

V. RESULTS and DISCUSSION

The proposed work tested on VRPLIB E022.dat small scale instance set from Solomon's VRP data set. In E022 instance set, customer's id, x and y position, delivery demand is given. This dataset contains 22 customers and maximum capacity = 6000.

TABLE I

SATISFACTORY SOLUTION OF E022 FOR CVRP PROBLEM

Vehicles	*Customers*	*Distance (kms)*	*Capacity*	*Sequence*
1	8	159	5600	1→18 →16 →13 →8 →9→ 14→ 6 →10 →1
2	5	107	4500	1 →20→ 12 →4 →21 →11 →1
3	5	240	4400	1→22→ 7 →17→ 5 →3→ 1
4	3	101	1600	1 →2 →15→ 19→ 1

In table 1, we can see that 4 vehicles are used to travel and visit all customers. This result contains distance of each route and capacity of each vehicle and sequence of each route. This results have been obtained after 1000 iterations.

The Table II contains average results taken after 20 runs.

TABLE II

RESULTS FOR E022 INSTANCES FOR CVRP

No. of Iterations	*Total traveling Distance (kms)*	*Vehicles*
500	611	3
1000	671	4
1500	637	3
2000	631	4
2500	589	4
3000	568	4
3500	546	4
4000	520	3
4500	499	4
5000	470	3

The table II contains the no. of iterations with respect to distance and no. of vehicle that have been used. This results show that when number of iteration increases then results goes near to the optimal.

The graph is plotted based on table II. It shows convergence rate.

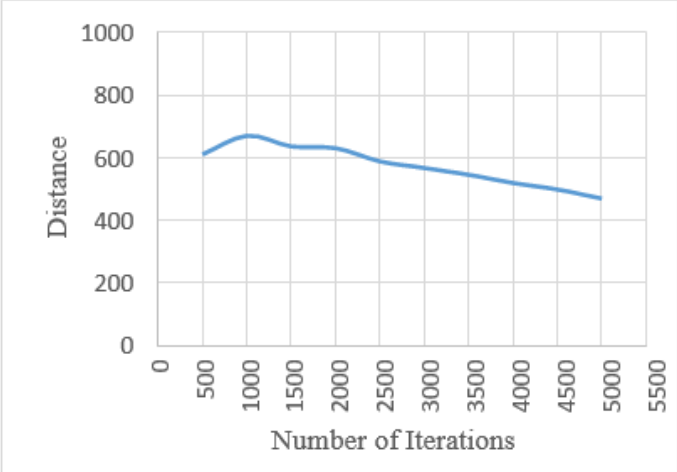

Fig 2: Convergence Graph

VI. CONCLUSION

In this paper a capacitated vehicle routing problem is solved using NSGA-II algorithm. The NSGA-II algorithm minimizes the total distance and number of distribution vehicles. The computational results show that when number of iterations increased then total distance is minimized. The obtained solution of selected CVRP problem is nearer to the optimal solution of E022 instance set of VRPLIB. In future modified NSGA-II algorithm can be proposed to solve the selected CVRP to obtain better solution. Also, the NSGA-II can be proposed to solve large size CVRP on multi-core or many-core systems.

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Digitization and Storage of Personal and Public Records in Open Standard Storage Format

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Abstract — **Digitization is the process of converting any hardcopy or nondigital record into digital format. This can include, among other things, digitizing text, photos, and converting analogue voice recordings to digital media. Records are information that an organization creates, receives, and maintains as evidence, whereas an archive is a document that contains the historical background of the nation and any organization.Our project is split into two phases digitization and storage. The system is designed to digitize any hardcopy or nondigital record into a softcopy or digital record during the Digitization phase. The system enables this by scanning the hard copy with a device with a camera, such as a smartphone. Afterwards, the digitized copy is converted into a specific format. And after the digitization phase, the file must be stored in a safe and secure manner so that it can be easily retrieved anywhere and at any time. To achieve this, we used the IPFS system to store the files. The Inter-Planetary File System (IPFS) is a distributed file storage protocol that enables computers all over the world to store and serve files as part of a massive peer-to-peer network. All files will be securely stored and encrypted using IPFS. Digitization is now a global necessity, and almost every country is attempting to make the transition. Many large- scale businesses and corporations have fully embraced digitization.**

Keyword: Digitization, record, secure, storage, organization, IPFS.

I. INTRODUCTION

Digitization is the process of converting different types of information into a digital format. Records are information that is created, received and maintained by an organization as evidence while an archive is a document that contains historical background for the nation and any organization. The term digitization is the key phrase that describes the process of making an electronic version of a 'real- world' object enabling the object to be stored, retrieved and manipulated on a computer and this is cemented over the internet.

The process of transforming any hardcopy or nondigital record into digital format is known as digitization. This can include digitizing text, photos, and converting analogue voice recordings to digital media, among other things. Many challenges inside an organization can be addressed through digitization. We have the option of implementing the digitization program in a different way depending on the desired goal. The decision to digitize should be founded on a balanced review of company needs, risks, and costs.

II. BACKGROUND

Digitization can address many issues within organization. We have a choice to roll out the digitization program differently looking at the specified outcome. as an example, if disaster preparedness could be a key concern, we may want to focus more of our efforts on digitizing indispensable records. On the either side, if the goal is to produce greater access to public records, it might be important that which records are accessed most frequently and start the digitization process there. Our Project is divided into two main phases, the digitization phase and the storage phase. In the Digitization phase, the system is designed to digitize any hardcopy or a nondigital record into a softcopy or a digital record. After this digitization phase, next is to store that file in a safe and secured way, so that it can be easily retrieved anywhere and anytime, to make this possible we have used the IPFS system for storing the files.

Since Digitization has become a very important and core part of the developing world, the project is very supreme and important for the growing technical world. Everywhere there are traditional paper methods being rejected and people switching to more developed and digitized. This project will play a crucial role in that particular space and fulfil all required needs.

III. OBJECTIVE

The main objective of the project is to create a well-developed system, where people can easily digitize their hardcopy documents and store them in a proper, safe and secured way, so that can be easily accessible from anywhere in the world. Secondly, having a speedy and easy to use interface, so that it can be easily understood the users and they can carry out their tasks in an efficient way. The project has a wide scope in present as well as the future, as these kinds of systems are in very high demand and almost every industry, company, business and even a common man requires these systems in their daily use of work. Also, government companies and government itself are trying to shift to this kind of

systems, as government works are majorly done in papers. So, in future we can make technological and design changes, which can even help government in future.

IV. PROBLEM DEFINITION

All the existing systems have all the available services for storage of files, documents, digitizing documents, or any other type of file but most of the systems do not have a secured way to store the file in the proper storage format. Most of the system use technology to store the data but it does not have a totally secured way of storing files. Taking this into consideration and finding this as a problem, the replacement for this can be a more secured way of storing the files which can be a IPFS system i.e., an Interplanetary File system which is a protocol and peer-to-peer network for storing and sharing data in a distributed file system. IPFS uses content- addressing to uniquely identify each file in a global namespace connecting all computing devices.

The problem is defined as follows:

1) The system into existence does have a totally secured way of storing files.

2) They do not have the facility to store a numerous format of files.

3) File sharing system is weak and are not advanced.

V. RELATED THEORY

IPFS: The Interplanetary File System (IPFS) is a protocol and peer-to-peer network for storing and sharing data in a distributed file system. IPFS uses content-addressing to uniquely identify each file in a global namespace connecting all computing devices. How Data is Stored: Data is stored in chunks of 256 KB, called IPFS objects. Files larger than that are split into as many IPFS objects as it takes to accommodate the file. One IPFS object per file contains links to all of the other IPFS objects that make up that file. When a file is added to the IPFS network it is given a unique, 24-character hash ID, called the content ID, or CID. That's how it is identified and referenced within the IPFS network. Recalculating the hash when the file is retrieved verifies the integrity of the file. If the check fails, the file has been modified. When files are legitimately updated, IPFS handles the versioning of files. That means the new version of the file is stored. How IFPS works: The IPFS decentralized web is made up of all the computers connected to it, known as nodes. Nodes can store data and make it accessible to anyone who requests it. If someone requests a file or a webpage, a copy of the file is cached on their node. As more and more people request that data, more and more cached copies will exist. Subsequent requests for that file can be fulfilled by any node— or combination of nodes— that has the file on it. The burden of delivering the data and fulfilling the request is gradually shared out amongst many nodes. This calls for a new type of web address. Instead of address-based routing where you have to know the location of the data and provide a specific URL to that data, the decentralized web uses content based routing.

VI. LITERATURE SURVEY

1. Stephanie Routhier Perry (2014). Digitization and Digital Preservation: A Review of Literature. This paper focuses more on the difference between digitization and digital preservation. This paper talks about the problem caused in the digitization of the documents into different formats and the problems that occur. Also, it mentioned that data storage is a critical necessity for services that help fulfill the expected requirements of the digital world. Finally, this article exhibited two scenarios of data storage immutability in IPFS and blockchain systems for the storage of large mutual agreements, as well as the blockchain encounter. Although blockchain is a secure system for storing transaction data, there is still a possibility of security breaches.

2. Mathis Steichen, Beltran Fiz, (2018). Blockchain-Based, Decentralized Access Control for IPFS- IEEE Confs on Internet of Things, Green Computing and Communications,

Blockchain, Computer and Information Technology.

This paper addressed the requirement of blockchain applications to share larger files containing sensitive information. It was mentioned, the files cannot be uploaded via unaltered ipfs nodes or efficiently stored on the blockchain. For this reason, it has been considered how to develop and deploy acl IPFS, an access control-focused extension of IPFS built on blockchain technology. A use-case for acl- IPFS has also been described, and experiments have been carried out to demonstrate the system's effects in comparison to the original IPFS. The contact with the blockchain is mostly to blame for the observed extra latency, which has been found to be apparent but unimportant to operations.

3. Mercy Gill, Usha Kakde (2021). Integrating Blockchain and the Interplanetary File System, a resilient platform for storing students' file.

This paper has brief overview of digitization and digital preservation techniques. As well as this paper contain a workflow process for digitization. The main problem stated here is about the steps that are required over the digitization process, which are to be followed. It talks the integration of Blockchain and Interplanetary File system which indeed includes the decentralized system and database to keep a permanent record of information and stores it in consecutive blocks and pattern.

VII. FLOW CHART DESIGN

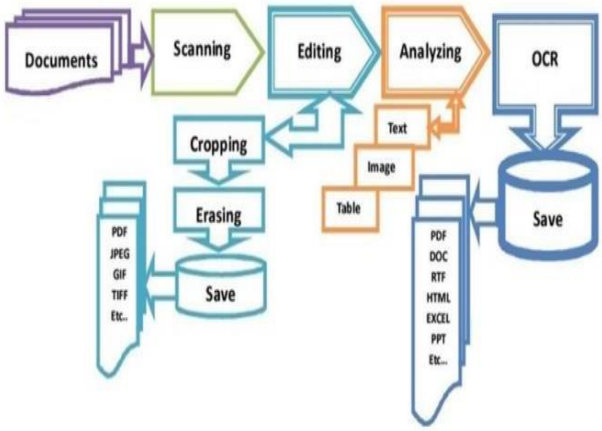

Fig: block diagram for digitization

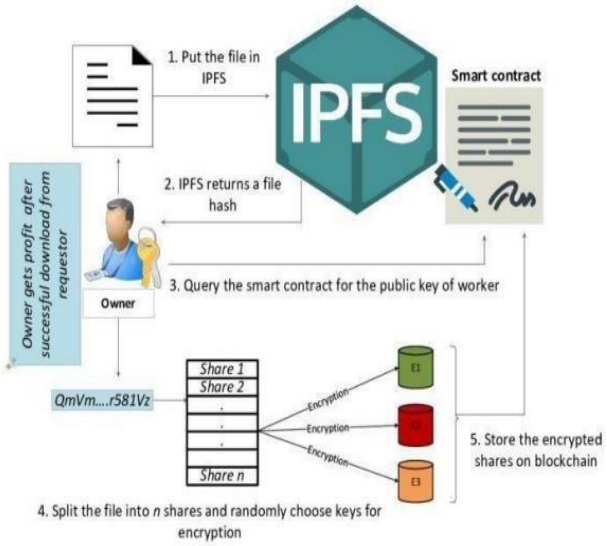

Fig: working of IPFS

VIII. RESULT

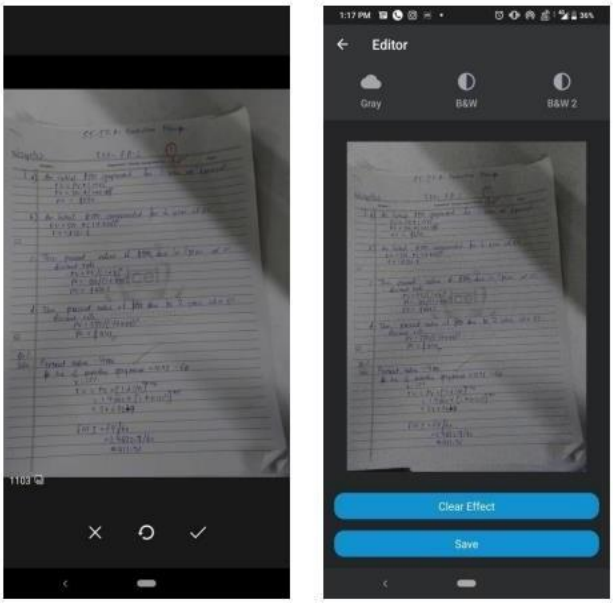

Fig: Image of App

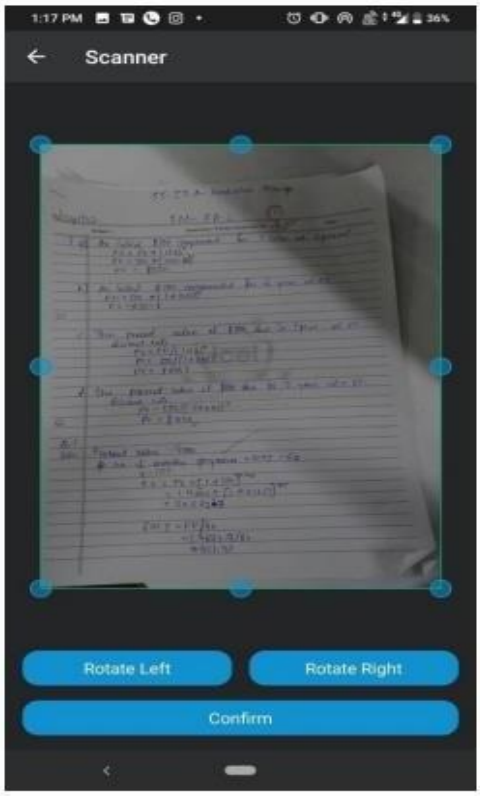

Fig : Image of app

IX. CONCLUSION

Seeing digitization as one of the most important factors in the advanced development of technology and future, it is very much essential to have a very relevant way to digitize. With not only just digitization, security and transparency are two other factor which plays a great role in the future development. Using blockchain and the IPFS system, the factors are included which leads to a perfect build-up of a system which requires a proper stay up of the storage of files which could encrypt and store it securely. Lastly, Digitization is the future and is the effective solution for maintaining transparency, accessibility and timeliness of records.

X. FUTURE SCOPE

Seeing digitization as one of the most important factors in the advanced development of technology and future, it is very much essential to have a very relevant way to digitize. With not only just digitization, security and transparency are two other factor which plays a great role in the future development. Using blockchain and the IPFS system, the factors are included which leads to a perfect build-up of a system which requires a proper stay up of the storage of files which could encrypt and store it securely. Lastly, Digitization is the future and is the effective solution for maintaining transparency, accessibility and timeliness of records.

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Generative Adversarial Networks:Theory, Applications,Challenges and Setting Up PyTorch on GPU Using Docker

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Abstract—**GAN stands for Generative Adversarial Networks(GAN) and is one of the most interesting topics in Deep Learning.GAN consist of two parts: Generator and Discriminator. They are in conflict with each other, hence the name "Adversarial"[3].GAN can be used to generate new data from existing data as well as creating images from given words (text-to-image conversion).GAN are a type of deep learning model that can learn how to recreate data with high dimensionality, such as images, audio, video, and textual data[1]. Specialized GAN can also generate 3D objects.The challenge is that GAN can be difficult to train, and existing solutions for better network architectures, functions, and optimization algorithms are not enough to address challenges[1].Hence In this paper, GAN theory ,challenges, applications, future scope and PyTorch based configuration for running code on NVIDIA GPU device are discussed.**

Keywords—Adversarial, deep learning, training, realistic, gpu, pytorch

I. INTRODUCTION

AI systems have the capability to think independently and make decisions based on the current events. Machine Learning is related to AI and Deep Learning is a branch of ML. Deep Learning attempts to imitate how the human brain works. Neural networks within Deep Learning have neurons that take in information and interact with other neurons in order to process it. Training GANs is difficult, because both networks need to find a point where their loss functions are at a minimum. Research is being done to simplify this process.[5]

Generative Adversarial Networks (GANs) is a type of deep generative model that was first introduced in 2014 by Goodfellow[2]. This model is used in various applications to handle complex and high-dimensional data. It works by using two neural networks, a generator and a discriminator, to compete with one another to reach a Nash equilibrium. The generator creates fake data that it then sends to the discriminator, which attempts to determine whether the data is real or created. In the process, the generator tries to learn the probability distribution of the real data. Despite its effectiveness, GANs suffer from several issues such as mode collapse, instability, and non-convergence[1].Adversarial trainingcan be difficult and is often referred to as unstable because there may be times when the generator has difficulty understanding what the desired results should be. This instability can be addressed with different techniques like Laplacian Adversarial Networks, Deep Convolutional Generative Adversarial Networks and Adversarial Gradient Loss Predictors. These provide different ways to help the generator provide the desired results[8].

To try to combat these issues, researchers continue to innovate the design of the network architecture, the choice of loss functions, and the optimization algorithms.In this research paper, the authors look at two common problems in the field of training models: model collapse and non-convergence. They then provide the latest solutions to these issues. The rest of the paper is divided up into various sections, which goes into detail about things like the architectures, principles, and algorithms of Basic GANs, how GANs have been improved, two typical GAN variants, and applications where GANs have been used. The final section is a conclusion of the paper.

II. CHALLENGES IN TRAINING GAN

A. Mode collapse:

GANs are trained on data with multiple parts or models to it, but they often generate limited diversity, meaning they may only create one type of output. This condition is called the "mode collapse problem" and has been the subject of many different studies looking to find a way to fix it[12].

B. Vanishing gradients

When one part of the GAN (the generator or discriminator) has become too dominant, it can lead to a situation where there is not enough learning. This is known as "vanishing gradients," as it can make it hard for the GAN to learn, because it will not be receiving enough input from the discriminator about the legitimate data it should be creating. Lastly, it can be difficult to select the right hyperparameters (such as batch size, momentum and learning rate) which may be necessary for the GAN to effectively learn and generate output[12].

III. BACKGROUND:HOW DOES GAN WORK?

Generator:

The Generator takes random noise created from the training data as input. The training data can be an image and the Generator then tries to create an image which is as close to the real image in the training dataset as possible. The Generator's goal is to create a fake image that is convincing enough to 'fool' the Discriminator.

Discriminator:

The Discriminator is a component of a Generative Adversarial Network (GAN). Its job is to determine which input is real (taken from training data) and which one is fake (generated by the Generator component). In order to do this, it needs to be trained using the training data. The Discriminator is taking input from two sources: the real data from the training data set, and the fake data from the Generator component. It then tries to classify the inputs as either real or fake. If it gets the classification wrong,it results in a classification error[4].

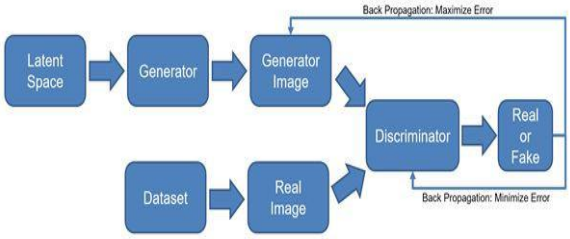

Figure 1: GAN Architecture

Step 1: Training of Discriminator starts with training data, x. Goal of Discriminator is to increase the probability of getting correct label. Output should be real for the training data and fake for data generated from the Generator.

Step 2: Take a random input from the training data and introduce noise to create random noise data z.

Step 3:Generator takes the random noise data z and tries to reconstruct the input x hat.

Step 4: Discriminator takes input from two sources. One input is the real input from the training data. Other input is the data generated by the Generator. Discriminator classifies input as real or fake. Based on classification, classification error is computed.

Step 5: It then back propagates the classification error to update the Discriminator. Goal of Discriminator is to minimize the classification error.

Step 6: Classification error is also back propagated to update the Generator. Goal of the Generator is to increase the Discriminator classification error.

Generator G produces a probability Pg as distribution of the samples G(z) obtained from z.

To learn the generator's distribution Pg over data x, we define a prior on input noise variables Pz(z),

D(x) represents the probability from the training data x rather than Pg.GANs need to optimize below min max objective function.

$$\min_G \max_D = V(G; D) = \min_G \max_D E_{exp_{real}}[\log D(x)] + E_{zp_z}[\log(1 - D(G(z)))] \quad (1)$$

IV. TYPES OF GAN'S

A. Fully connected GAN's

A fully-connected neural network is a type of computer algorithm that can learn from input data. The GANs introduced in this paper are not very advanced, and have numerous drawbacks. They are only suitable for working with very simple datasets such as MNIST or CIFAR-10[7].

B. DCGAN

A DCGAN (Deep Convolutional Generative Adversarial Network) is an improved version of a traditional GAN (Generative Adversarial Network). DCGANs use convolutional and convolutional-transpose layers in their discriminator and generator in order to make the process more efficient. These convolutional layers allow for the understanding of the statistical distribution of the original samples. DCGANs also use a special type of algorithm called a CNN (Convolutional Neural Network) which is mainly used to find important features in a given image, such as edge detection. Finally, DCGANs have been found to be more stable in generating images than in normal GANs. In order to prevent GAN instability, the authors recommend replacing any pooling layers with strided convolutions for the discriminator and fractional-strided convolutions for the generator. Furthermore, they suggest removing fully connected hidden layers, adding batch normalization for both the generator and discriminator, using the ReLU activation function in the generator and the Tanh activation function in the output layer, and using the Leaky ReLU activation function in the discriminator[6].

C. Conditional GAN-CGAN

The generative network's job is to create 'fake' samples in order to fool the discriminator network. Furthermore, both the generator and the discriminator are able to use some kind of arbitrary input data to produce more precise results.A Conditional GAN is a type of Artificial Intelligence system that uses two networks, an encoder and a decoder, to generate data. The encoder maps an input label into a low-dimensional space, and the decoder does the opposite and maps the low-dimensional space back into the label. This allows the system to generate new data based on the input labels[9].

D. Info GAN

A GAN utilizes an information-theoretic approach where it can learn disentangled representations without needing to be supervised. Instead of having the

latent variables be known in advance, they propose drawing them from different distributions such as Bernoulli, Normal, and multiclass. Then the discriminator is tasked with reconstructing these latent variables. In order to ensure that the GAN model is successful at creating a representation of the input data that includes interesting features, the authors propose forcing the GAN to have a high information content between the generated samples and a small subset of the latent variables C[11].

E. LAPGAN

LAPGAN stands for Laplacian Generative Adversarial Networks. It is a type of algorithm where GAN (Generative Adversarial Networks) is used together with a Laplacian pyramid with different levels. In the coarsest level of the pyramid, the GAN is trained to map a noise vector to an image with the lowest resolution. Then, the GAN at each other level takes the image generated in the coarser level and uses it as a condition to produce the image at that level. With this technique it's possible to create images with great resolution[6].

F. Vari GAN

Vari GAN is a type of artificial intelligence that is used to create multi-view human images from a single view. It follows a coarse-to-fine approach, meaning it generates images in multiple steps. In Vari GAN, there are three main networks: a Coarse Image Generator, Fine Image Generator and Conditional Discriminator. The Coarse Image Generator uses a Variational Auto Encoder (VAE) to generate a low resolution image from an input image and target view. The Fine Image Generator is built with a U-Net architecture which is named after its symmetric shape. U-Net takes the low resolution image and converts it into a higher resolution image that is conditioned on the original input image. Finally, the Discriminator examines the conditioned high resolution image to measure the difference between the generated image and the ground truth. It achieves this by using an adversarial loss and a content loss based on the L1 difference[10].

G. VGAN

Vondrick proposed a generative adversarial network for video (vGAN). This type of network uses two interactive networks (the generator and the discriminator) to create and improve videos. The generator has two-streams, the background stream which uses 2D convolutional layers and the foreground stream which uses spatial-temporal 3D convolutional layers. The discriminator takes the total generated video as input and tries to distinguish between real and generated videos. This network generates tiny videos of about one-second duration, but requires large memory space since it treats videos as 3D cubes[5].

H. TGAN

TGAN stands for a type of deep learning network, called a "Temporal Generative Adversarial Network", which was proposed by Saito.. TGAN goes beyond vanila GAN by having one extra element: a temporal generator. This is a type of generator which produces a series of latent frame vectors from a random variable. The image generator then takes those frame vectors and produces individual video frames, which then go to the discriminator for evaluation. Finally, for the training to be stable, TGAN adopts the same WGAN model but with a twist: it applies a technique called singular value clipping instead of weight clipping to the discriminator[7].

V. APPLICATIONS

COMPUTER VISION

GANs (Generative Adversarial Networks) are currently being used mainly in the field of computer vision - this refers to using powerful computer algorithms to process and interpret images. Specifically, GANs are used for image enhancement (making images look clearer and sharper), image transformation (changing an image from one form to another, like converting a picture to a line drawing), image compounding (putting multiple images together to form one), and video production (putting together video clips to create a new video).

IMAGE RESOLUTION ENHANCEMENT

Super-Resolution Generative Adversarial Network (SRGAN) as a way to improve the resolution of images. This network takes a low-resolution image as input and produces an image with 4 times the high-resolution detail. One year later, Wang proposed the Enhanced Super-Resolution Generative Adversarial Network (ESRGAN) which is designed to make the images produced by the SRGAN more realistic and to reduce unwanted noise in the images by changing the structure of the network and the format of the loss function[4].

IMAGE TRANSLATION

Pix2pix is an image-to-image conversion method developed by Isola that uses Conditional Generative Adversarial Networks (GANs). It enables the transformation of an image from one domain to another. Experiments have shown that pix2pix is effective for graphics and visual tasks. Improvements on the method have resulted in pix2pixHD, which produces higher-resolution images with better clarity and quality. Although pix2pix is very successful in image conversion problems, it only works with data that has a pairing between the input and output image domains. To address this, CycleGAN, DiscoGAN, and DualGAN were proposed. These three methods use a different approach to make it possible to train image conversions on unpaired data[8].

NATURAL LANGUAGE PROCESSING

SeqGAN and RankGAN are both types of GAN which Yu et al. and Lin et al. proposed as replacements for traditional methods in lecture, literature and music generation. Li et al. proposed GANs as a reinforcement learning problem, where the output of the discriminator is used as a reward for the generator. This means that the generator is rewarded for producing conversational exchanged that are so realistic it is like two real people having a conversation.

IMAGE INPAINTING

Image inpainting is a process of restoring parts of images that have been damaged or lost. Many deep learning techniques have been developed to attempt to solve this problem, and the challenge they face is filling in large gaps of an image. Convolutional networks are often employed because they are good at generating an image with the right features to fill in the gaps[12].

VIDEO GENERATION

Video prediction is a way of predicting what will happen in a video in the future. VGAN and TGAN are two ways of making a GAN that generates videos. VGAN assumes the video is made up of a single background and a mobile foreground. TGAN uses a generator to create latent frame vectors and an image generator to turn them into video frames. MoCoGAN uses content, which is the objects in a video, and motion, which is their movement, to generate a video. It does this through a unique adversarial learning scheme that involves image and video discriminators. Experiments with different datasets have proven that MoCoGAN successfully creates videos that have the same content but different motion, or different content but the same motion[11].

VI. ENVIRONMENTAL SETUP USING DOCKER

1-Model is developed using Pytorch framework that is to be executed on NVIDIA GPU hence Pytorch is configured by pulling respective docker image and started as container in docker environment.

Following commands were executed on fedora36

#docker pull pytorch/pytorch:1.4-cuda10.1-cudnn7-devel

#docker run --gpus all -it -p 5080:8888 --rm --ipc=host -v /home/amar/:/amar/ --name amarpytorchproject pytorch/pytorch:1.4-cuda10.1-cudnn7-devel

#jupyter notebook --ip 0.0.0.0 --port 8888 --no-browser --allow-root &

Above command will generate a url that will enable us to access jupyter-notebook for running PyTorch code.

Following are the digits generated by the GAN based model ,trained on publicly available MNIST dataset.

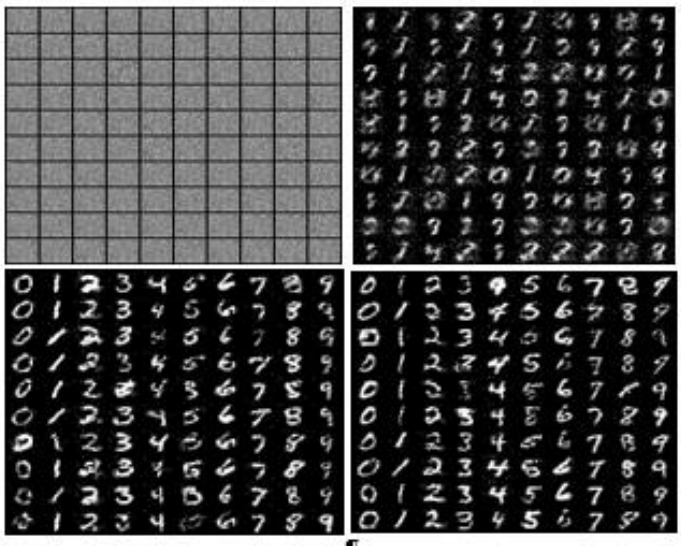

Figure 2: “GAN based” model output after few epochs

We noted following observations.

1-Running a GAN based models which processes images/videos to generate output, there is need of powerful GPU.

2-It takes huge time to generate the results on Intel i5 based CPU.

3-But it is found that running same model on NVIDIA GPU like TitanX,we observed huge deduction in execution time, almost greater than 4 times.

4-Thus it proves that ,GAN is able to generate realistic looking data which humans cannot identify its origin. The same data can be used further as training data to enhance the accuracy of models where highest accuracy is expected.

TABLE 1. Summary of Architecture-Variant GANS

Type	Description	Findings
Fully connected GAN	Fully connected neural networks are used for both the generator and the discriminator.	-Applied to some simple image datasets, such as MNIST and CIFAR-10. It does not perform well in terms of generalization for more complex image types.
Semi-supervised GAN	In comparison to fully connected GAN (FCGAN), the discriminator in SGAN is multi-headed.	It uses softmax and sigmoid to classify real data and differentiate between real and fake samples.
Bidirectional GAN	An encoder (E), a generator (G), and a discriminator comprise the architecture (D)	BiGAN) is developed for learning the inverse mapping, -The batch size is 128 and the weight decay as 2.5×10^{-5}.
Conditional GAN	The extra information y (which can be a class label or other modal data) is fed to both the discriminator and the generator by CGAN.	Dropout is applied to both the generator and the discriminator with a probability of 0.5. -Momentum is used with an initial value of 0.5 and was eventually increased to 0.7.

InfoGAN	Unsupervised learning of interpretable representations by maximising mutual information between conditional variables and generative data.	Batch normalisation is used in conjunction with the Adam optimizer. The discriminator uses Leaky ReLU with a leaky rate of 0.1, while the generator uses ReLU.
Laplacian Pyramid of Adversarial Networks	Used to generate higher-resolution images from lower-resolution GAN input.	The discriminator employed three hidden layers with sigmoid output, whereas the generator employed a five-layer CNN with ReLU and batch normalisation.
Deep Convolutional GAN	For Generator, a deconvolutional neural network architecture is used.	DCGAN uses the spatial up-sampling ability of the deconvolution operation for G, which makes the generation of higher resolution images using GAN

VII. GAN-BASED SEGMENTATION METHODS

A. GANs applications in brain tumor segmentation

Brain MRI images and CT scans are commonly used in medical imaging to diagnose and monitor specific patient illness progression, as well as plan possible treatment.Alzheimer's and brain tumours are two of the most fatal diseases. Manual segmentation and identification of pathologies in brain images, on the other hand, are time-consuming and tedious tasks.The imbalanced datasets of brain tumour images pose significant challenges in medical imaging, directly affecting the training process of the proposed models. GANs have recently gained traction in the research community for their ability to syn- thesize brain images.[13]

B. GANs applications in skin lesion segmentation

Malignant melanoma is a dangerous form of cancer which is highly increasing in numbers. In 2018, it had 1.04 cases reported, which is a frightening statistic. Unfortunately, if these cancers are not diagnosed quickly, the survival rate of people with melanoma can be less than 15% in five years. However, there is hope because a quicker response can bring the survival rate to greater than six times. Dermatologists use detemoscopy which involves monitoring and magnifying the skin's pigmentation. But this takes a lot of time and expertise. Thankfully, the advancement of deep learning models in computer vision can help dermatologists more accurately detect skin-related cancers.Stacked adversarial learning is a technique used to learn the features of skin lesions, such as the characteristics of an area of skin affected by cancer. Feature diversity means that it can take various types of information about a lesion and use it to detect it. FCN stands for fully convolutional network which is a type of network used to generate the lesion samples needed for skin lesion segmentation. GAN stands for generative adverserial networks, and this type of network is used to help with the task of segmenting images of skin lesions.[13]

C. GANs applications in cardiac segmentation

Cardiac segmentation is the process of segmenting three dimensional images of the heart so that specific parts, such as more vulnerable parts, can be identified and studied. Cardiac magnetic resonance imaging (CMRI) is used to detect cardiac diseases, so it contains important details for evaluation of treatments. However, echocardiography, which is another way to evaluate the heart, can be challenging due to low spatial resolution and deformable appearances, which make it difficult to correctly label the imaging. Thus, the authors of [102] proposed a model using generative adversarial networks (CGANs) to try to address some of these challenges and improve segmentation of cardiac short-axis in MRI.[13]

D. GANs applications in liver tumor segmentation

The World Health Organization (WHO) reported in 2017 that liver cancer had become the second most deadly type of malignant tumor (a type of cancer) worldwide. Thus, researchers all over the world are actively studying how to prevent and treat liver diseases. Early detection of liver lesions (abnormalities) is important because it will lead to better treatment plans and help patients to recover faster. To detect liver lesions in the early stages, researchers have come up with different methods and frameworks based on computed tomography (CT) images. For example, Frid Adar et al. proposed a method that uses Generative Adversarial Network (GAN) which is a type of machine learning, to augment (or “increase”) the medical images when the dataset is limited.[13]

E. GANs applications in retina diseases segmentation

Diabetic retinopathy and Glaucoma are two of the leading causes of vision loss and blindness. Early detection and screening are vital in preventing permanent vision loss as these diseases cause damage to the blood vessels of the eyes. Research focusing on the segmentation of retinal vessels has employed deep learning-based models. A GANs-oriented, semi-supervised network has been proposed for segmentation tasks, which is more effective than traditional CNN networks. Additionally, residual learning techniques were applied to improve the architecture of the Convolutional Neural Networks (FCNs).[13]

VII. CONCLUSION

In recent years, GANs have become very popular in the scientific world, and have been used for a wide range of applications, including speech generation and cybersecurity. However, training a GAN can be difficult, as it can encounter two major problems: mode collapse and non-convergence. One way to address these

challenges is to change the network architecture, objective function, or optimization algorithm to create a more powerful model. In response to these solutions, researchers have created many different GAN variants with different capabilities. This article provides an overview of the original GAN framework and explores the various GAN variants created through different optimization techniques. It also summarizes the existing research on GANs and discusses how different approaches address the common challenges.[12]

VIII. FUTURE DIRECTIONS

GAN can be used to create meta-universe scene which are in huge demand in movies and animations. Efficient GAN can be built for generating high-resolution images without blurriness, working with images of different resolutions. They have also been used in video and 3D model generation, but the results are imperfect hence better and fast GAN models are expected[11]. All of these challenges will need further research and exploration, if GANs are to reach their full potential[9].

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IoT-based Automated System for Water-related Disease Prediction

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Abstract – **Water is an essential nutrient that has a key function in the human body. All bodily fluids, including blood, lymph, etc., are derived from pure drinking water. Therefore, proper water monitoring is crucial for producing safe, pure, and hygienic water. The majority of homes get their water from wells. To maintain a safe and dependable source of drinking water, it is essential to regularly test the quality of our well water. The test results enable us to accurately describe a water system's problems. This aids in ensuring that the water supply is adequately protected against potential pollution and that the right treatment has been selected and is functioning as intended. Everyone on the earth needs clean drinking water, and today this is frequently a known issue owing to various water-borne illnesses including cholera, diarrhoea, etc. The goal of the research is to address these issues. To determine the contents, the water samples are observed. Then, machine learning, deep learning and neural network algorithms are employed to estimate purity using those contents. The results are then examined, and every disease that could be brought on by drinking that water is screened for.**

Keywords – Water-borne Disease, Water Quality, LSTM, SMOTE, Data Augmentation, Prediction, Forecasting

I. Introduction

Safe and readily available water is important for public health, whether it is used for drinking, domestic use, food production, or recreational purposes. Improved water supply, sanitation, and water resource management can significantly contribute to lowering poverty while boosting a nation's economic growth. More than 2 billion people reside in nations with water shortages, which are predicted to get worse in some areas due to population expansion and climate change. At least 2 billion people throughout the world consume water that has been tainted with feces. The biggest threat to the safety of drinking water is microbial contamination brought on by feces contamination. Arsenic, fluoride, and nitrate pose the greatest chemical dangers in drinking water, but new contaminants such as pesticides, medicines, per- and polyfluoroalkyl substances (PFASs), and microplastics also cause public concern. Water that is safe and plentiful makes it easier to practice cleanliness, which is important for preventing many neglected tropical diseases as well as acute respiratory infections and diarrheal diseases. Drinking water that has been tainted by microorganisms can spread diseases like diarrhea, cholera, dysentery, typhoid, and polio, as well as cause 485,000 diarrhea-related deaths annually.

In 2020, 5.8 billion people, or 74% of the world's population, used a drinking water service that was safely managed, or one that was on-site, readily available, and uncontaminated. The rest 2 billion individuals without access to well-managed services included –

- 1.2 billion people have access to basic services, i.e., a better water source within a 30-minute roundtrip;
- 282 million people without access to basic services or who must travel more than 30 minutes to access a better water source;
- 368 million people use unprotected wells and springs to get their water;
- Collecting untreated surface water from lakes, ponds, rivers, and streams on behalf of 122 million people.

According to the World Health Organization (WHO), water-related illnesses are the greatest cause of sickness and death globally, taking the lives of more than 3.4 million people annually. Young children make up the majority of the victims, and the vast majority of them pass away from illnesses brought on by organisms that flourish in raw sewage- contaminated water sources. According to analysts, preventing disease and death caused by dirty water and poor sanitation would result in enormous financial benefits for both production and health. According to one estimate, depending on the nation, there would be an economic return of between $3 and $34 for every dollar spent. Also, Water-borne diseases can become major problems after natural disasters if large numbers are forced to live temporarily in crowded areas with poor sanitation and limited supply of safe water. Research suggests that, in some settings, climate change could affect water-borne diseases, because changes in temperature and rainfall can affect the survival of disease-causing organisms. Hence, there is a need for continuous monitoring of water quality and gaining insights from collected data to estimate unsolicited events like a disease outbreak. Currently, there are low-efficient system that can predict diseases based on water quality mostly which is analyzed manually on which human health readily depends. Therefore, there is a requirement for an automated water quality monitoring system that can also analyze the water quality data, estimate probable disease spread, and raise alerts on the occurrence of such events.

There are some milestones for the project implementation:

- Conceptualizing Framework by setting monitoring parameters
- Sample location and frequency
- Sampling techniques, building applications, and apparatus
- Sampling timetables
- Checking qualification and accreditation standards for testing data
- Developing techniques for validating sampling results and quality assurance
- Specifications for reviewing and analyzing findings
- Specifications for record-keeping and documentation, including how monitoring results will be documented and preserved
- Requirement for results reporting and communication with stakeholders

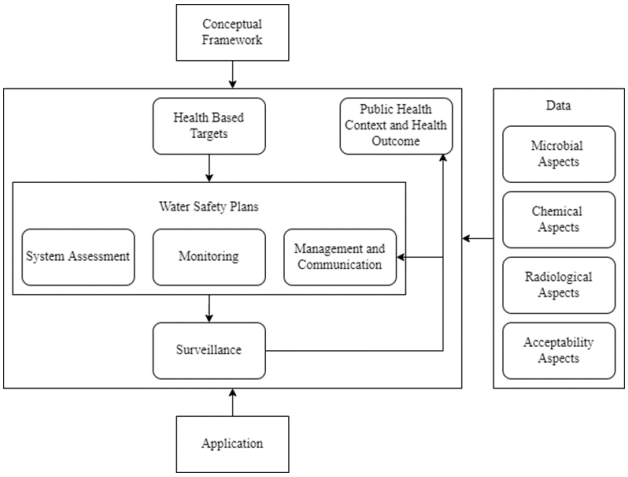


Figure 01: Interrelationship between Individual Module

II. Literature Survey

Detection of rotaviruses in river water and sewage water in Shanghai by RT-PCR, Ming Yang, Wenhui Qiu, et. al. For this project water samples were collected from around 21 sites. Those samples were tested in the lab using various chemical methods thus concluding the results, The results have revealed that rotavirus amplicons have a positive control and thus environmental water samples can be noticed as a specific band in agarose gel thus after electrophores is, which also suggested that virus particles are recovered from water samples using sodium chloride, aluminum chloride precipitation method, and also using the RT nest PCR method it was effective to detect the rota-virus present in water samples. Developing an underwater monitoring and alert system for water-borne disease management, N. M. K. Varma, et. al. This Project is known as an Underwater acoustic sensor network that can collect ocean, river, and lake data such as salt content, temperature, pH, turbidity, and also oxidation in the water supplies. In this, they are adding preprocessing and rule-based engine functionalities to the underwater surface gateway thus sending the warning message to the local healthcare center. Government healthcare centers receive the data from the underwater surface gateway via the internet and the equivalent data can be processed using big data analysis for water-borne disease protection and its management.

Measuring the Water Quality in Bore well Using Sensors and Alerting System, S. Jayalakshmi, el. al. The main aim of this paper is to recognize the grade of water using the IoT. In this project executing a system for measuring the water value through devices like a TDS meter, DC motor, LM35 temperature sensor, and GSM. Micro- controller Avenue is the significance that is checked by using sensors. The recorded data is gathered in the centralized database server and if the water value is below the TDS meter values, a caution message is sent to owners using GSM. This atmosphere can have adjustable good water. In the proposed paper, the water quality is checked using the Turbidity sensor and also the motor's temperature using sensors.

An Affordable System for Remotely Monitoring Water Quality in Residential Water Tanks, Khaili, Asma & Almamari, et. al. In the following proposed project work, a system is projected to remotely sense, record, and determine the value of drinking water kept in domestic tanks. Various sensors are used to determine the pH, turbidity, oxidation, and temperature values present in the water. Three separate temperature sensors are used to check the temperature of the water, and also the temperature inside and outside of the tank is checked. The system sends caution messages to the landowner and the local establishments or societies (if they set) when one of the values is lower than the normal values. Implementation of Wireless Sensor Network for Real Time Overhead Tank Water Quality Monitoring Sowmya, C., C. D. Naidu, et. al. The main objective of this project is to examine the quality of the water in the overhead tanks in society simultaneously with help of using 3 calculating devices like pH, conductivity, and temperature sensors. The Application of Wireless Sensor Network technology is used for the examination of instant water quality. In this proposed project work the system design and implementation of WSN are presented in detail. In this WSN is used for checking water quality the gathered amount of sensor nodes with the ability of networking, which is deployed at various overhead tanks and water bodies in a particular surrounding.

III. PROBLEM STATEMENT

About 70% of the earth's surface is covered by water, which is one of the most critical resources for maintaining life. Rapid industrialization and urbanization have caused an alarming rate of water quality degradation, which has

resulted in terrible diseases. Traditional methods for estimating water quality involve costly and time-consuming statistical and laboratory tests, making the idea of real-time monitoring irrelevant today. Thus, with the goal of the need for a quicker, more practical solution because of the dire effect caused by it Proposing a model using time-series analysis powered with AI, ML, and DL to predict and forecast long and short-term trends related to water-borne diseases along with providing appropriate solutions. The suggested methodology will validate the potential for application in real-time for automated IoT-based water-borne diseases related detection systems by achieving reasonable accuracy with a limited number of parameters.

IV. OBJECTIVES

- To predict water-related various diseases using an IoT device that will analyze the quality of water with the help of AI, ML, and DL and eliminate the risk at an early stage.
- To ensure testing, monitoring, and frequent water quality surveillance of the drinking water supply and sources by the supplier to foster the provision of clean tap water to every rural home and public institution and to bring confidence in drinking water straight from the tap.
- To monitor reportable illnesses that are frequently brought on by waterborne pathogens, and detection of outbreaks.
- To study long-term trends, in demographic and geographic data, and provide appropriate solutions.
- To help government authorities to lower water-borne diseases through the proposed system by maintaining appropriate water quality levels through continuous monitoring.

V. SCOPE

- For making the general public conscious of the significance of drinking water quality and its connection to health, as well as the requirement for clean drinking water to be available in appropriate quantities for domestic use for drinking, cooking, and hygiene.
- Acknowledgment of surveillance is important and a community reaction is required.
- Converting suggestions of research's findings into a sizable IoT-based online monitoring system that uses sensors for the necessary metrics. Based on the real-time data supplied by the IoT system, the tested algorithms would make an immediate prediction of the water quality.
- The suggested IoT system would make use of pH, turbidity, temperature, and other parameter sensors. TDS for parameter readings and use of an Arduino microcontroller to convey those readings Transceiver.
- Before water is released for consumption, it would detect water of poor quality and alert the appropriate authorities. It should prevent as many individuals from consuming low- quality products. water and thereby reduce the severity of terrible illnesses like diarrhea and typhoid.
- Investigations into outbreaks with intervention studies to assess available choices for interventions.
- Case-control or cohort studies to assess the contribution of water to illness risk.
- In light of this, the system will facilitate would benefit from the application of a prescriptive analysis based on the anticipated values to help those who make decisions and policies.

VI. METHODOLOGY

This research will aid in the prediction of water diseases, prevent water contamination, and promote healthy use of the resource. Thus, the system will use a variety of sensors, such as pH, turbidity, oxidation, and conductivity sensors, to implement these various sensors to forecast and prevent the types of diseases that may arise.

Here, several sensors will function as needed; for example, the pH sensor will give our machine information on both acidic and non- acidic conditions. The total amount of light scattered by the floating items in the water is calculated by turbidity sensors. The number of suspended particles in a body of water increases with turbidity, which is a measurement of the water's capacity to either clean itself or decompose into waste. Here, the devices are getting the analog input from the sensors and giving it to the system to check the water quality, locate the diseases and the system will find with the aid of the various water quality datasets, and stop them in their tracks.

IoT will be utilized to forecast water quality in the system using cutting-edge technology like AI, ML, and DL. Predictive research is chiefly concerned with forecasting (predicting) outcomes, consequences, costs, or effects. This type of research tries to extrapolate from the analysis of existing phenomena, policies, or other entities to predict something that has not been tried, tested, or proposed before A Predictive research project often asks how- or how well something might work, or what the impact of something might be. The Predictive paradigm is a lot like a crystal ball trying to tell the future of something.

We have chosen predictive Research since we are going to forecast/predict the type of diseases that can occur if the current quality of water levels persists in the future.

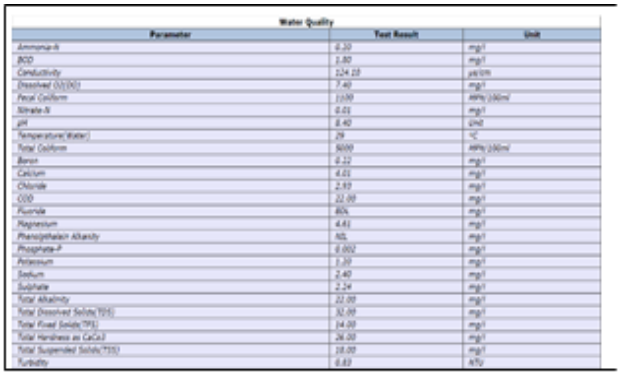
We would be following a deductive approach since we have formulated a set of hypotheses or your dissertation that need to be confirmed or rejected during the research process.

a. Data collection method and tools

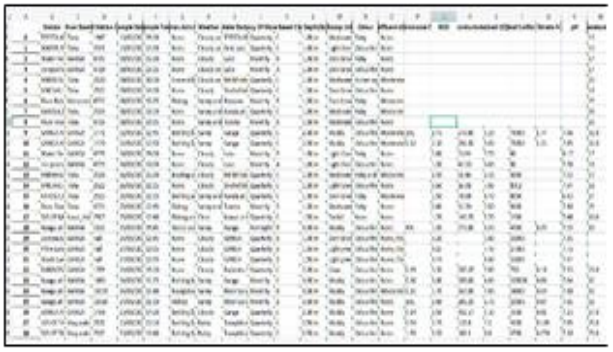
We required a water dataset with varied water quality attributes for these issue statements. The West Bengal Pollution Board updates the state of West Bengal's water properties in real-time regularly.

The river data sample page appears as follows:

The attributes provided by them are as follows:



Since the data was found on a website, web scraping was used to acquire the data, which was then put on an excel sheet with 10715 rows of data samples.



Tools used for data collection: Jupyter Notebook, Python, BeautifulSoup Library

Data Source:

http://emis.wbpcb.gov.in/waterquality/views ampledatacitizen.do

Code for Scraping:

https://colab.research.google.com/drive/17a k3TM0goYrqk3o01O1AnVlJYr740oLm?us p=sharing

b. Data analysis

- The process of data analysis is very important to avoid future costs and make the model more accurate.
- After collecting the data from scraping various preprocessing techniques were applied to the dataset starting from handling the noise and removing the outliers.
- Applying various feature engineering techniques to understand the structure of the dataset and get various insights from it.
- Applying data augmentation techniques to make the dataset as a time series data using various techniques.
- The Data analysis technique which can be applied to our project is Predictive Analysis since we will be finding patterns in older data as well as current events to analyze and predict future events.

VII. IMPLEMENTATION DETAILS

The first step is to collect water-related data with the help of sensors. Or by using pre- collected data also which contains attributes like temperature, TDS, Turbidity, pH, and conductivity. The data is easily available on many websites. After that collected data should be stored in the cloud. This is only for the monitoring and storing of the data. You can use a cloud service for the storage of the data. to improve the project, the system will display water quality data by using the P10 dot matrix display. Then for training and testing the data, there will be a need for an accurate dataset. Water quality-related datasets can easily be available on any health- related website like WHO or the West Bengal pollution control board or can simply find them on Kaggle. For training and testing of the data, the system will use a gradient boosting classifier machine learning algorithm. Use a spyder scientific environment that gives features like advanced editing and debugging. Scikit-learn a machine learning library developed in python language will be used for classification, support vector machine, regression, gradient boosting classifier, and many more algorithms. The algorithm will help in the prediction of the disease by providing appropriate solutions.

The next step is to integrate the model with the user-friendly dynamic website which gives an alert to nearby government offices or any water purifying plant. Push bullet application will be used which is the easiest way to transfer data from mobile to pc and vice versa.

If water quality is dangerous to health, then it will automatically give the notification to the devices. It will also forecast long and short- term trends.

Tools:

- IDE – Jupyter Notebook, PyCharm
- Database and Cloud Service – Firebase, AWS
- IoT Devices

Technologies:

- Frontend – HTML, CSS, JavaScript, jQuery, Bootstrap
- Backend – Django, Python

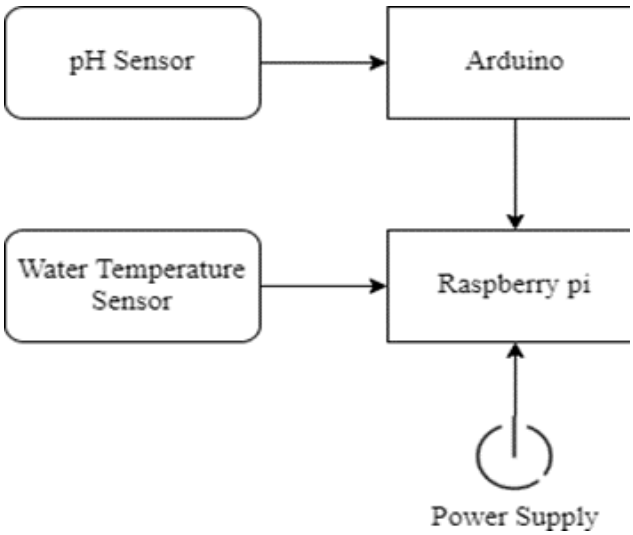


Figure 2: Block Diagram of Water Prediction Model

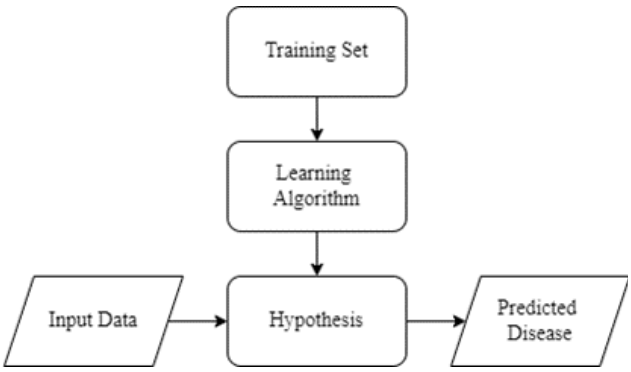


Figure 3: Software Working Module

VIII. Results and Discussion

The primary cause of illness and death worldwide is water-related disorders. Water infected with viruses, bacteria, metals, poisons, and other chemical contaminants is the main source of diseases linked to poor water quality. To estimate unexpected events like a disease epidemic, we, therefore, need to continuously check the quality of the water and gain knowledge from the data that has been collected. There is currently no technology that can forecast diseases based on water quality. Therefore, there is a need for a system to monitor water quality that can also evaluate the data, predict when diseases may spread, and issue alarms when such things happen. There are some completion dates for the project.

IX. CONCLUSION

Any region's health and economy are directly impacted by the quality of the water. To preserve excellent public health, it is crucial to provide a safe drinking water supply. As a result, it is difficult to determine the exact quality of the water. The prediction model must be accurate to prevent misleading results. As a result, water infections can likely be predicted by preventing the interaction with any dangerous chemicals.

The project will use Raspberry PI and Arduino with no analog sensor built into the raspberry pi. It can be further implemented on a single chip to reduce cost. This project can now only predict limited types of diseases. More diseases can be predicted after adding more datasets. This project can also be integrated with android phones by creating sensor modules that can be attached to android phones and the prediction part will be handled by the website app. Thus, using an IoT device and a system powered by AI, ML, and DL will examine the quality of the water and reduce the risk at an early stage, one can forecast numerous diseases that are related to the use of water. It will encourage the provision of safe tap water to every rural home and public institution and inspire confidence in drinking water straight from the tap, the supplier should ensure testing, monitoring, and regular water quality surveillance of the drinking water supply and sources. Keeping track of outbreaks and reportable illnesses that are frequently caused by waterborne pathogens.

Long-term patterns in demographic and geographic data will be easier to be studied, and relevant solutions will be offered before mishappening. At last, maintaining proper water quality levels through ongoing monitoring can assist government officials in reducing water-borne diseases.

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Exploring the Power of Blockchain Technology: Opportunities, Challenges, and Future Possibilities

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Abstract: **Blockchain technology is a decentralized, distributed ledger that allows for secure and transparent recording of transactions. It operates on a network of nodes and is secured through cryptography, making it resistant to tampering and fraud. There are several types of blockchain networks, including public, private, and consortium blockchains.**

Blockchain technology offers several benefits, including increased security, transparency, and efficiency. It has the potential to transform various industries, such as finance, supply chain management, digital identity management, and smart contracts.

Despite its potential, blockchain technology also faces several challenges and limitations, such as scalability, interoperability, and adoption and regulation. Addressing these challenges will be critical for the future success and growth of blockchain technology.

Keywords: Blockchain technology, network, distributed ledger,smart contract

I. INTRODUCTION

Definition of blockchain technology:

Blockchain technology is a decentralized, distributed digital ledger that records transactions across a network of computers. It uses cryptography to secure and verify the integrity of these transactions. Each block in the chain contains a number of transactions and is linked to the previous block, forming a chain of blocks (hence the name "blockchain"). The ledger is maintained by a network of nodes, making it resistant to modification or tampering by any single node.

This technology enables the creation of a secure, transparent and tamper-proof record of transactions, without the need for intermediaries such as banks. Blockchain has the potential to revolutionize various industries, including finance, supply chain management, and voting systems, among others.

This paper provides an overview of blockchain technology, including its definition, structure, and basic principles. The different types of blockchain networks, including public, private, and consortium blockchains, are also discussed. The benefits and potential applications of blockchain technology are explored, including increased security, transparency, and efficiency, and its use in industries such as finance, supply chain management, digital identity management, and smart contracts.

Additionally, the challenges and limitations facing blockchain technology are evaluated, including scalability, interoperability, and adoption and regulation. Finally, the paper concludes by discussing the future scope and potential of blockchain technology and its role in shaping the digital landscape.

Overall, this paper provides a comprehensive introduction to blockchain technology, its benefits and applications, and the challenges it faces. It highlights the importance of understanding and exploring this emerging technology as it continues to evolve and play an increasingly important role in our digital world.

Brief history of blockchain:

Blockchain technology was first introduced in 2008 as the underlying technology for the digital currency, Bitcoin. The concept was presented in a whitepaper by an unknown person or group using the pseudonym Satoshi Nakamoto.

Since then, blockchain has evolved beyond its original use case in cryptocurrency. The technology has been applied in various industries and has received increased attention from businesses, governments, and individuals.

In 2015, the concept of smart contracts was introduced, allowing for the automation of contractual processes on the blockchain. This opened up new possibilities for decentralized applications, further expanding the potential uses of blockchain.

Over the years, various blockchain platforms and networks have been developed, each with its own unique features and uses. The rise of blockchain-based decentralized finance (DeFi) and non-fungible tokens (NFTs) has further popularized the technology and sparked new innovations.

Overall, the brief history of blockchain shows a rapid evolution from a niche technology to a potentially transformative tool with numerous real-world applications.

The purpose of the paper is to provide a comprehensive overview of blockchain technology and its key features to help the reader gain a better understanding of its potential uses and limitations. It should be written in a clear and accessible manner, suitable for a wide range of readers with varying levels of technical expertise.

II. HOW BLOCKCHAIN WORKS:

Blockchain networks work by maintaining a decentralized ledger of transactions that is distributed across a network of computers (nodes). Each node has a copy of the ledger, and transactions are verified and added to the ledger through a consensus mechanism.

Here is a step-by-step explanation of how a blockchain network works:

- Transaction: A user initiates a transaction, which is broadcasted to the network.
- Verification: The transaction is verified by network nodes, ensuring that the user has sufficient funds and that the transaction is valid.
- Package into a block: The verified transactions are packaged into a block, along with a unique code called a hash, and a reference to the previous block's hash.
- Distributed consensus: The block is then broadcasted to the network, where nodes compete to validate it and add it to their copy of the ledger through a consensus mechanism. This mechanism ensures that all nodes have the same version of the ledger.
- Addition to the chain: Once a block is validated, it is added to the chain and cannot be altered, ensuring the integrity and immutability of the ledger.

This process is repeated for each new transaction, forming a chain of blocks. The decentralized nature of the network and the consensus mechanism ensure that the ledger is secure and transparent, and that transactions are verified and recorded without the need for intermediaries.

A. Overview of a blockchain network

A blockchain network consists of several key components:

- Decentralized ledger: A blockchain network maintains a shared ledger of transactions that is decentralized and distributed across a network of nodes. Each node has a copy of the ledger, and transactions are verified and added to the ledger through a consensus mechanism.
- Nodes: The nodes in a blockchain network are computers that run the software that powers the blockchain. They are responsible for verifying transactions, adding them to the ledger, and maintaining the network.
- Consensus mechanism: The consensus mechanism is the process by which the network reaches agreement on the state of the ledger and the validity of transactions. Different blockchain networks use different consensus mechanisms, such as Proof of Work (PoW) or Proof of Stake (PoS).
- Cryptography: Cryptography is used to secure the transactions and the ledger. It ensures that the ledger is tamper-proof and that transactions are verified and validated by the network.
- Smart contracts: Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. They can automate various processes and reduce the need for intermediaries.
- Tokens: Tokens are digital assets that can represent ownership of an asset, such as a stock or a physical commodity, or a unit of currency. They are often used in blockchain networks as a means of exchange.

Overall, a blockchain network is a decentralized, secure, and transparent system for recording transactions and tracking assets. It has the potential to revolutionize various industries by providing a trustless and secure platform for conducting transactions and exchanging assets.

III. TYPES OF BLOCKCHAIN NETWORKS

There are several types of blockchain networks, including:

- Public blockchains: Public blockchains are open networks that allow anyone to join and participate. They are typically transparent and secure, and offer a high degree of decentralization. Examples include the Bitcoin and Ethereum networks.
- Private blockchains: Private blockchains are restricted networks that are only accessible to a limited number of participants. They are often used for enterprise applications, where the goal is to maintain control over the network and protect sensitive data.
- Consortium blockchains: Consortium blockchains are hybrid networks that are partially centralized and partially decentralized. They are governed by a consortium of organizations, rather than a single entity, and offer a balance between transparency, security, and control.
- Hybrid blockchains: Hybrid blockchains are networks that combine features of public and private blockchains. They allow for both public and private transactions on the same network, and can provide a balance between security, privacy, and accessibility.

Each type of blockchain network has its own benefits and limitations, and the choice of network type depends on the specific use case and the requirements of the users.

Public blockchains offer the highest degree of decentralization and security, but may not be suitable for all applications due to scalability and privacy concerns. Private and consortium blockchains offer greater control and privacy, but may sacrifice some of the benefits of decentralization. Hybrid blockchains aim to provide a balance between the two.

IV. KEY FEATURES OF BLOCKCHAIN TECHNOLOGY

Here are some key features of blockchain technology:

- Decentralization: The blockchain network is decentralized and operates on a peer-to-peer basis, with no central authority controlling it.

- Immutable: Once data is recorded on a blockchain, it is extremely difficult to change or tamper with, making it highly secure.

- Transparent: All participants in a blockchain network can view and verify transactions, making it a transparent system.

- Secure: Blockchain uses cryptography to secure data and ensure that only authorized parties can access it.

- Tamper-Proof: The decentralized nature of the blockchain makes it resistant to tampering and fraud, as any changes to the data must be approved by a consensus of participants in the network.

- Traceability: Each transaction on a blockchain is recorded and linked to previous transactions, making it possible to trace the history of an asset from its creation to its current ownership.

- Efficiency: Blockchain technology eliminates the need for intermediaries, reducing the time and cost of transactions.

V. APPLICATIONS OF BLOCKCHAIN TECHNOLOGY

- Cryptocurrency: Cryptocurrency refers to digital or virtual currencies that use cryptography to secure transactions and to control the creation of new units. The most well-known example of a cryptocurrency is Bitcoin. Cryptocurrencies are typically decentralized and maintained on a public ledger that is secured by a blockchain.

- Supply chain management: Blockchain technology can be used in supply chain management to increase transparency and efficiency by allowing all parties involved in the supply chain to have access to the same information. This can help to prevent fraud, reduce errors, and improve the overall flow of goods and information.

- Digital identity management: Blockchain technology can be used to create secure, decentralized digital identities for individuals, organizations, and devices. This can help to prevent identity theft and fraud, as well as make it easier for individuals to manage and control their personal information.

- Smart contracts: Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. They are stored on a blockchain and can be automatically executed when certain conditions are met. This can help to reduce the need for intermediaries, increase transparency, and increase the speed and efficiency of contractual agreements.

VI. LIMITATIONS AND CHALLENGES OF BLOCKCHAIN TECHNOLOGY

- Scalability: Scalability refers to the ability of a system to handle increasing amounts of transactions and data. Blockchain technology currently faces scalability challenges due to its limited processing power and storage capacity. This can result in slow transaction speeds, high fees, and long confirmation times.

- Interoperability: Interoperability refers to the ability of different blockchain systems to work together seamlessly. Currently, different blockchain systems use different protocols and technologies, which can make it difficult for them to interact with each other. This can limit the growth and adoption of blockchain technology.

- Adoption and Regulation: Adoption and regulation are two of the biggest challenges facing blockchain technology. Many

- individuals and organizations are still unfamiliar with the technology, and there is a lack of standardization and clear regulations. This can make it difficult for blockchain technology to be widely adopted and used in various industries and applications. Additionally, there is a lack of trust in the technology due to its association with illegal activities, such as money laundering and fraud. This can also limit its adoption and growth.

VII. CONCLUSION

Blockchain technology is a decentralized, distributed ledger that allows for secure and transparent recording of transactions. It operates on a network of nodes and is secured through cryptography, making it resistant to tampering and fraud. There are several types of blockchain networks, including public, private, and consortium blockchains.

Blockchain technology offers several benefits, including increased security, transparency, and efficiency. It has the potential to transform various industries, such as finance, supply chain management, digital identity management, and smart contracts.

Despite its potential, blockchain technology also faces several challenges and limitations, such as scalability,

interoperability, and adoption and regulation. Addressing these challenges will be critical for the future success and growth of blockchain technology.

In conclusion, blockchain technology is a rapidly growing and evolving field with tremendous potential for innovation and progress in the years to come. As we continue to explore its capabilities and overcome its limitations, we can expect to see it play an increasingly important role in our digital world.

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Nefty – The NFT Marketplace

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Abstract— **NFT market development platforms are shaping the future of future startups to beat the competition. Build your own marketplace to create, sell, and trade NFTs using our NFT marketplace development platform. "NFT Marketplace" is a stage where consumers can hold, display, sell or produce Non-Fungible Tokens (NFTs). Non-Fungible Tokens (NFTs) are actually digital assets that are built on blockchain technology and reflect real-world objects. NFTs are certificates of ownership or authenticity of digital assets such as images, music, art, etc. NFTs are stored on the blockchain and contain information about the NFT's history and details. The NFT Marketplace allows creators to reach a wider audience with their NFT work. This system will be useful for buying and selling different types of NFTs on the NFT Marketplace platform.**

I. INTRODUCTION

Non-fungible tokens were first introduced in 2017. Unlike traditional cryptographic tokens, NFTs are unique digital assets that cannot be duplicated. All cryptocurrencies are basically Bitcoin, Ether or other tokens. These tokens are fungible because they are exchanged with each other and their value remains constant. So you can easily exchange one Bitcoin for another Bitcoin. However, this does not work for non-fungible tokens that represent rights to unique assets. Essentially, NFTs are a way to tokenize assets. For example, you can digitize your rights to a work of art and receive a token to prove it. There is only one token associated with your property and no similar token can be found. Exchanging Art Tokens for other Art Tokens is not the same or equivalent. Just like every real-world asset is unique, the NFTs it represents are also unique. Unlike Bitcoin or Ethereum, non-fungible tokens cannot be exchanged directly on various cryptocurrency exchanges. A special platform is required to buy and sell NFTs. The NFT Marketplace is a platform where users can create, store, buy and sell non-fungible tokens. In most cases, tokens can be auctioned off or purchased at a fixed price. To use the NFT marketplace, users must have a cryptocurrency wallet (e.g. MetaMask) to store their cryptocurrencies in order to transact. NFTs can be implemented on any blockchain that supports smart contract programming. Therefore, most NTS are built on Ethereum using the ERC-721 and ERC-1155 standards. Unlike normal tokens, which are fungible and have the same value, each NFT is unique and cannot be duplicated, exchanged or divided. Since NFTs are based on smart contracts (also known as self-executing contracts), each token contains a unique set of information (metadata) recorded in the smart contract, and the blockchain ensures immutability and security. Creating a NFT marketplace usually requires creating a token protocol on the Ethereum network. This is a special group of smart contracts (Figure 1) that provide implementation of certain functions in the market. Additionally, the protocol integrates with marketplace systems. In most cases, all NFT auction platforms share a common thread. First, users need to register on the platform and integrate digital wallets to store NFTs and cryptocurrencies. The platform's registration process is directly related to the cryptocurrency wallet and actually registers with the wallet. Users can then create collections by uploading items to display their work. Users will also be able to choose which payment tokens they will accept for their works and set a secondary selling fee if offered by the platform. The next step is to list the items you want to sell. Users can choose to bid on an auction or fixed price. When an item is sold, a transaction is created that initiates a private trading smart contract for the user's wallet. The platform may need to adjust the fee, and if approved, the NFT will be listed for sale and will be able to accept bids. Generally, NFT marketplaces charge a small fee on the purchase amount.

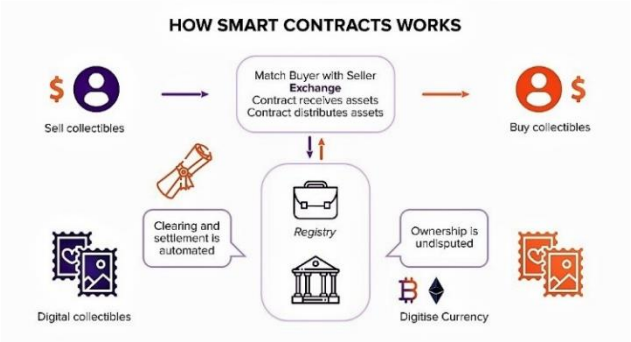

Fig. 1. Working of smart contracts.

II. RELATED WORK

Wajiha Rehman has published a research paper [1] that aims to provide a comprehensive overview of NFTs and their underlying technologies (e.g. blockchain and Ethereum). She also has many platforms for buying and selling NFTs, as well as NFT applications in various fields including education, fashion, sports and digital art. In addition, this white paper highlights key issues in the adoption of NFT technology in terms of security, privacy, environmental impact, ownership, governance, and ownership.The significant increase since the introduction of NFTs is discussed. The current technological and legal environment presents significant challenges related to the application of NFTs. Various NFT applications are being

sought in various fields. Qin Wang published a research paper [2]. The NFT ecosystem is being explored from various perspectives. We start with an overview of current NFT solutions, then provide technical components, protocols, standards, and desired features. We then discuss the evolution of security by discussing the design model's prospects, opportunities, and challenges. We will discuss some common issues in terms of usability, security, governance and scalability, covering both system-level issues arising from blockchain-based platforms and human factors such as regulation and society. Mieszko Mazur has published a research paper [3] examining the risk and return characteristics of NFT-based startups listed on cryptocurrency exchanges. His research has motivated the recent surge in NFT activity from creators, investors, and traders. This article begins by proposing a new classification of traditional NFTs, from blockchain NFTs to NFT DeFi via the NFT metaverse. Next, we set up our NFTs. You get 130% on the first day of listing. Long-term investment returns of multiples of 40 (approximately 4000%), four times higher than Bitcoin over the same period. It provides a positive, significant alpha and shows an above-average beta. It also shows that the NFT sector of the cryptocurrency market is leading the market recovery after the mid-2021 crash, generating returns close to 350%. The final analysis of the article shows that NFT infrastructure integrated into existing blockchains increases the market value of these networks. Z. Zheng published a research paper [4] describing the blockchain, the foundation of Bitcoin, which has recently attracted a lot of attention. The blockchain acts as an immutable ledger that allows transactions to occur in a decentralized manner. Blockchain-based applications are emerging in a variety of fields, including financial services, reputation systems, and the Internet of Things (IoT). However, there are still many challenges of blockchain technology, such as scalability and security. This article provides a comprehensive overview of blockchain technology. It provides an overview of blockchain architecture and compares some of the common consensus algorithms used in different blockchains. Technical issues and recent advances are also briefly listed. It also describes future trends in blockchain. Fakhar ul Hassan published an article [5] that provides an overview of blockchain-based network applications. They talked about how blockchain is challenging the status quo of the central trust infrastructure currently prevalent on the Internet, towards design principles that emphasize decentralization, transparency, and trustworthy auditability. Ideally, blockchain represents a decentralized, transparent, and more democratic version of the internet. Their goal in this article was to highlight the evolution of blockchain-based systems that seek to revive the existing mostly centralized networked application space.

III. PROPOSED METHODOLOGY

FIG. Figure 2 shows a conceptual diagram of the proposed NFT trading platform. You cannot buy or sell without an NFT environment. NFTs are traded on a decentralized website known as the NFT Marketplace, which lists all NFTs for sale by creators around the world. Make it easy for customers to find and purchase NFTs. A notable NFT trading platform is based on the Ethereum blockchain network. NFT marketplaces were originally introduced on the Ethereum blockchain network. These types of platforms require both buyers and sellers to use wallets to ensure smooth transactions.

Merchants can sell NFTs in several ways. Set a fixed price for a specific NFT and make it easy for customers to buy at the purchase price. Alternatively, sellers can add their NFTs to the auction listing and bid to determine the minimum bid price at which buyers can participate in the auction.

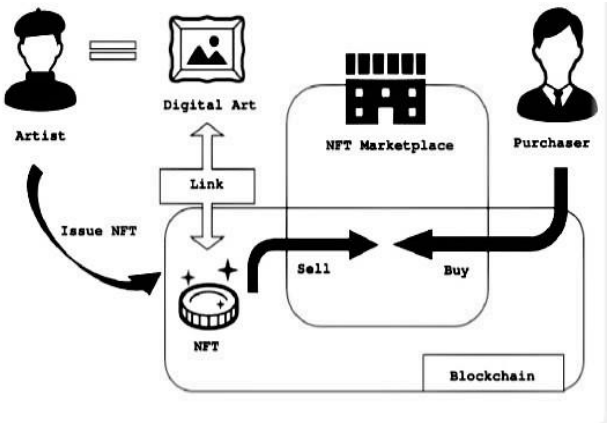

Fig.2. System Design of Proposed NFT Marketplace.

A. Working of Smart Contract

A smart contract is a computer program or trading protocol designed to automatically execute, control or document events and actions in accordance with the terms of a contract or agreement. The goal of smart contracts is to reduce the need for trusted intermediaries, arbitrage costs and fraudulent losses, and to reduce malicious and accidental exceptions. Operation of a smart contract that converts the contents of the contract into a block chain/code stored in the block chain. Thus, the terms of the contract appear in the form of proposals and autonomous orders based on blockchain technology. Such code is supported by programming that guarantees that an item can be executed when certain conditions in the contract are met. However, in the case of smart contracts or depending on the type, an external agent may need to intervene to ensure that the terms of the contract are being fulfilled. Based on external data and information, depending on whether the conditions of the smart contract are met, it is necessary to decide whether to execute the contract and fulfill the contract. A contract is executed immediately when its conditions meet.

Encrypted transaction logs are exchanged between participants without the involvement of third parties, so

there is no fear of information being tampered with for personal gain. Because blockchain transaction records are encrypted, it is very difficult to hack. Also, since each entry in the distributed ledger is linked to the entries before and after it, changing one entry would require a hacker to change the entire chain. Smart contracts eliminate the need for intermediaries to conduct transactions, as well as time delays and associated fees. Fig. 3 shows a smart contract in action.

Fig. 3. Working of a Smart Contract.

B. Features of NFT Marketplace

Currently, NFT Marketplace platforms dominate the cryptocurrency industry. Due to the skyrocketing income, several entrepreneurs and crypto enthusiasts are interested in creating their own NFT Marketplace platform. The following are the key characteristics that a trading platform must possess in order to achieve great success in the cryptocurrency industry. The NFT Store is an advanced control panel that includes NFT preview information, owner details, price history, and more. Advanced token retrieval options on the trading platform give users instant access to the right token. Provide users with a simple listing mechanism to list tradable non-fungible tokens without barriers. Instead of requiring buyers to register with random online wallets, give your marketplace users their own cryptocurrency wallets and help them store their NFTs fearlessly. Since the main purpose of NFT marketplaces is NFT trading, it is important to provide flexible pricing options, rates, etc. to enable users to transact smoothly. The ability to track the location of registered or traded NFTs on the platform helps users control trades and trades. As NFT users increase, it is recommended to have cross-chain functionality so that NFTs from various blockchain networks can be listed and traded here. These features will attract more NFT enthusiasts to the platform. Fig. 4 shows the features of a NFT Marketplace.

C. Working of NFT Marketplace

The NFT Marketplace is a place to list NFTs for sale. They are very similar to auction houses. NFTs are claimed to be true works of art and the highest bidder wins a prize. The more people bidding, the higher the price. This is why collections are so easy to sell. This creates a scarcity that increases the value and price of NFTs. NFT marketplace has numerous different features and types, which makes them quite distinct from eCommerce marketplaces. NFTs or digital assets can be stored, traded, and displayed to a large audience, and a unique business model is evolving.

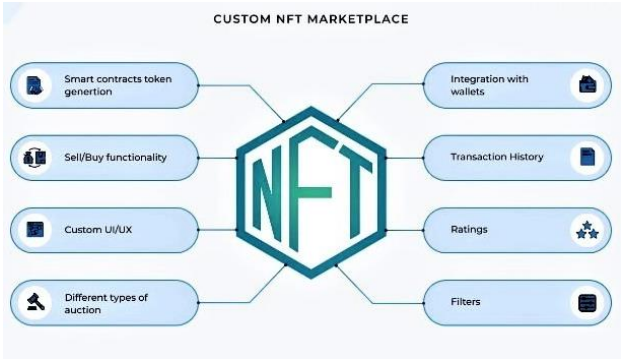

Fig. 4. Features of NFT Marketplace.

Unlike platforms like Spotify or Netflix, which offer unlimited digital content at a subscription fee, NFT marketplaces are built on the notion that, as with physical goods, digital content can be scarce, meaningful, and for sale. These platforms use blockchain technology to maintain digital provenance in much the same way that a traditional auction house can examine a piece of art to verify that it is an original rather than a copy. Some platforms even provide the option to burn items. This further reinforces the scarcity of digital products. Blockchain-based transaction ledgers can also make attribution easier by automatically distributing percentage revenue from resold goods among creators every time their NFTs trade hands. To use the NFT Marketplace, you need three things: Cryptocurrency Wallet: Choose one that is compatible with the blockchain network you want to use. For example, if you plan to buy or sell NFTs on the Ethereum blockchain platform, use a compatible Ethereum wallet such as MetaMask. Not an empty wallet: Before buying, listing or issuing NFTs, you need to pre-fill your wallet with some funds. User account: Create an account for the specific market you want to work with NFTs in. Fig. 5 shows the working of a NFT Marketplace.

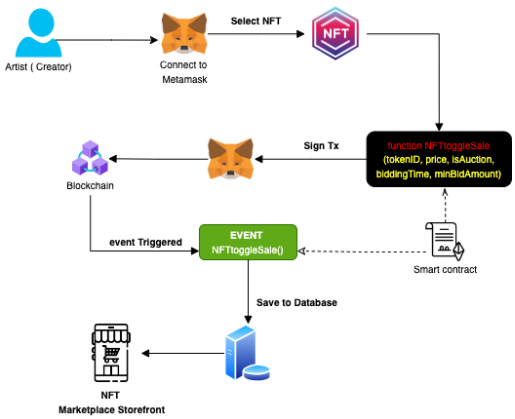

Fig. 5. Working of NFT Marketplace.

D. Blockchain Technology

Blockchain is a method of recording information that makes it impossible or difficult to change, hack or manipulate the system. A blockchain is a distributed ledger that replicates and distributes transactions across a network of computers participating in the blockchain. Blockchain technology is a structure that stores public records of transactions, also called blocks, in multiple databases called "chains" on a network connected through peer-to-peer nodes. This repository is commonly referred to as a "digital ledger". The properties of this book ensure the safety and security of its contents.

Each transaction in this book is authorized by the owner's digital signature, which authenticates the transaction and protects it from unauthorized access. Thus, information contained in digital registries is securely protected. Simply put, a digital ledger is like a Google spreadsheet shared by millions of computers on a network that stores transaction records based on actual purchases. What's interesting is that anyone can see your data, but they can't damage it.

IV. WORK FLOW

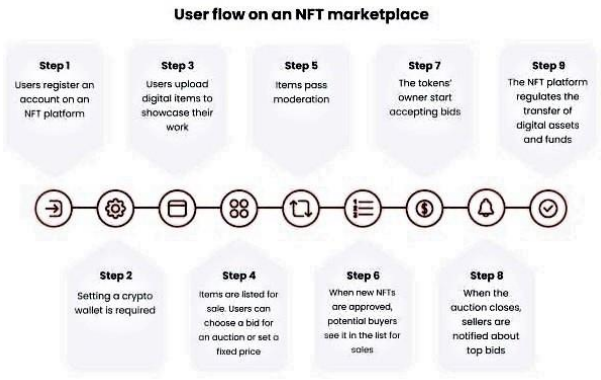

Fig. 6. Flowchart of the proposed system.

V. CONCLUSION

This article proposes a model for creating, listing and selling NFTs in the NFT Marketplace. The proposed method uses Solidity for writing smart contracts, JavaScript for React and testing, Ethers for interacting with the blockchain, and Hardhat as the development environment. It also uses Ipfs to store metadata and React routers for navigational components. The NFT Marketplace is a new-age marketplace for trading, selling, and buying digital works. As cryptocurrencies grow in popularity and value, it is safe to assume that NFT markets and entire blockchain networks will remain in demand in the long run. The effectiveness and applicability of the proposed method will be studied in the public NFT market and compared with other blockchain networks for secure transactions of NFT domains.

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Performance Evaluation of Lightweight ASCON-Hash Algorithm for IoT Device

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Abstract—**Lightweight cryptographic hashing algorithms are designed to be efficient and fast, making them suitable for use in resource-constrained milieus such as Internet of Things (IoT) devices, other embedded systems. These algorithms are optimized for limited computational power, memory, and bandwidth, while still providing a high level of security. Resources constrained devices typically have limited computational power, memory, and bandwidth, making it challenging to use traditional, computationally intensive cryptographic algorithms. Lightweight hashing algorithms are designed to address this challenge by providing a high level of security while being optimized for the limited resources of these devices. This allows them to be used in a wide range of applications, such as: Authentication: To verify the authenticity of messages and prevent tampering or replay attacks. Digital signatures: To provide non- repudiation and ensure that messages have not been altered in transit. Data integrity: To detect accidental or intentional modification of data. Key derivation: To generate cryptographic keys from a shared secret or password. This paper is focused on ASCON-Hash LWC , which his based on sponge structure. Detailed study on hash function of ASCON is done and algorithm is implemented on raspberry Pi to analyze actual result. After performing experiments on the ASCON-Hash ,it has been observed that there is possibility to optimize the algorithm by optimizing the permutation layer of hash function.**

Index Terms—Cryptographic algorithm, data integrity, decryption, encryption, hash functions, IoT, lightweight, resource constrain devices.

I. INTRODUCTION

THERE is extensive use of smart gadgets for variety of applications. Many smart gadgets come into resource constraint category, with limited processing capabilities in terms of memory, time and energy consumption. To maintain equilibrium of security triad (confidentiality, Integrity and availability) in resource constraint micro-controller like Raspberry Pi, Arduino Uno is matter of concern. For achieving confidentiality, encryption and decryption algorithms are used. To achieve Integrity hashing concept, need to be implemented.

Cryptographic hashing algorithms are mathematical functions that convert input data of arbitrary size into a fixed-size output, called a hash, such that for same input value the hash value will be same. These algorithms are designed to be irreversible function, meaning that it is practically impossible to reconstruct the original input from the hash.[1] Traditional cryptographic hashing algorithms, such as the widely-used SHA-1 and SHA-2, have some potential drawbacks that canlimit their effectiveness in certainscenarios:

- Vulnerability to collision attacks: Some traditional cryptographic hashing algorithms are vulnerable to collision attacks, which occur when two different messages produce the same hash value. This can lead to security vulnerabilities in systems that rely on the uniqueness of hash values, such as digital signatures and message authentication codes.
- Limited message size: Traditional cryptographic hashing algorithms often have a limited message size that can be hashed in a single operation. This can be a limitation in certain scenarios, such as when hashing large files or streams of data.
- No privacy protection: Traditional cryptographic hashing algorithms do not provide privacy protection for metadata associated with the hashed data, such as the length of the message or the identity of the sender and receiver.
- No key management: Unlike some cryptographic algorithms, traditional cryptographic hashing algorithms do not require key management, but they rely on the properties of the hash function to provide security. However, if the hash function is compromised, this can lead to security vulnerabilities.

Lightweight cryptographic hashing, also known as lightweight hash functions, refers to a class of hash functions that are designed to be implemented efficiently on resource- constrained devices, such as low-power microcontrollers or RFID tags. These hash functions are typically designed to have a small code and data size, low power consumption, and high processing speed, while still providing a level of security that is appropriate for the specific application.[2]

Some examples of lightweight cryptographic hash functions include PHOTON, SPONGENT, and LESAMNTA, which are designedto provide cryptographic security while also being efficient in terms of memory and processing power.

Lightweight cryptographic hash functions are important for securing the growing number of IoT kind devices, which often have limited resources and are vulnerable to attacks due to their connectivity to the internet. These hash functions can be used for tasks suchas message authentication and integrity checking, which are

important for ensuring the security of data transmitted between IoT devices. It's important to note that while lightweight cryptographic hash functions can provide a level of security that is appropriate for many IoT applications, they may have limitations in terms of the level of security they can provide compared to more complex hash functions. Therefore, it's important to carefully evaluate the specific security requirements of the application and choose a hash function that is appropriate for those requirements.

II DIFFERENCE BETWEEN TRADITIONAL HASHING AND LIGHTWEIGHT HASHING

Traditional cryptographic hash functions and lightweight cryptographic hash functions are both designed to perform the same basic task, which is to take an input message of arbitrary length and produce a fixed-size output that is representative of the message. However, there are several key differences between the two types of hash functions. Design: Traditional cryptographic hash functions, such as SHA-2 and SHA-3, are designed to be highly secure and resistant to a wide range of attacks, including collision attacks, preimage attacks, and second preimage attacks. These hash functions are designed to provide a high level of security, but can be computationally expensive and may not be optimized for low-power devices. On the other hand, lightweight cryptographic hash functions are designed to be efficient and fast on low-power devices such as microcontrollers and embedded systems. These hash functions typically use simpler designs and algorithms that are optimized for performance, but may not provide the same level of security as traditional hash functions.[3][4]

Security: Traditional cryptographic hash functions are designed to provide a high level of security, and are typically used for applications where data integrity and authenticity are critical, such as digital signatures and password storage. These hash functions are designed to be resistant to a wide range of attacks, and are often subject to extensive security analysis and testing.

Lightweight cryptographic hash functions, on the other hand, may not provide the same level of security as traditional hash functions, and may be vulnerable to certain types of attacks, such as collision attacks or hash-flooding attacks. However, these hash functions are still designed to provide a basic level of security and integrity, and are often used in applications where speed and efficiency are more important than absolute security.

Applications: Traditional cryptographic hash functions are widely used in a variety of applications, including encryption, authentication, and digital signatures. These hash functions are used in high-security applications where data integrity and authenticity are critical. Lightweight cryptographic hash functions are often used in low-power devices and embedded systems, where efficiency and speed are more important than absolute security. These hash functions are commonly used in applications such as sensor networks, RFID tags, and other devices where memory and processing power are limited.

III TYPES OF LIGHTWEIGHT CRYPTOGRAPHIC HASH FUNCTIONS

There are three major category of lightweight cryptographic hash function. Markel Damgard , block cipher and Sponge construction. These constructions also include substitution permutation network, Fiestel structure with arithmetic modular addition, circular fashion bit shift, exclusive Or operations. Below these constructions are described in brief.

A. Markel Damgard Hash Function:

Merkle-Damgård is a widely used construction for constructing cryptographic hash functions. It is named after Ralph Merkle and Ivan Damgård, who independently developed the idea in the late 1970s. The Merkle-Damgård construction is the basis for many popular hash functions, including MD5, SHA-1, SHA-2, and SHA-3.The Merkle- Damgård construction is based on a compression function that takes a fixed-size input and produces a fixed-size output. The compression function is used to process blocks of the input message and generate an intermediate hash value. The intermediate hash value is then used as the input to the compression function for the next block, until all blocks have been processed.

The Merkle-Damgård construction consists of three phases: padding, compression, and output.

Padding: The input message is padded so that its length is a multiple of the block size of the compression function. The padding is done in such a way that it is distinguishable from the original message, to ensure that the padding cannot be used to create collisions.

Compression: The compression function is applied to each block of the padded message, using the intermediate hash value from the previous block as an input. The output of the compression function is the intermediate hash value for the current block.

Output: Once all blocks have been processed, the final intermediate hash value is the output of the hash function. The security of the Merkle-Damgård construction depends on the security of the compression function and the strength of the padding. The compression function should be designed so that it is resistant to collision attacks, and the padding should be designed so that it is distinguishable from the message and resistant to length extension attacks.

One disadvantage of the Merkle-Damgård construction is that it is vulnerable to length extension attacks, which allow an attacker to append data to a hash output without knowing the input. This vulnerability has led to the development of other constructions, such as the sponge

construction used in SHA-3, that are resistant to length extension attacks.[5]

B. Block Cipher Hashing Construction:

The Lightweight (LW) block cipher is a family of small, efficient block ciphers designed for resource-constrained environments such as low-power devices. One common use of the LW block cipher is as a component of hash functions.

LW block cipher-based hash functions use the following construction:

1. The input message is padded to a multiple of the block size of the LW block cipher.

2. The padded message is divided into blocks of the block size.

3. An initial value (IV) is chosen and passed through the LW block cipher to produce the initial state.

4. For each block of input data, the current state is passed through the LW block cipher, along with the block of input data, to produce a new state.

5. After all the blocks have been processed, the final state is the hash value.

The LW block cipher consists of a number of rounds, each of which applies a non-linear function to the state, followed by a linear mixing operation. The non-linear function is typically based on an S-box, which maps an input to an output based on a fixed lookup table. The linear mixing operation typically involves the XOR or addition of various parts of the state.

The LW block cipher is designed to have a low gate count, low power consumption, and a small code size. It is also designed to be resistant to various attacks, such as differential and linear cryptanalysis.

C. Sponge Construction

Sponge functions are a class of cryptographic primitives that can be used for various purposes such as message authentication, encryption, and hashing. In particular, the sponge construction can be used to build a hash function.

A hash function based on the sponge construction operates as follows:

1. The input message is split into blocks of a fixed size, which is usually a multiple of the internal state size of the sponge function.

2. The sponge function is initialized with an initial state and a fixed output size.

3. The input blocks are fed into the sponge function, which updates its internal state by absorbing the input.

4. Once all input blocks have been processed, the sponge function enters the squeezing phase, during which it generates the hash output by repeatedly applying the sponge function and outputting a portion of the internal state.

5. The output is truncated to the desired length to obtain the final hash value.

One popular lightweight sponge-based hash function is

called the "ASCON-hash" function, which was selected as the second-round winner of the NIST hash function competition in 2017. ASCON-hash is a family of sponge functions that can generate hash values with a wide range of output sizes. It has a number of desirable properties, including resistance to various types of attacks and efficient implementation on a wide range of platforms.

Overall, the sponge construction provides a flexible and efficient framework for constructing cryptographic hash functions that can be tailored to specific requirements. Lightweight cryptography in particular emphasizes the needfor efficient and resource-constrained implementations, making sponge-based hash functions a promising choice for such applications. Some of the example of Lightweight Cryptographic hash: BLAKE2: It is a hash function that uses the Merkle- Damgård construction with a different compression function than SHA-2. BLAKE2 is faster and more secure than SHA-2, and supports multiple output sizes. The BLAKE2 hash function is initialized with a key and a salt, which are used to add additional entropy to the hash output. The key and salt are mixed into the initial state vector using a modified version of the ChaCha20 block cipher, and the hash function is then used to process the input message in a series of blocks. Whirlpool: Whirlpool is a hash function that uses the Miyaguchi-Preneel construction, which is similar to the Merkle-Damgård construction but with a different padding scheme. Whirlpool is designed to be resistant to collision attacks and is used in some digital signature algorithms.

SHA-3 is the latest hash function standard from NIST, and is based on the sponge construction. SHA-3 is designed to be resistant to length extension attacks, and supports multiple output sizes.

SipHash is a family of hash functions that are designed to be fast and secure on 64-bit platforms. SipHash uses a combination of XOR and modular arithmetic to mix the input message, and is resistant to hash-flooding and timing attacks.

XXHash is a fast non-cryptographic hash function that is designed to be efficient on 32-bit and 64-bit platforms. XXHash uses a combination of XOR, modular arithmetic, and bit shifts to mix the input message, and is resistant to hash-flooding attacks.

FNV-1a: FNV-1a is a simple and fast non-cryptographic hash function that is designed to be efficient on 32 -bit platforms. FNV-1a uses a combination of XOR and multiplication to mix the input message, andis resistant to hash- flooding attacks.[6][9]

IV. LIGHTWEIGHT ASCON-HASH ALGORITHM

This paper is based on the detail study and implementation of ASCON-HASH algorithm on raspberry pi (IoT controller) ASCON is a family of lightweight authenticated encryption algorithms that provide both confidentiality and authenticity of messages. In addition to the encryption and decryption functions, ASCON also includes a hash function that can be used to securely derive message keys and other cryptographic parameters.

The ASCON hash function takes an input message of any length and produces a fixed-size hash value as output. The algorithm uses a permutation-based design, where the input message is first padded to a multiple of the block size and then processed in blocks using a round function that mixes the input with a secret key and a nonce. The final output is computed by applying a finalization step to the last block and returning a portion of the internal state.

ASCON provides a high level of security with respect to both preimage and collision attacks, and is designed to be efficient in both hardware and software implementations. The algorithm has been thoroughly analyzed and is considered secure against a wide range of attacks. [4][8]

A. The ASCON-HASH algorithm operates as follows:

i. The input message is split into blocks of a fixed size (either 128 or 320 bits, dependingon the securitylevel desired).

ii. The sponge function is initialized with an initial state and a fixed output size of 256 bits.

iii. The input blocks are fed into the sponge function, which updates its internal state by absorbing the input.

iv. Once all input blocks have been processed, the sponge function enters the squeezing phase, during which it generates the hash output by repeatedly applying the ASCON permutation and outputting a portion of the internal state.

v. The output is truncated to the desired length to obtain the final hash value

ASCON – HASH Algorithm:
Plain Text P.T as input ,output Hash Message size l < h or l arbitrary if h=0 and produce output: Hash with fixed length Initialization:
S← $pa\ (IVh,r,a||\ 0c)$
Absorption:
$P.T1 \ldots . P.Ts \leftarrow P.T\ ||1||0*$
For each character of P.T
$S \leftarrow pa((Sr \oplus P.Ti)\ ||Sc)$
Squeezing
for i=1,….., t=(l/r) do
$Hi \leftarrow Sr$
$\boldsymbol{S} \leftarrow pa\ (S)$
return $|H1|| \ldots . ||Ht||l$

Where

IV: Initial Vector

a : number of rounds p : Permutation

M : Plain text or Message

c : constant

H : Hash output at each phase r : rate

l : length (256)

S : State

Initial State: Thenext step is toset theinitial state ofthe ASCON permutation. This state consists of a 128-bit state vector and a 64- bit associated data (AD) length. The state vector is initialized to a fixed value, and the AD length is set to zero.

Absorb Phase: The absorb phase is used to process the input message. The message is divided into blocks and each block is XORed with the state vector. Then, the ASCON permutation is applied to the state vector to mix in the message block.

Padding: If the input message is not a multiple of the block size, padding is added to the last block to make it a full block. The padding consists of a 1-bit followed by zeros, and is XORed with the state vector.[11]

The squeezing stage in ASCON-HASH consists of the following steps:

Squeeze Phase: The squeeze phase is used to extract the hash output from the state vector. This is done by repeatedly applying the ASCON permutation to the state vector and outputting a block of the specified hash size at each iteration. The size of each block is equal to the output size of the hash function, which is typically 256 bits.

Finalization: Once the specified number of blocks has been output, the final state vector is XORed with the key schedule to prevent multi-target attacks, and the final output is produced. The final output is equal to the concatenation of all the output blocks produced during the squeeze phase. The number of blocks output during the squeeze phase is determined by the size of the hash output and the block size of the ASCON permutation. For example, if the hash output is 256 bits and theblocksizeis 128 bits, thentwo blockswillbe outputduring the squeeze phase. The squeezing stage ensures that the final hash output is a fixed- size value that is unique to the input message. By repeatedly applying the ASCON permutation and outputting blocks of the specified size, the squeezing stage produces a hash output that is resistant to collision attacks and other types of attacks.

Substitution Layer: The substitution layer of ASCON-HASH is designed to provide diffusion and confusion properties to the hash function, which are necessary for

the security of the function. The nonlinear substitution operation and the linear diffusion operation work together to ensure that any small change in the input to the function results in a large change in the output, making the function resistant to attacks. Figure 1 shows substitution layer pS. [10]

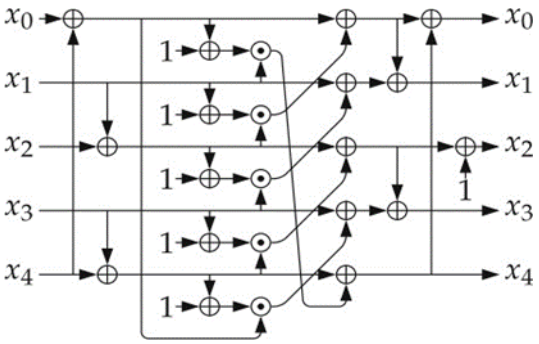

Fig 1: ASCON 5-bit Box

Linear diffusion: The state is transformed using a linear matrix multiplication operation. The matrix used in ASCON- HASH is designed to provide maximum diffusion in a small number of rounds. The linear diffusion layer of ASCON-HASH is a linear transformation that is applied to the state of the permutation to providediffusion, which is a key property ofany secure hash function. The linear diffusion layer operates on the state in a way that ensures that small changes in the input propagate uniformly to all bits of the state.

Figure 2 shows linear diffusion layer of ASCON- HASH consists of a matrix multiplication operation between the state and a fixed 5x5 binary matrix, denoted by M. The matrix M is carefully chosen to provide a good diffusion property while maintaining a small implementation footprint.

$$x_0 \leftarrow \Sigma_0(x_0) = x_0 \oplus (x_0 \ggg 19) \oplus (x_0 \ggg 28)$$
$$x_1 \leftarrow \Sigma_1(x_1) = x_1 \oplus (x_1 \ggg 61) \oplus (x_1 \ggg 39)$$
$$x_2 \leftarrow \Sigma_2(x_2) = x_2 \oplus (x_2 \ggg 1) \oplus (x_2 \ggg 6)$$
$$x_3 \leftarrow \Sigma_3(x_3) = x_3 \oplus (x_3 \ggg 10) \oplus (x_3 \ggg 17)$$
$$x_4 \leftarrow \Sigma_4(x_4) = x_4 \oplus (x_4 \ggg 7) \oplus (x_4 \ggg 41)$$

Fig 2: ASCON Linear diffusion Layer

The linear diffusion layer is applied to the state of the permutation in each round of the hash function, except for the first and last rounds, which do not have a diffusion layer. The number of rounds used in the hash function depends on the desired security level and the input size of the hash function. Overall, the linear diffusion layer of ASCON-HASH plays an important role in ensuring the security of the hash function, by providing a good diffusion property that ensures that any small change in the input results in a large change in the output.

V EXPERIMENTAL RESULTS AND OBSERVATIONS

Implementation of ASCON-HASH algorithm was carried out using python language on Raspberry Pi 3 model b controller. It consists of 1 GB of Random-access memory, Quad Core 1.2GHz Broadcom BCM2837 64bit CPU , BCM43438 wireless LAN and Bluetooth Low Energy (BLE) on board , 100 Base Ethernet , Micro SD port for loading operating system and storing data , Upgraded switched Micro USB power source up to 2mA with Vcc 5V.

Input as text file with varying size (i.e 100kb , 200 kb ,300kb, 400kb, 500kb) was provided to the algorithm and results are observed. Measurement parameters such as

TABLE I TIME TAKEN FOR ASCON HASHING ALGORITHM IN SEC , MEMORY AND ENERGY CONSUMPTION

File Size (Text File) In Kb	Hashing Time In Seconds	Memory Consumption In Kb	Energy in Mili Joules	Data Process In Kb/Sec
100	21.88	220	218	46.80073
200	45.06	380	450	45.45051
300	66	428	661	46.54545
400	87.4	528	874	46.31579
500	109.6	628	109.6	46.71533

Inference:

a. As the file size increase gradually rate of time & Memory consumption increase in linear way.

b. Average throughput for ASCON algorithm is 46 Kb/Secs

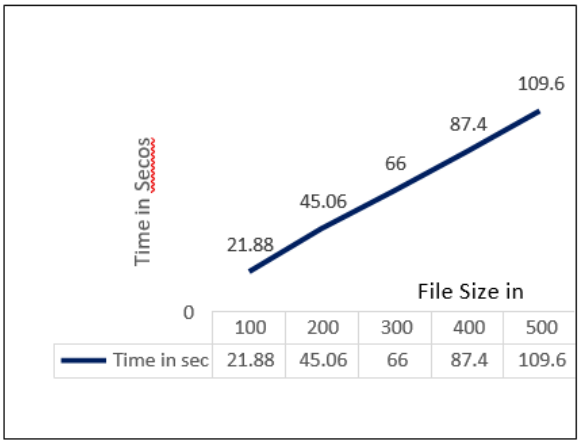

Fig 3 : Hash Algorithm Time Consumption in Sec Figure 3. shows the linear shift in the graph of time in secs verses input file size (i.e if input file size increases, in that case execution time of the algorithm increases in linear fashion. In same way figure 4. Shows that memory consumption increasingly steadily with increase in input

file size. As energy consumption parameter directly proportional to time , hence as execution time increases , energy consumption is also increases and same is depict in figure 5

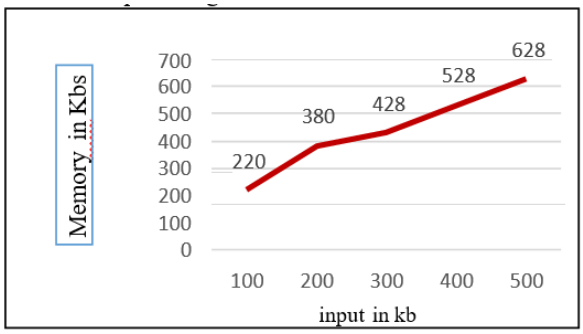

Fig 4 : Hash Algo Memory Consumption in Kb

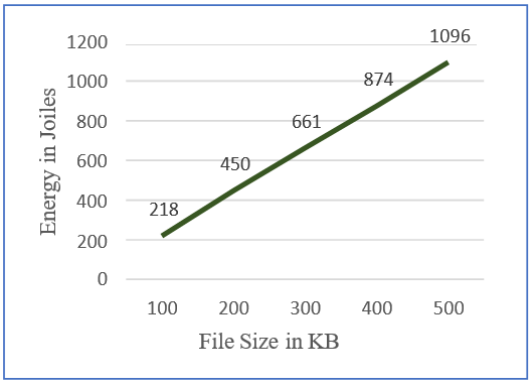

Fig 5: Energy consumption by raspberry pi 3

VI. DISCUSSION ON THE ACHIEVED OUTPUT

TABLE II TECHNICAL PARAMETER MEASURED, OUTCOME ACHIEVED, INFERENCE AND IMPACT

Technical Parameter Measured (for 100kB oftext file)	**Output achieved** ASCON-HASH	**Outcome as inference of output**	**Impact**
Hashing Time **Time in sec**	21.88 sec	Time required to create hash value of plain text calculated using time.start and time.Stop function and the difference is noted.	As ASCON-Hash Function consumes21.88 sec , it will effect energyconsumption parament
Memory Consumptionin Kb	220 kb	For memory consumption, psutil library with memory.rss fuction is used to calculate memory consumption during Hashingprocess	Gradually increase in input file size will linearly increases in memory consumption with the average rate of 102 bytes
Energy in Joules	218 millijoules	Energy is calculated as E= Vcc*I*t whereas Vcc is5V, I is current i.e 2mA and t is time taken for execution of decryption function for 100 kb text file.	Energy parameter is directly proportional to the time required for data processing and execution of hash function. Hence energy consumption increases as time for execution increases
Bit rate / Byte rate	46 kb /sec	Total size of data processed per unit of time . Bit rate of 46kb /sec is observed after execution of ASCON Algorithm for text file data.	It is observed that average byte rate is 46 kb / sec after providing the various input data, which shows that constant byte rate is maintained for the system.

VI. CONCLUSION

One of the main advantages of ASCON-HASH is its simplicity, which makes it easy to implement and verify. It has a small code size and memory footprint, making it an attractive option for use in low-power devices. It also offers a high degree of security, with a collision resistance of 2^128 and a preimage resistance of 2^256.

ASCON-HASH is based on thesponge construction, which means that it can be used for both hashing and message authentication code (MAC) generation. The algorithm has a flexible parameter set that allows users to adjust the security level and performance to meet their specific needs.Overall, ASCON-HASH is a strong and efficient hash function that can be used in a wide range of

applications, particularly those that require lightweight cryptography. However, as with any cryptographic algorithm, it is important to use it correctly and to ensure that it is implemented securely to avoid any potential vulnerabilities.

ASCON-hash can be optimized for better efficiency by optimizing substitution , diffusion , permutation layer of algorithm , but care should be taken to maintain security level of algorithm.

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Subdued Privacy Breach by Ameliorating Security over Data Stored in Multi-Cloud

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Abstract— **For storing data across several clouds, many new strategies have recently been developed. Users automatically have some degree of information leakage control thanks to data distribution over various cloud storage providers (CSPs), as no one point of attack can leak all the data. Even when using numerous clouds, however, the unintended spread of data chunks can result in significant information leakage. In this article, we examine a significant issue with information leakage brought on by the haphazard distribution of data in multi-cloud storage systems. Then, we introduce the technique, a multi-cloud storage system that is cognizant of information leaks. By storing syntactically similar data on the same cloud, a methodology seeks to reduce information leakage from users across different clouds. We create a function to compute the information leakage based on these signatures and an approximate algorithm to efficiently create similarity-preserving signatures for data chunks. We then offer a powerful storage plan generation approach based on clustering for spreading data chunks over many clouds with little information loss. Finally, we assess our plan, which can stop information leaks more effectively than an impromptu placement. Additionally, our study of system attackability shows that our technique makes information attacks more difficult.**

Keywords—Multicloud storage, information leakage, system attackability, remote synchronization, distribution and optimization

I. INTRODUCTION

Users need widespread and expansive network storage to manage their ever-expanding digital lives with the increased acceptance of devices like laptops, telephones, and tablets. Due to their user-friendly interfaces and affordable storage prices, various cloud-based file-sharing and storage services, including Dropbox, Google Drive, and Amazon S3, have become popular in response to these needs. These centralised cloud storage systems are attacked, nevertheless, for seizing control of customers' data and allowing storage providers to utilize it to run marketing and advertising analytics [1]. Additionally, the data of users may be exposed through malevolent insiders, backdoors, bribery, and coercion, among other methods. Utilizing multi-cloud storage systems [2, [3, [4,] [5,] in which no single point of attack may leak all the information, is one potential way to lower the risk of information leaking. A malevolent actor would need to force all the numerous CSPs on which a user might place her data in order to obtain a complete picture of her data, similar to the one exposed in previous privacy attacks [6]. Don't put all your eggs in one basket, to put it simply, as the adage goes. But things are not quite that straightforward. rsync-related protocols are used by CSPs like Dropbox, among many others, to synchronize local files with remote files in their centralized clouds [8].

However, these fingerprints are only useful for exact equality checking because they can only determine whether the data nodes are duplicates. Finding identical chunks is rather simple, but effectively detecting similarity between chunks is a difficult issue because similarity-preserving fingerprints don't exist (or signatures). Simultaneously, if one wants to minimize information dissemination, the similarity is crucial. Simply put, two paragraphs of text with a single-word difference result in two distinct chunks. The two chunks would be viewed as distinct and placed separately if identification were the only factor taken into account, but since they both almost totally share the same information, they should preferably be combined.

We point out that the aforementioned issue persists even with encryption because, if the encryption key is compromised (for example, as a result of the CSP being forced to divulge it by a third party, such as the National Security Agency, or as a result of the CSP's own malice), the user's entire data can be easily leaked. Even if the encryption key is made public, information leakage can be minimized if encryption is carried out after nearly identical grouping chunks. Therefore, in order to limit information leakage in the multi-cloud storage system, we need more advanced approaches to identify data chunks that are nearly the same (or similar).

II. RESEARCH BACKGROUND

A. Problem Statement

Users automatically have some degree of information leakage control thanks to data distribution over various cloud storage providers (CSPs), as no one point of attack can leak all the data. However, even when using numerous clouds, uncontrolled data chunk distribution can result in excessive information leakage.

- Even when using numerous clouds, unplanned data chunk distribution can result in excessive information leakage.
- Redundancy of comparable data when several clouds' data are often modified.
- Data from numerous clouds is not sufficiently secure. There is a danger that everything will be lost.

B. Objective

Most of the time, individuals are using centralised multiple cloud storage services like Microsoft Azure, Dropbox, and iCloud to store their data, which gives them control over their data and creates a single point

of failure across numerous clouds. [7] Unplanned data releases on multi-cloud storage providers, however, would result in significant information leaks and single points of failure across numerous clouds. Therefore, the goal of this study is to identify the best methods for limiting information leakage in multicloud. Then, we introduce StoreSim, a storage system that is concerned about information leakage and stores comparable data in the same cloud. We created the MinHash technique to quickly produce similarity-preserving signatures for data chunks. We also created a function to calculate information leakage based on these signatures, which were hashed using fingerprinting algorithms like SHA-1 and MD 5. So that users' data could be stored effectively and securely using a multi-cloud storage system, we supplied optimal information leakage protection.

III. SYSTEM ANALYSIS

Proposed System:

We introduced the StoreSim system, which is aware of an information leakage storage system in the multi-cloud, to reduce information leakage during unplanned data releases. To prevent information from being lost over several clouds is used to syntactically store comparable data across the same cloud. By effectively creating similarity-preventing signatures for data chunks using the unique MinHash method, and designing a function to calculate information leakage based on these signatures provided by fingerprint techniques like SHA-1 and MD5, this system has fulfilled its purpose. A user can now store data across many clouds, edit each cloud's data as needed, and safely download data across multiple clouds. To reduce information leakage, we designed a cutting-edge system that is utilized to store data in a secure, effective, and efficient manner across a centralized multi-cloud storage system..

Advantages Of Proposed System

- Each data piece that is kept across several clouds is encrypted, making it impossible for anyone to access it without decryption.
- There is no issue with vendor lock-in, and users can easily keep their multiple cloud data throughout time.
- The suggested system includes cost efficiency, data integrity, and availability;
- Reduce the likelihood that all the information will be lost at once.

IV. PROJECT IMPLIMENTATION

A. *Proposed Modular Implementation*

I used three modules in this project job, and each module has its functions, such as:

1. Data Owner (Client) module
2. Metadata Servers module
3. Cloud Service Providers module

1. Data Owner module

This module is used to pre-process user data for optimization purposes, including binding, deduplication, chunking, and delta encoding. The owner must sign up for the system and use their username and password to log in. Following that, they will perform the following tasks, including:

- the user uploads their own files from a local PC to the system, divides them into chunks with a maximum size of the data unit, and then encrypts them before sending them to various clouds.
- The data owner has the ability to edit their own data once it has been posted to several clouds. By comparing the similarity across data chunks and using the jac card similarity to determine where to upload the updated data, users can modify both cloud data in this manner..
- By requesting cloud keys from the storage providers, the owner can get data that is stored across several clouds.

2. Metadata server's module

This module is used to keep data on the users who represented the files saved in the various cloud storage providers, as well as information about the files, cloud storage providers, and users. However, in order to visit this page, the user must first log in using a username and password that were explicitly chosen by the system's developer.

3. Cloud Service Providers module

I discussed cloud functionality in this module. To access files, see requests, and approve requests sent by other users or the data owner, the cloud user must first log in to the page where they will view files, view requests, and approve requests. After chunking different data, I used a cloud service that was coupled with my local system to store it.

B. *SYSTEM DESIGN*

1. Data Flow Diagram: Admin

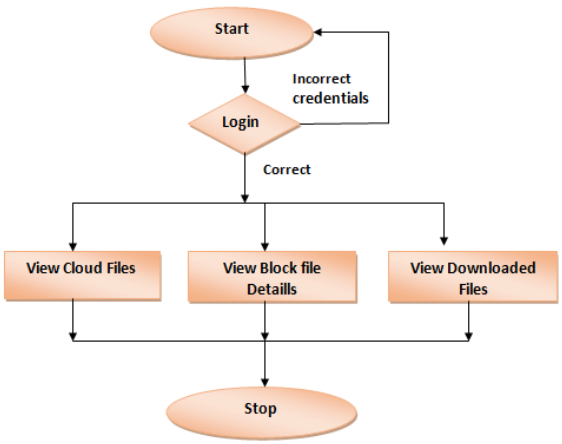

Figure 1: A Data Flow Diagram for Admin

2. Data Flow Diagram: Metadata server

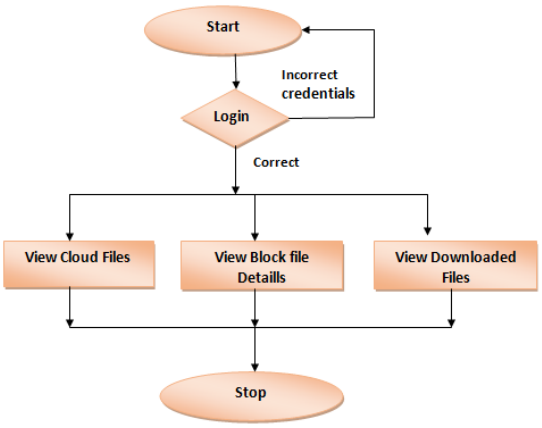

Figure 2: A Data Flow Diagram for Metadata server

3. Data Flow Diagram: User

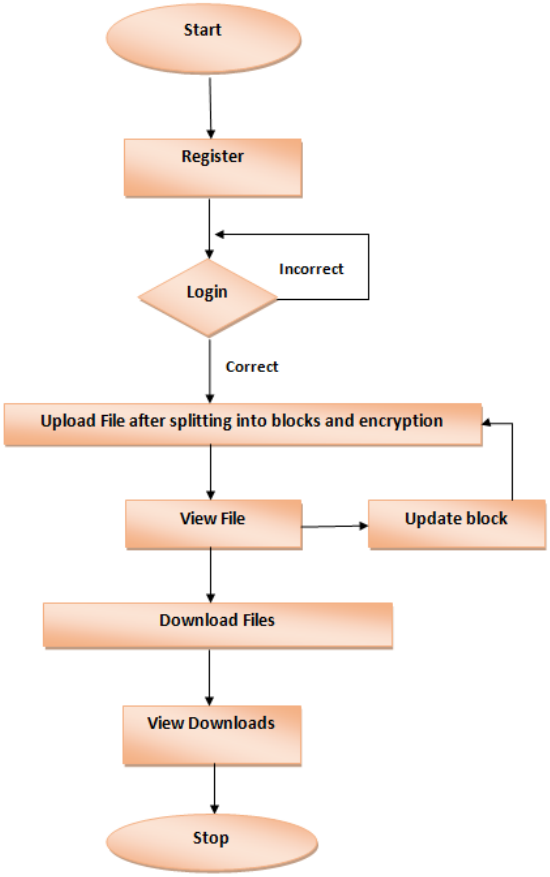

Figure 3: A Data Flow Diagram for User

V. Implementation And Result Analysis

A. Project execution process:

1. DBA home page:

The login credentials were successfully evaluated at the DBA login page, and their respective services are listed in this welcome file.

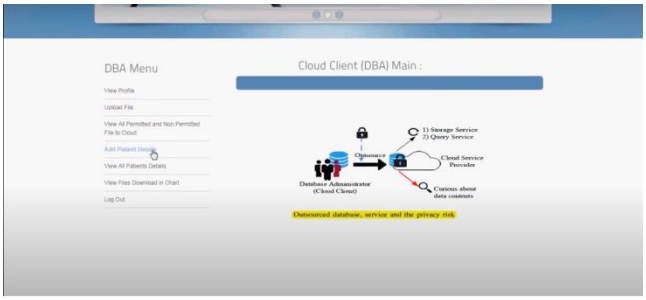

Figure 4: DBA home page

2. File upload page:

By choosing one of the servers on this file upload page, a new file can be uploaded together with the names of its attribute names, and content will load for submission.

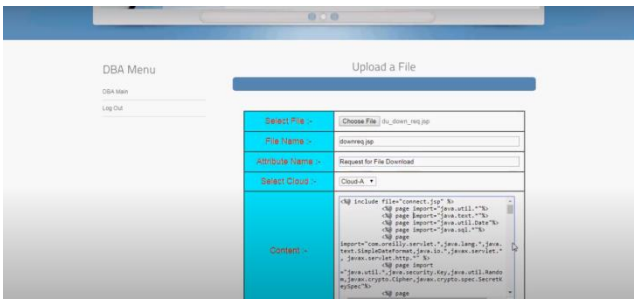

Figure 5: File upload page

3. File encryption page:

The content of a file that is being uploaded to a particular server must be encrypted with the proper Mac key and forwarded to the cloud server using this file encryption page.

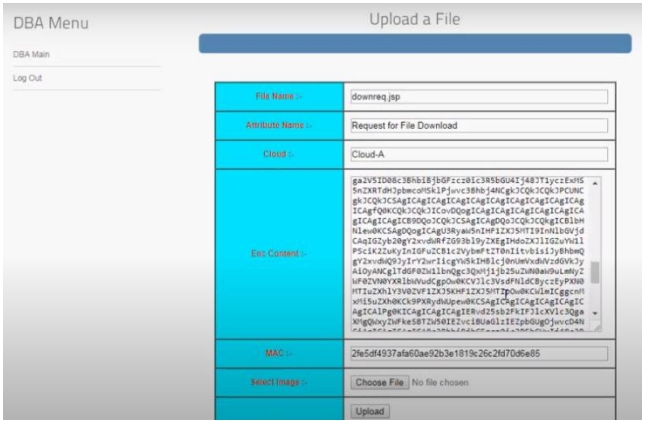

Figure 6: File encryption page

4. File upload acknowledgment page:

After the file's content has been successfully loaded and encrypted on the designated server, an acknowledgment will be displayed here in this file upload acknowledgment page.

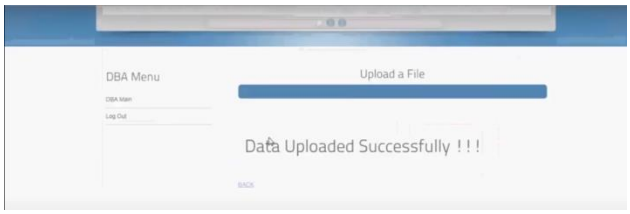

Figure 7: File upload acknowledgment page

5. Forward status page:

After a file has been successfully uploaded to a particular server, it will be reported here on this forward status page as the status of the forward content.

Figure 8: File status page

6. File permission page:

This file permission page will acknowledge all users whose corresponding requested file to a certain server has been approved or denied.

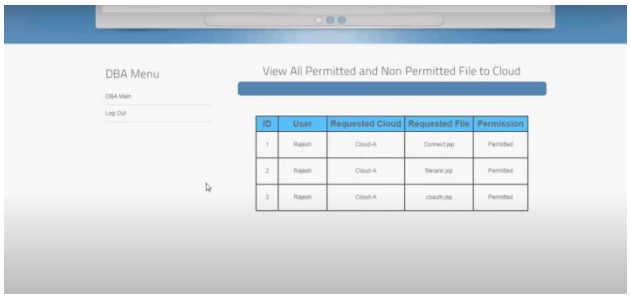

Figure 9: File permission page

7. File search page:

In order to filter or get the desired data, this File Search page's attributes, such as query type, table name, and query, are used as inputs.

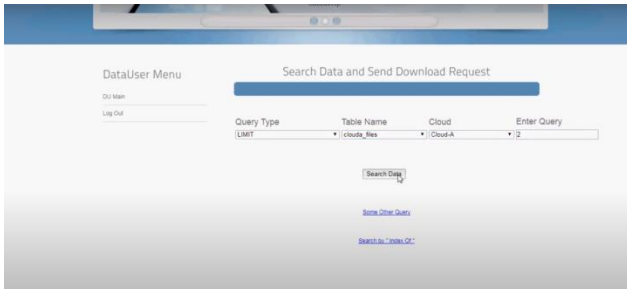

Figure 10: File search page

8. Search result page:

The download request is also made easier on this search result page, where results from a multi-keyword process are displayed in the form of a table.

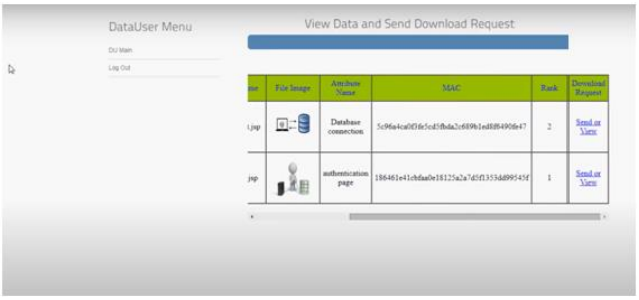

Figure 11: File status page

VI. Conclusion And Future Scope

Conclusion : To secure the database on the cloud in this project, we suggested a two-cloud strategy coupled with a set of connection protocols. Because most users store their data across numerous clouds for security reasons, Unplanned data dissemination across several clouds, however, may raise the degree of information leakage by increasing the likelihood that all data would be lost. I created a storage system that is aware of information loss in many clouds and stores similar data in the same cloud in order to minimise information leakage. I created a technique to quickly create similarity-preserving signatures for data chunks, and based on those signatures, I created a function to calculate the information leakage. Finally, I listed the best providers of multi-cloud storage that effectively reduce information leakage. Thus, we can successfully achieve data secrecy when accessing the database in the cloud, demonstrating the effectiveness and viability of the suggested access mechanism for use in bigger systems.

Future Scope : Software that satisfies every user requirement cannot be created. However, this system has some room for improvement in the future:

- A user will automatically receive an email notification whenever their cloud data is changed.
- System security will also upgrade as security technology does.
- Increasing the number of clouds beyond two to effectively manage information leakage.

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Enhanced Shield Protection over Confidential Private Data in Public Cloud Store

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Abstract— **A new paradigm called "cloud computing" makes it possible for users (data owners) to store their data on servers in the cloud and for users (data consumers) to access that data. This paradigm lowers the data owner's storage and maintenance costs. Also, the owner of the data no longer has physical access to it, which increases the security threats. Hence, a data integrity auditing solution is crucial for the cloud. The necessity to verify data ownership while preserving privacy has made this problem challenging. This paper suggests a secure and effective method of proving data ownership in order to overcome these challenges. We also add support for multiple owners, data dynamics, and batch verification to SEPDP. The auditor may easily and quickly verify that data is there using this approach, which is its most appealing aspect. No matter what kind of data is saved in the cloud by consumers, security and privacy are their top priorities. Data sharing should be permitted with conditional dissemination to regulate data access by establishing evaluation procedures and policies that will enhance network security and shorten network (data transmission time) between two virtual machines running on distinct physical machines. When we concentrate on the cloud computing domain in relation to data as a service, we need to place emphasis on the following characters, such as DO who owns the data we store there, in turn, DU who benefits from the data owned by DO, and of course, who consumes data-as-a-service through cloud servers by privileged access of service data, which is advised to be a reliable and adaptable mechanism. This procedure needs to be optimised with regard to the data stored on servers and the privacy of user interactions with cloud servers when it comes to data. Even though the Cloud Service Provider Authority claims to guarantee the accessibility of DO's confidential data, in some crucial circumstances corporeal identification may be lost for DO. Of course, sensitive information will be encrypted for services using advanced methods such AES by quad block modularization Block key. In addition, data interaction In order to improve the aforementioned process from a Data-as-a-Service standpoint, time delays must be taken into account. The process will be organised by a third-party authority that reduces necessary computational ad hocs in data possession in order to make it dependable and secure. Applying the aforementioned procedure enables us to get beyond problems with data security and transit across hybrid clouds, such as secure key management, the requirement for isolation management, data ownership difficulties, and the quality of data transit services.**

Keywords—Integrity verification, Storage-as-a-Service, Privacy preserving, Dynamic auditing, Batch auditing.

I.INTRODUCTION

In order to help nodal data stores reduce infrastructure costs, ease administrative strain during the data maintenance process, and provide worldwide access to data from remote node locations, the financial side of data storage-as-a-service may need to concentrate on a key approach[1]. As we try to boost process benefits including commercial aspects, data access sharing, utilisation, and synchronisation, it may be necessary to regulate the many privacy-related concerns connected with regulating data access through cloud service providers[3]. To maintain storage space that can be utilised to earn income, CSP must give up rarely used data. Rarely, this could result in data loss and corruption, endangering the privacy or reputation of anyone affected[2]. In a heterogeneous cloud infrastructure, data ownership for DO. The auditing authority (TPA), which unifies the CSP & DU procedures under one roof, enables job-oriented auditing features, and serves as a public evaluator, maintains these Block keys created via data modularization methods. The rate of change of computational transactions is substantially influenced by modular cryptographic algorithms[4]. In order to maintain the data integrity of a modular section of data stored at CSP through the assessment process led by TPA and improve data protection, we present a novel approach that primarily focuses on cryptographic operations, such as modular Block key generation, public key signature generation, and sophisticated evaluation phases for multiple data owners[5]. The organisation of the data integrity evaluation procedure is the responsibility of TPA as part of their agreement to deal with cloud servers of the untrusted variety[6]. Of course, there is always a chance that this procedure will be successful and unsuccessful. Protecting data privacy while building a secure auditing process is our top goal[8]. Simple actions, such as the addition, updating, and deletion of a specific modular chunk of data, are allowed in this process implicit facility of data metrics, which is made available to Data Owners, without modifying the meta form of another modular chunk of other data (DO) [7]. The numerous requests that are afterwards received from various D

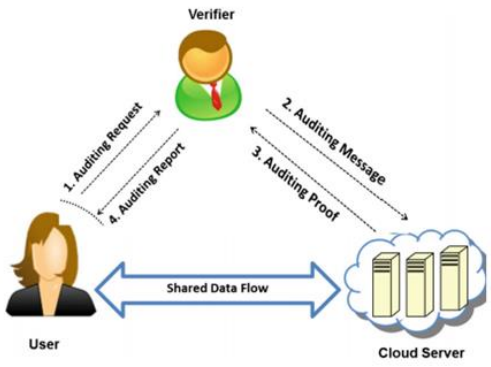


Fig: System Characters Model diagram.

Us should be handled by a thorough assessment mechanism for modular data that is powered by TPA.

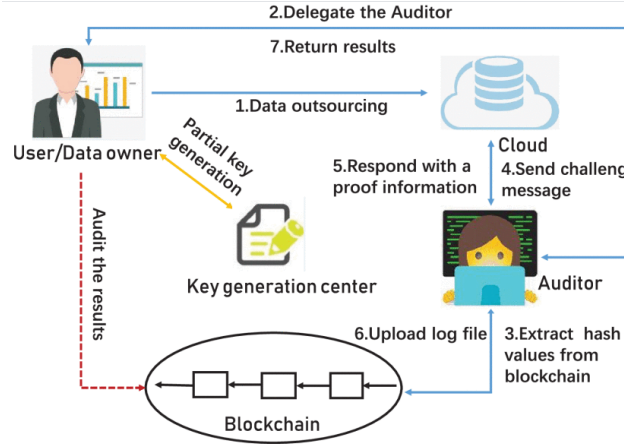


Fig: System Access Model diagram.

AES emphasises the length of the public key (Kp), the segment key (Ck) and segment divisions (Cs), the segment key length (Ck) and segment divisions (Cs), the total key length (Kn), and the bit length (n), i.e. Kn = (cnt(Ck)-cnt(Kp))*n*Cs. For instance, the segment key in this sample key has been extended to 512 bits by increasing the repetition count to 4 [10]. The total key length is Kn=(40-8)*4*4 or 512 bits because the segment divisions and hex key both have lengths of 4. The figure from the introduction chapter does a good job at illustrating the AES structure[9].

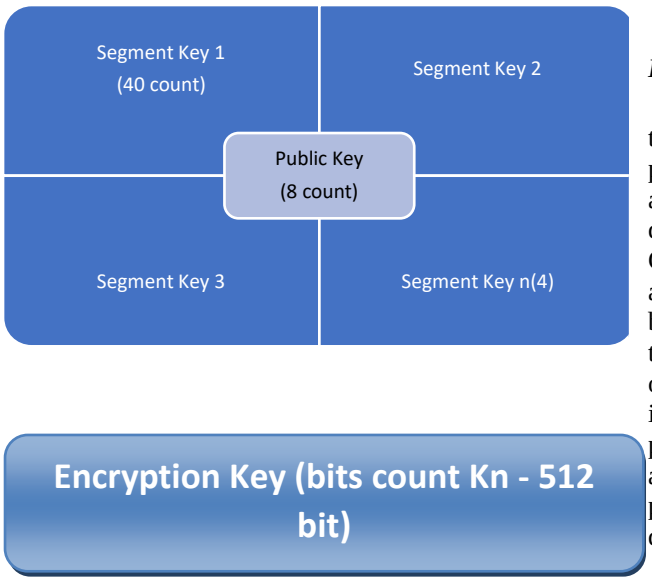


Fig: AES key Segment bitwise Integration Model diagram.

II. RESEARCH BACKGROUND

A. AIM OF THE PROJECT

The main objective of the project is to advance data security analytics by using panelized Block key generation, public key signature generation, and a sophisticated evaluation phase for the various data owners to maintain the data integrity of a modular section of information stored at CSP through the assessment process overseen by TPA.

B. SCOPEOFTHEPROJECT

We recommend a communitarian get-to-control strategy that designates interpretation centres in the entrance structure. According to a security study, our suggested approach can ensure information classification and has many other essential security properties. A detailed study of the execution demonstrates that our proposed conspiracy is adept at handling overhead and stockpiling.

C. TECHNICALAPPROACH

The technology method to securing data security is described as follows:

1. Data outsourcing;

2. Designating the auditor

3. Get the blockchain's hash values

4. Send a challenge via the cloud.

5. Support your argument with public key creation in your reply.

Upload the log file to get the results.

III. SYSTEM ANALYSIS

Proposed System:

We propose a novel scheme that focuses on three main divisions: modular Block key distribution, public key signature generation, and sophisticated analysis stage for the multiple data owners to maintain data integrity of a panelized section of data stored at CSP in order to increase the utility of data security analytics. Modular cryptography techniques also have a big impact on how quickly computing transactions transfer. This strategy even supports the numerous data owners, modular data assessment procedures, and important data dynamic activities indicated in the project report's introduction. Probabilistic data integrity analysis is facilitated by the modular data evaluation process at CSP, which includes a discrete phase for doing a probabilistic data integrity analysis.

Advantages Of Proposed System

- A comprehensive privacy preservation mechanism is built to enable safe data sharing on the cloud server.
- 2 In order to deal with the 512-bit Consolidated Block key, 2 AES through quad block modularization is being developed to strengthen the cryptography method maintained at CSP's endpoint.

➢ 3 CSP controls data access and usage to safeguard legitimate data requests while preventing or neutralizing hostile attacks.

IV. PROJECT IMPLIMENTATION

A. Proposed Modular Implementation

I used three modules in this project job, and each module has its functions, such as:

- Data Owner (Client) module
- Metadata Servers module
- Cloud Service Providers module

• Data Owners

The data owner can use this module to upload blocks, check them (data auditing), edit them, delete files, and see the blocks that have already been submitted.

• Data User

He enters his or her user name and password to log into this module. The receiver will do things like After logging in, access All Data Owner Files. request for file, File Download, View Response to File

• Third-Party Auditor

In this module, the sector is capable of doing the following tasks. Table in blocks View File Deleted or Modified Results View, and View Assailants

• Cloud Service Provider

The service provider manages a server that holds data and has the ability to access data owners, end users, and other users, among other things. View the Block Table, File Request, Attackers, and Transactions. View the findings, including the results and the file throughput and file time delay.

B. SYSTEM DESIGN

Data Flow Diagram:

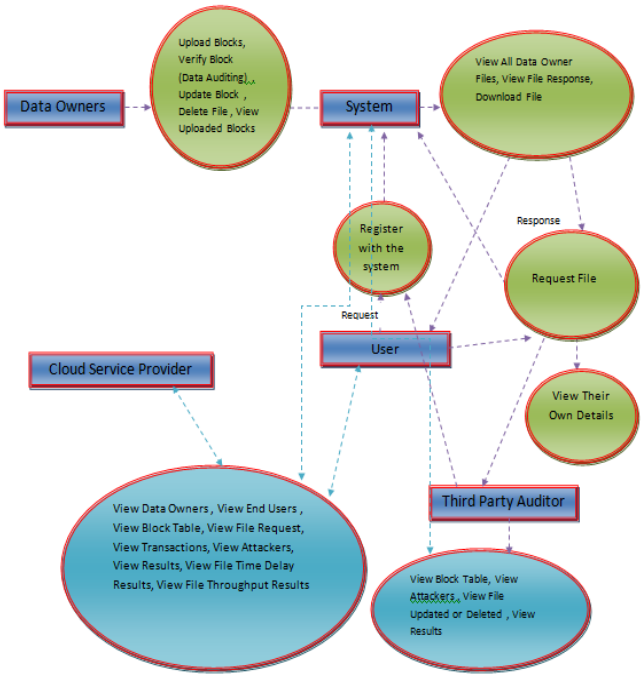
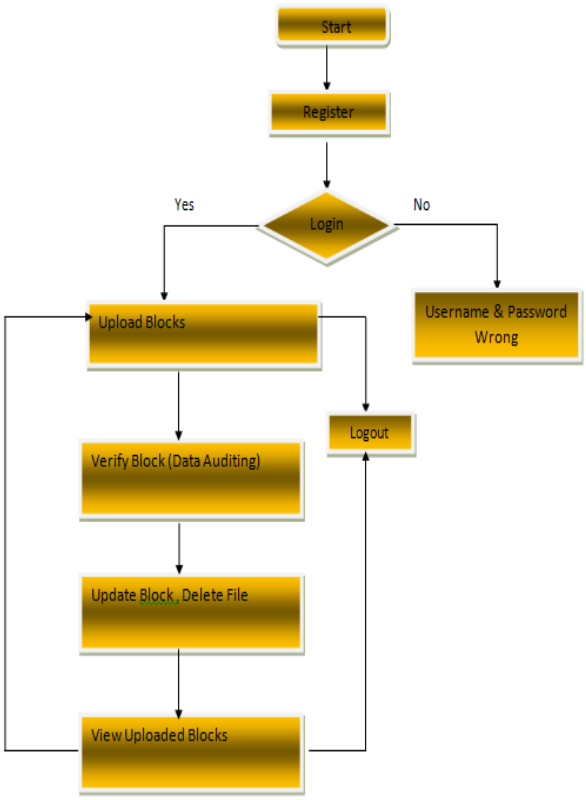
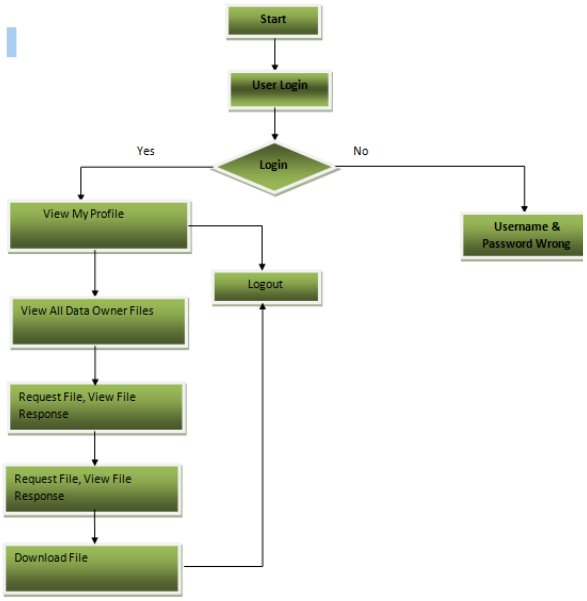


Figure 1: A Data Flow Diagram

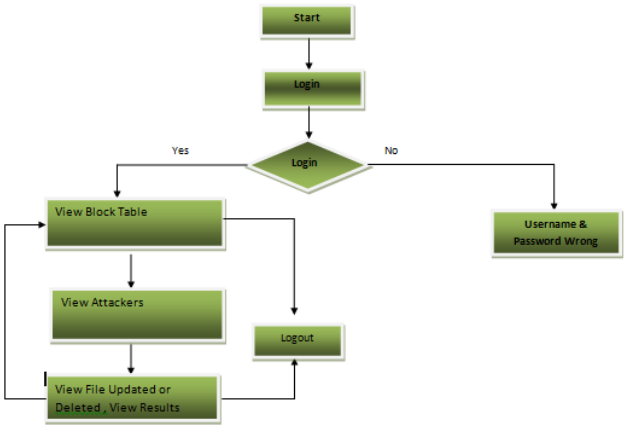
➢ **Flow Chart : Data Owners**



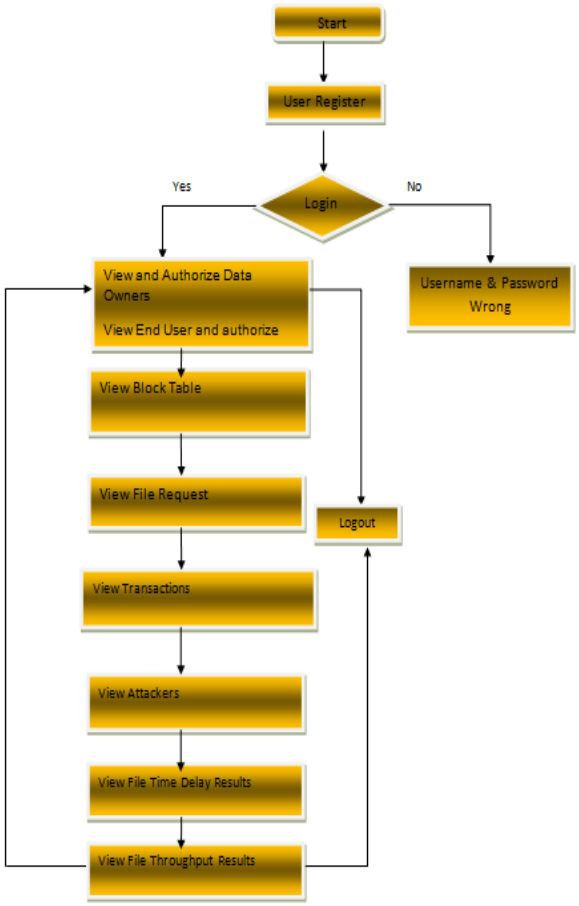
Flow Chart : User



Flow Chart: Third Party Auditor



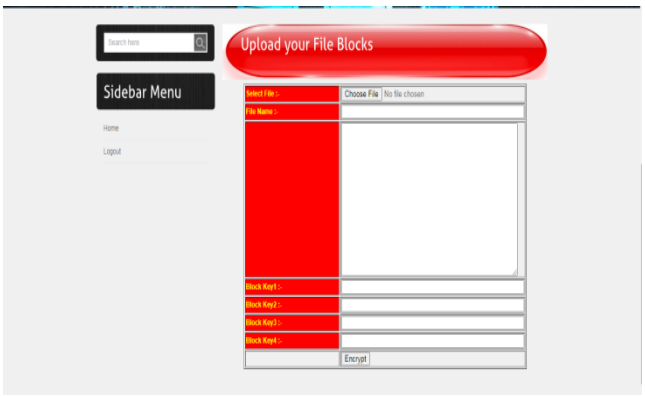
➢ Flow Chart : Cloud Service Provider

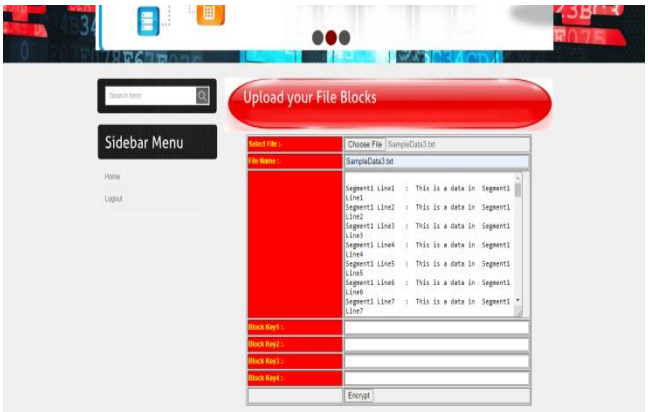


V. IMPLEMENTATION AND RESULT ANALYSIS

File upload page:

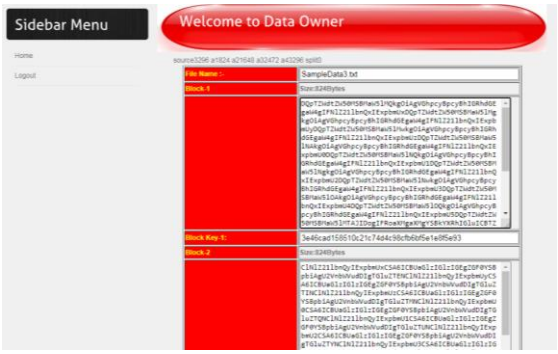
Users may upload files with recognized names that are Bean block partitioned and encrypted with special block keys using the data provider for this file upload page. The content of the entire file is divided into four smaller parts, each of which is encrypted with a separate block key.





File block key encryption page:

This page shows the file's encrypted content, which has been split into four parts and encrypted using a separate block key.

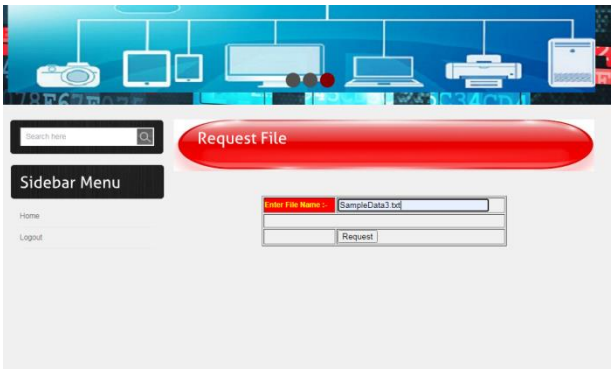


View all owner files page:

On the all owner files page for this view, each file that has been uploaded is displayed along with the name of the data owner who requested the upload.

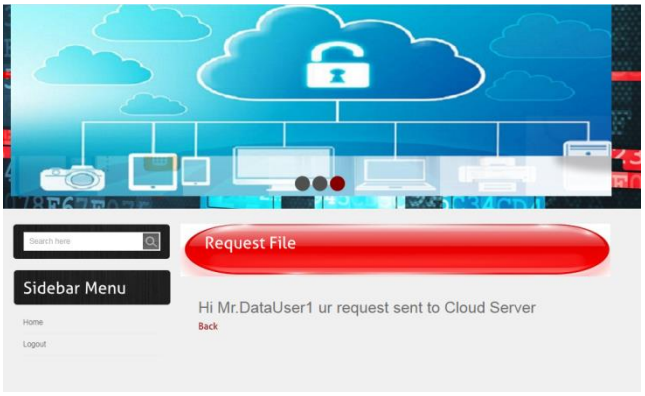
File request page:

Users of the website can submit a request for a certain share data file and initiate the file request process by clicking the request button in this file request form.



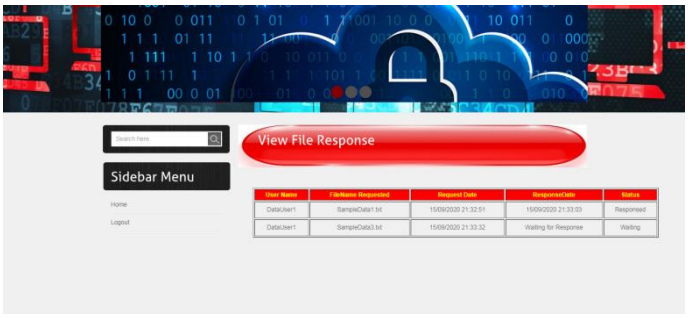
File request acknowledgment page:

The request acknowledgment as a result of the user requesting a certain shareable file is shown on this file request acknowledgement page.



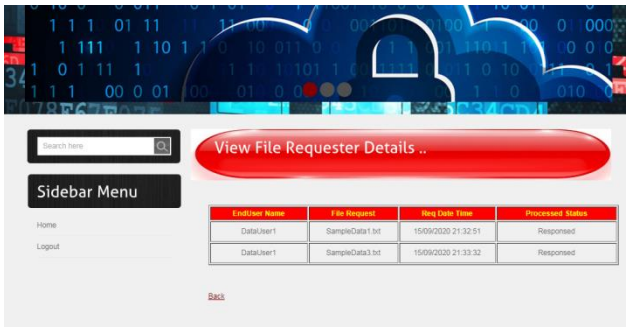
View file response page:

This view file displays the responsive page response status of each request that a data user made and then deleted for a specific file that is being served, along with the request date and response date.



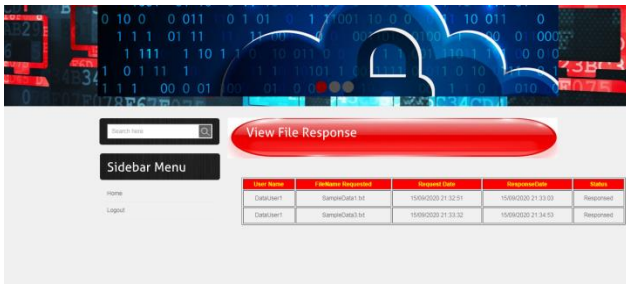
Cloud Server

View file requester details page:
In this view, the file request details page's cloud administrator may, at a specific time, approve the request for the file made by a data user.



Data User Status Page:

For each request that was deleted from a data user for a specific file that is being serviced, this Data User Status page provides the date and the outcome.

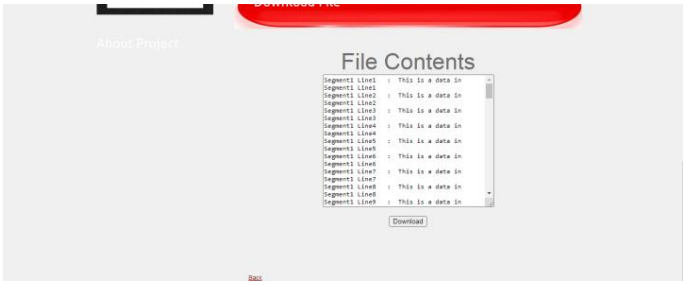


File download page:

You must first enter the file name, owner name, four distinct blocker keys, and a secret key on this page before the download for a specific file can begin.

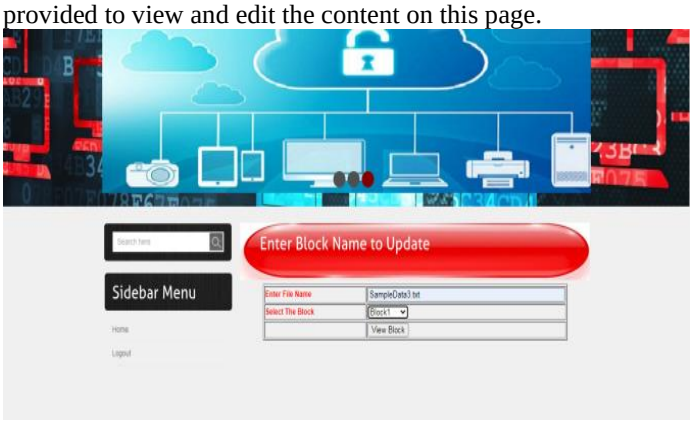
Request file key retrieval page:

The only parameters that must be entered by the data user on this page are the file name and owner name; all other parameters are automatically filled in the columns that were set by the cloud data store administration model, and we may click on download to finish the file download activity.



Update block page:

Enter a filename and a specific block name in the boxes provided to view and edit the content on this page.



VI. Conclusion And Future Scope

Conclusion : In this project, we'll talk about things like data ownership, secure key management, the requirement for isolation management, and the quality of services for data transportation. We provide a novel scheme that concentrates on three main divisions: modular Block key generation, public key signature production, and sophisticated assessment phase for the different data proprietors in order to increase the utility of data security analytics. In addition to ensuring the data integrity of shared data in public cloud storage, this strategy strives to protect owner privacy. Additionally, modular cryptographic techniques have a substantial impact on how quickly computing transactions move. This approach supports even the numerous data owners, flexible data evaluation procedures, and large data dynamic activities that were indicated in the project report's introduction. The modular data assessment technique at CSP includes a special Block key mapping table, which makes probabilistic data integrity analysis easier. The TPA-driven computational transaction transition time is more efficient than the current methods. The overhead on cloud servers is quite low. A

sophisticated privacy security solution is used to safely disseminate data on the cloud server. In order to manage the 512-bit Consolidated Block key, the implementation of AES employing quad block modularization makes the cryptography mechanism stronger and is maintained at the endpoint of CSP. At CSP, data accessibility and consumption are controlled to accommodate valid data requests while preventing or neutralising hostile intrusions

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Influential Propagation Model for Malware Detection in Public Cloud Security

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Abstract: **Cloud-haze edge registering particularly distributed computing is giving different administrations in numerous regions all over the planet and assumes an essential part in digital physical-social frameworks (CPSS). Especially, virtualization is one of primary empowering advancements of distributed computing and understands the powerful arrangement of processing assignments through the relocation of virtual machines (VMs), so how to get the virtual climate in the cloud is extremely urgent. The reason for this paper is to resolve the issue of malware proliferation among VMs under the foundation as a help (IaaS) design. A dynamical proliferation, first and foremost, model is proposed to investigate the significant variables influencing the spread of malware, particularly the effect of introducing antivirus programming in VMs. On this premise, a hypothetical examination for this model is researched through differential elements, from which it can comprehend the scattering conduct of malware under an tainted cloud climate. At last, a few mathematical reenactments are led to check the relevance what's more, adequacy of the proposed model**

I. INTRODUCTION

CYBER-physical-social frameworks (CPSS) can make our regular routines smarter and more advantageous through giving forward-looking and customized administrations [1]. With the approach of the enormous information period and the prevalence of the Web of Things later on, CPSS administrations will definitely require different information support including the worldwide verifiable information and the nearby continuous information, which will include many issues such organization correspondence (e.g., [2], [3]), information capacity, handling and applications (e.g., [4], [5]). In this specific circumstance, analysts are enthusiastically creating cloud fog-edge processing as of late. In particular, haze edge registering has been broadly applied to handle the nearby real time information, which is a significant and compelling enhancement of distributed computing. As a strong worldview for carrying out the information concentrated applications, distributed computing has an indispensable job in putting away and handling information. It can offer administrations like foundation as a help (IaaS), stage as a help (PaaS), and programming as a help (SaaS) for clients on request. As one of the main strategies of distributed computing, virtualization breaks the limits of existence. Especially, it can partition an actual processing gadget into more virtual machines (VMs) with a similar usefulness and understand the unique organization of processing undertakings through the relocation of VMs. There is no question that virtualization will significantly further develop asset usage and save framework the executives costs [6]. Tragically, virtualization likewise presents new weaknesses that are turning into the assault focus of malware.The first malware created to stay away from virtual frameworks, be that as it may, because of different factors like benefit and advantage, malware producers started to focus on all processing gadgets, including physical and virtual machines [7]. Since the Web has solid engendering skill and is additionally the most significant transporter of PC infection transmission, so once malware shows up in a physical or virtual machine, it will spread quickly in the organization, which might make extraordinary harm human creatures, going from financial misfortunes to serious dangers to human existence. Therefore, examining how is fundamental to safeguard the virtual climate from malware assault in the cloud.

For the most part, the accompanying three viewpoints will speed up the spread of malware in the cloud. Right off the bat, the relocation of VMs will work with the dissemination of malware [8], [9]. By utilizing the weaknesses of VMs to embed malware, crooks can use the relocation of VMs to accomplish the motivation behind malignant assault. Significantly, the movement of VMs assumes a key part in distributed computing, by which the dynamic organization of figuring undertakings can be carried out. Besides, the homogeneity of VMs will likewise help the engendering of malware [10]. Here, the homogeneity primarily implies that VMs have the homogeneous design and settings, and the introduced programming projects are comparable. Practically speaking, there are a huge number of VMs in the cloud, assuming they are designed individually, it won't just require a ton of investment, yet additionally be inclined to mistakes. For comfort, only one of them is generally designed, and afterward the others are produced by replicating it. These tasks should now be possible consequently. Clearly, such homogeneity will give numerous potential open doors and decrease specialized trouble for assailants. Thirdly, the correspondence among VMs is the another spread method of malware. Distributed computing is a circulated equal registering, the finish of many figuring errands requires VMs to convey and help out one another through virtual organizations. The creators [8] guaranteed that the inside correspondence in the cloud is quite possibly of the most serious danger to distributed computing security. For different viewpoints, the work [11] gave a few motivations behind why the hoodlums are not difficult to control different VMs and get ready for different assaults. These focuses are likewise presented exhaustively in [12]. Through the previously mentioned weaknesses of VMs in the cloud, lawbreakers can to be sure effectively send off different assaults, for example, botnet assault, dispersed refusal of administration (DDoS) assault, ransomware assault and spyware assault. The work [13]

portrayed that malware can enter the virtual climate in its own specific manner, and might in fact make or control VMs to make them claimed without anyone else. When the quantity of controlled VMs arrives at a specific level, botnets will arise, and crooks can send off DDoS assaults whenever. Specifically, the botnets in the cloud can send off the DDoS assaults on targets outside the cloud [14]. What's more, when a cloud supplier offers types of assistance to the client, it permits the client to introduce programming and transfer information (e.g., picture, video, and different records) to the cloud. This additionally gives an open door to hoodlums to embed malware (e.g., ransomware and spyware) in the cloud. In addition, crooks are progressively disposed to take client security information for benefit, and ransomware assault has been quite possibly of the most famous assaults as of late. In [15], the creators expressed that malware can spread by sharing pictures from the picture vaults at VMs. In view of an examination of 5303 Amazon pictures of VMs, Balduzzi et al. [16] viewed that as 98% of Windows and 58% of Linux pictures contain applications with serious weaknesses. Plus, a pernicious client can transfer the contaminated picture to proliferate malware in the cloud [12].

To manage these dangers in the cloud, many measures have been taken to recognize and forestall the spread of malware. Among them, the actual host machines were utilized to screen the way of behaving of the VMs. The virtual organization is mindful to the correspondence among VMs and is a coherent organization in light of an actual organization, and the stockpiling what's more, computation elements of VMs additionally rely upon the physical have machines. In any case, the work [17] brought up that malware in the virtual climate is probably going to escape the reconnaissance of safety apparatuses. Moreover, a superior way for containing malware is to introduce antivirus programming for all VMs in the cloud similarly as actual machines forestall PC infections. It is unquestionable that this will for sure control the spread of malware to a huge degree. By and by, this will likewise build the expense of antivirus speculation and energy utilization. Eventually, it will definitely increment the above of cloud suppliers and clients, what's more, even antagonistically influence the worldwide environment. Li et al. [18] found by concentrating on Cyber Guarder (a security device planned for the green distributed computing) that the presentation cost of Cyber Guarder is more than 10% and the energy utilization is expanded by 5%. This additionally shows that it isn't prudent to introduce antivirus programming on all VMs in the cloud. To adjust the advantages and expenses of conveying numerous interruption discovery frameworks, the work [19] proposed an assault model and thought about various interruption discovery frameworks as per the expenses. Afterward, motivated by the use of the traditional scourge model in the study of disease transmission, the creators [12] investigated a helpless safeguarded tainted (SPI) cloud malware assault model. As the creators guarantee, this is the first numerical model to investigate the impact of hostile to malware programming on the spread of malware in the cloud. In addition, this work doesn't totally duplicate the traditional scourge model, and gives the comparing reasons. The elements of the model is additionally dissected. Be that as it may, it is worth focusing on that this model is laid out in an at first uninfected cloud climate. In other words, all VMs enter the virtual organization without contamination.

1.2 SCOPE OF THE PROJECT

Indeed, the authors pointed out that antivirus software updates always lag behind the emergence of new viruses, and it is not possible to remove all viruses from the network. In addition, our work is also different from the traditional computer virus propagation model. On the one hand, these traditional models do not consider the cloud environment. On the other hand, the model compartments and their transition are different.

1.3 OBJECTIVE

In this paper, a new dynamical propagation model of malware is developed. Specifically, it is found from the model analysis that the proposed model has a unique (viral) equilibrium. Furthermore, the stability of the equilibrium is analyzed. The unique (viral) equilibrium is globally asymptotically stable regardless of any threshold. This implies that once malware appears in a virtual network, it will always exist, and no matter what method is adopted, it cannot be completely eliminated. However, by adjusting system parameters, the proportion of infected VMs can be reduced to a relatively low level. This can provide directional guidance to curb the spread of malware. Finally, some numerical simulations are performed to illustrate the obtained theoretical results and verify the proposed model.

1.4 PROBLEM STATEMENT

To balance the benefits and costs of deploying multiple intrusion detection systems, the work proposed a attack model and compared different intrusion detection systems according to the costs. Later, inspired by the application of the classical epidemic model in epidemiology, the authors explored a susceptible-protected-infected (SPI) cloud malware attack model. As the authors claim, this is the first mathematical model to explore the effect of anti-malware software on the spread of malware in the cloud. Besides, this work does not completely copy the classical epidemic model, and gives the corresponding reasons. The dynamics of the model is also analyzed. But it is worth mentioning that this model is established in an initially uninfected cloud environment. That is to say, all VMs enter the virtual network without infection.

Inspired by the above discussion especially the work, this paper aims to address the issue of malware propagation among VMs under an infected cloud environment. Different from the work, our work allows the infected VMs access to the virtual network. Indeed, the authors pointed out that antivirus software updates always lag behind the emergence of new viruses, and it is not possible to remove all viruses from the network. In addition, our work is also different from the traditional computer virus propagation model. On the

one hand, these traditional models do not consider the cloud environment. On the other hand, the model compartments and their transition are different.

1.5 EXISTING SYSTEM

- Existing work allows the infected VMs access to the virtual network. Indeed, the authors pointed out that antivirus software updates always lag behind the emergence of new viruses, and it is not possible to remove all viruses from the network.
- In addition, these works are also different from the traditional computer virus propagation model.
- On the one hand, these traditional models do not consider the cloud environment.

1.5.1 EXISTING SYSTEM DISADVANTAGES

- Low Security
- Low effectiveness.
- Very difficult to handle malware.

1.6 PROPOSED SYSTEM

- The purpose of this paper is to address the issue of malware propagation among VMs under the infrastructure as a service (IaaS) architecture.
- Firstly, a dynamical propagation model is proposed to explore the important factors affecting the spread of malware, especially the impact of installing antivirus software in VMs.
- On this basis, a theoretical analysis for this model is investigated by means of differential dynamics, from which it is able to understand the dissemination behaviour of malware under an infected cloud environment.

1.6.1 PROPOSED SYSTEM ADVANTAGES

- To better understand how malware propagates in an infected cloud environment.
- Our system balances the benefits and costs of deploying multiple intrusion detection systems.

II. MODEL DESCRIPTION

Our objectives and inspirations have been depicted in the past segment, this part will present the proposed dynamical engendering model of malware exhaustively.

To describe the spread of malware in the cloud, as work [12], in this paper, each VM under IaaS engineering

is in one of three states: powerless, contaminated, and safeguarded. Obviously, these states can be changed into one another over the long haul under specific circumstances. On this premise, all VMs are separated into three gatherings: powerless compartment, contaminated compartment, and safeguarded compartment. Their implicationsare characterized as follows.In light of the above definitions, it is easy to see as the change between three states. There are a sum of six structuresof progress between them, i.e.,

• Susceptiblecontaminated (see Fig. 1);

• Susceptiblesecured (see Fig. 2);

• Infected ⇆ protected (see Fig. 3).

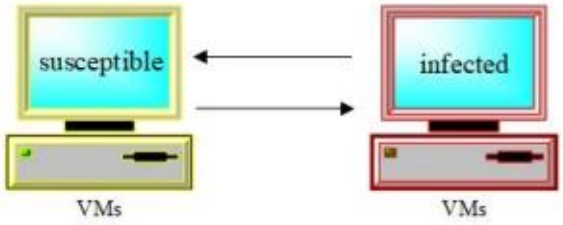


FIGURE 1: Susceptible⇆ infected.

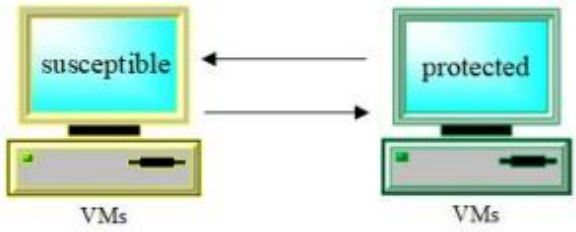


FIGURE 2: Susceptible⇆ protected.

Taking into account the expense of antivirus speculation and energy utilization, not all VMs will introduce antivirus programming. Since simply by reinstalling the framework can be 100 percent sure that the contaminated VMs are liberated from malware, here just consider introducing antivirus programming to safeguard defenseless VMs. Thusly, regardless of whether the malware in a contaminated VM is taken out, the comparing VM won't be resistant to malware assaults, furthermore, will be in a vulnerable state. In other words, contaminated → safeguarded is unthinkable. Essentially, secured → contaminated is likewise illogical. From one viewpoint, as indicated by the definition of safeguarded express, a safeguarded VM is difficult to be contaminated by malware during the whole time of antivirus programming. Then again, in a safeguarded VM, when the antivirus programming is uninstalled or obsolete, the relating VM will become vulnerable. In outline, susceptible tainted also, susceptiblesafeguarded are conceivable.

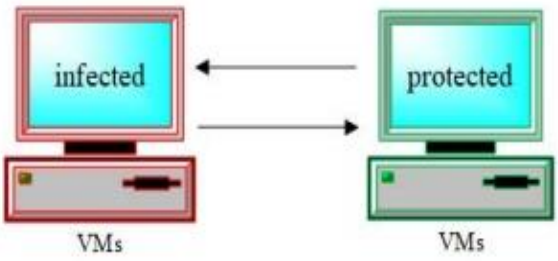


FIGURE 3: Infected ⇆ protected.

2.1 MODULES NAME:

This project having the following 4 modules:

- User Interface Design

- Admin
- Server
- Client User

2.2 TECHNIQUE USED OR ALGORITHM USED

Algorithm:Dynamical Propagation Model

To characterize the spread of malware in the cloud, like work [12], in this paper, each VM under IaaS architecture is in one of three states: susceptible, infected, and protected. Of course, these states can be transformed into each other over time under certain conditions. On this basis, all VMs are divided into three groups: susceptible compartment, infected compartment, and protected compartment. Their meanings are defined as follows.

- Susceptible: the state of an uninfected VM in the cloud that is vulnerable to malware attacks. That is to say, an uninfected VM in the cloud does not install antivirus software or the installed antivirus software has expired.
- Infected: the state of a VM in the cloud that has been infected by malware. That is to say, the malware has not been removed.
- Protected: the state of an uninfected VM in the cloud that is immune to malware attacks. That is to say, an uninfected VM in the cloud install the unexpired antivirus software.
- Susceptible compartment: the set of all susceptible VMs in the cloud.
- Infected compartment: the set of all infected VMs in the cloud.
- Protected compartment: the set of all protected VMs in the cloud.
- Susceptible $\leftrightarrows$ protected (see Fig. 2)
- Infected $\leftrightarrows$ protected (see Fig. 3).

III. REQUIREMENTS

3.1HARDWARE . REQUIREMENTS

- PROCESSOR: PENTIUM IV 2.6 GHz,Intel Core 2 Duo.
- RAM:512 MB DD RAM
- MONITOR:15” COLOR
- HARD DISK :40 GB

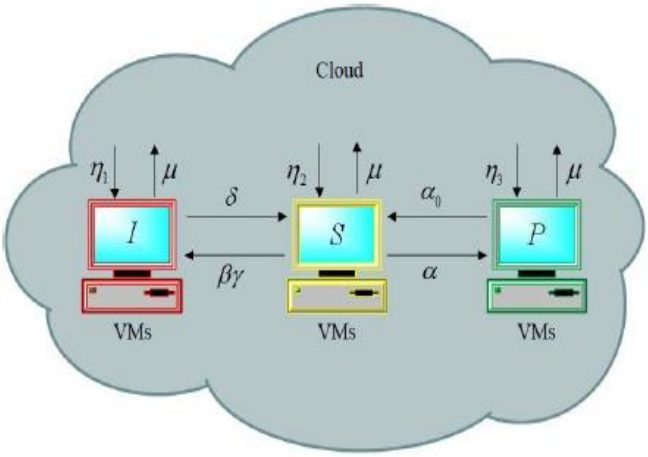
3.2 SOFTWARE REQUIREMENTS

- Front End: J2EE (JSP, SERVLET)
- Back End:MY SQL 5.5
- Operating System: Windows 7
- IDE:Eclipse

IV. SYSTEM ARCHITECTURE

Before proceeding with model analysis, let us introduce the meaning of some basic terms, which will be useful in the sequel.

- Dynamical System: dynamics is primarily the study of the time-evolutionary process and the corresponding system of equations is known as dynamical system [27]. In this paper, system (1) is a differential dynamical system.
- Equilibrium: equilibrium is a fixed point of a dynamical system, which is important in analyzing the local and global behaviours of the dynamical system. In this paper, an equilibrium represents a possible final propagation level of malware, which can be obtained by solving the first order differential dynamical system (1).
- Viral Equilibrium: in this paper, if the component of infected VMs in an equilibrium is not zero, this equilibrium is called viral equilibrium.
- Stability: long-term behaviour of an equilibrium of a dynamical system. In this paper, by analyzing the stability of equilibrium of dynamical system (1), the final propagation level and behavior of malware in the cloud can be predicted.



The transfer diagram of the proposed dynamical propagation model of malware

V. SNAPSHOTS

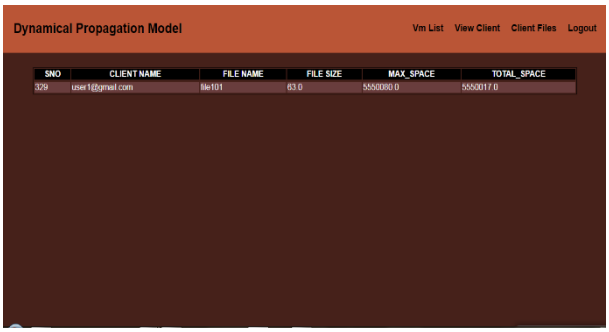


FIG 5.1 SEE DETAILS PAGE

FIG 5.2 USER INFORMATION PAGE

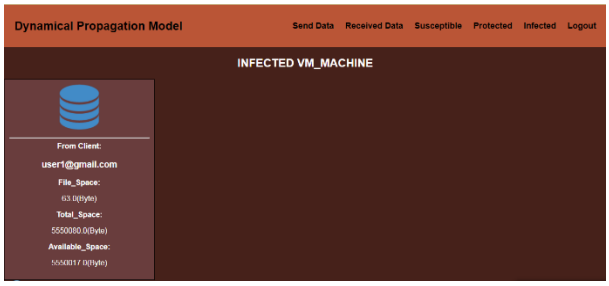


FIG 5.3 INFECTED VIRTUAL MACHINE PAGE

VI. FUTURE IMPROVEMENT

Right off the bat, our work has demonstrated that the last level of disease relies upon framework boundaries. Be that as it may, it is need of further research on control techniques, which restricts its practicality to a specific degree. Subsequently, it is crucial for study the specific control methodologies. Furthermore, it is worth attempting to apply profound learning methods to investigate the proliferation conduct of malware in the cloud.

VII.CONCLUSION

In this paper, a dynamical engendering model of malware for distributed computing security has been proposed. To better understand how malware proliferates in a tainted cloud environment, an extensive examination including the equilibrium and its security for the proposed model has been conducted. It is found from the model examination that once malware shows up in a virtual organization, it will constantly exist, and no matter what strategy is taken on, it can't be completely eliminated. Be that as it may, by changing framework boundaries, the proportion of tainted VMs can be diminished to a moderately low-level. At long last, a few mathematical recreations have been given to illustrate the got fundamental outcomes.

In spite of the fact that our work has accomplished a few outcomes about the propagation conduct of malware under a tainted cloud environment, in our view, there is still a lot of work to do in the future.

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Block-Based Reversible Data Hiding with Secret Sharing

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Abstract- **The three entities required by this research's technique for reversible data concealment in multiple encrypted image blocks are the data owner, the data hider, and the recipient. The source image is divided up by the resource owner into several blocks of pixels, which are then stream-encrypted and sent to the server. The server data hider tags the multi-part encrypted blocks by incorporating hidden bits into them. As a result, the original picture may be correctly reconstructed by the receiver by extracting additional data from the annotated encrypted blocks. Because of the procedure's security and dependability, sensitive data may be transferred securely without endangering the integrity of the original data. Because hostile attackers will be unable to modify the original data, it is also more resistant to tampering and manipulation. It is more effective as well since it reduces the need for extra data storage and transmission overhead. Numerous applications, including digital forensics and medical imaging, will benefit from this procedure**

I. INTRODUCTION

Data hiding is defined as the process of concealing data (representing some information) within cover media. In other words, the data concealing process connects two categories of data: embedded data and cover media data. The link between these two sources of data defines many applications. This approach assures that the cover may be retrieved without loss after the embedded data has been extracted. The RDH method is also utilized for distortion-incompatible coverings, such as military, legal forensic, and medical photographs, because to its high reversibility. Almost all modern RDH algorithms start with a high-peak prediction-error histogram and then reversibly embed data into it via histogram shifting.Because of the necessity to protect picture privacy, content owners are hesitant to display photos to data-hider, particularly photographs containing sensitive information. Encryption is a popular and effective method of safeguarding picture privacy because it transforms a meaningful image into a meaningless image that is impossible for any unauthorized user to identify. As a result, reversible data hiding in encrypted pictures must be designed (RDH-EI). In cloud storage, for example, the content-owner wishes to save the image in the cloud while maintaining privacy by encrypting the image before uploading it to the cloud. The cloud service provider will embed some additional data inside the encrypted picture for management purposes without accessing the content.The approved receiver, on the other hand, can fully reconstruct the original picture after decryption and data extraction as needed. The pixel correlation of a picture is lost after encryption; however, if the image is encrypted using an encryption technique that does not modify pixel position or pixel block location, such as the advanced encryption standard (AES) and stream cypher, the pixel correlation remains. Data extraction and picture recovery may be accomplished by employing correlation. By computing the local standard deviation of encrypted blocks, the original picture is recovered.

In recent years, homomorphism-based approaches that can directly act on encrypted images to obtain the required effect have been developed. In general, homomorphic encryption is used to encrypt the original picture, and then homomorphic property is used to insert a secret message within the encrypted image. Finally, data extraction and picture recovery are accomplished by determining a specific connection between the directly decrypted image and the original image.

RDH-EI approaches based on secret sharing were established to decrease data growth and computational complexity. Wu et al. developed a secret sharing-based RDH-EI approach in [8], which encrypts the original picture to produce encrypted images using Shamir's threshold secret sharing [9], and then distributes the encrypted images to a data-hider for data hiding. In the best-case scenario, the encrypted photos are just twice the size of the original image.Another RDH-EI approach based on secret sharing was proposed in [10], in which an original picture is turned into an encrypted image and the encrypted image is transferred to a data-hider for data concealment. Because the resulting encrypted picture is the same size as the original image, data expansion is avoided, and computational complexity is reduced.

However, the majority of known RDH-EI approaches use either a single data-hider or a multiple data-hider model. The original image cannot be reconstructed from the designated encrypted photos once the data-hider has been subjected to possible harm, such as faulty administration by itself or hostile assault by an opponent. In this paper, we propose a novel approach to safe picture encryption utilizing a single data hider is shown by the newly suggested method for reversible data hiding in images. Each manageable piece of the source image is encrypted with the AES encryption algorithm, a commonly known symmetric encryption method. The data hider processes the encrypted picture blocks, each of which holds a piece of the source image data and inserts a hidden message to create a labelled encrypted image.

The encrypted picture blocks are decoded at the receiver using the AES decryption technique and the same symmetric key. This permits the concealed data to be extracted using a key (kh) and the real picture to be recovered by reassembling the encrypted image blocks.

This method is particularly useful for industries like the military and medicine that require high degrees of

anonymity and data protection. Three people are involved in the process: the receiver, the data hider, and the picture provider. The receiver receives the secret key from both the image provider and the data hider, which boosts security by using the same key for both encryption and decryption.

II. PROPOSED ALGORITHM

Figure 1 illustrates the secret sharing paradigm put out by Wu et al. for RDH-EI (b). To hide the data, the resource owner separates the actual image into ‘n’ number of blocks, which are then distributed to the data cache and encrypted using the AES algorithm and the encryption key "ke."

The vault has a control center in this architecture that handles the distribution and collecting of encrypted photos, as well as decrypting the source images and extracting the secret message.

The suggested secret sharing paradigm with multipart encryption blocks is depicted in Figure 2 below and consists of three steps: image encryption, data concealment, and data extraction and picture recovery.

Unlike previous designs, the entire image is encrypted and sent to the data cache, while the proposed mode contains multiple part data image blocks that are sent to the data cache. Next, we present each step of the formally proposed model. In the image encryption step, the actual image is divided into ‘n’ number of blocks each of which gets encrypted. Each byte array read from the source image is then represented in a block, which is then encrypted with the encryption key that, and each encrypted block is placed into a single cache. The source image encryption procedure is formatted with,

$$\left(E^{(1)}, E^{(2)}, \cdots, E^{(n)}\right) = Enc_{ke}(I), \qquad (2)$$

where E(t) 1<t<n is the block encrypted in ‘t’ and Encke(I) is the source image encryption technique using the encryption key. The data hider then receives E(t) to conceal the data. The data of the encrypted image block E(t) can be included in a data hider with a data hiding key kht. The number may be used to get the linked tagged encrypted picture.,

$$EM^{(t)} = Emb_{kh_t}\left(E^{(t)}, D\right), \qquad (3)$$

Where 'D' represents embedded data, EM(t) represents the tth indicated encrypted image block, and Embkht (*) represents the data hiding technique with data hiding key kht. When there is k (2 k n) or more specified encrypted pictures, the receiver may retrieve both the original image and the k or more embedded data. Let EM(t1), EM(t2), and EM (tr) be any k or more marked encrypted image blocks, with 't1', 't2', 'EM(tr)', and 'n', 'k', and 'r' being integers.

Depending on whether the data concealing key khte, 1 er is required in the source image recovery procedure, the data extraction and picture recovery operations can be characterized by one of two scenarios:

$$\begin{cases} D = Ext_{kh_{t_e}}\left(EM^{(t_e)}, kd\right), 1 \le e \le r, \\ I = Rec_{kd}\left(EM^{(t_1)}, \cdots, EM^{(t_r)}\right), \end{cases} \qquad (4)$$

where Extkhte (*) is a data extraction method with the data hiding key khte, Reckd (*) is a source image recovery algorithm with the decryption key 'kd', and 'D' is the extracted data This new model is summarized below based on the aforementioned study.

RDH-EI uses the idea of secret sharing, which allows the resource owner to share encrypted image blocks to hide data in a single data cache. Thus, the source image is more protected, and an unauthorized user cannot decrypt the actual image. Each image block is embedded with secret information, making it much more secure.

Each encrypted image block can have an arbitrary number of bits embedded in it, and each cache has a different labelled encrypted image block, and the receiver requires k labelled encrypted image blocks to recover the actual image, which means that even if the labelled encrypted image block k1 caches leak, the actual image will not be leaked. As a result, the suggested strategy can effectively limit the likelihood of real image leaking. We may lessen the risk of the original image being leaked by using the recommended approach.

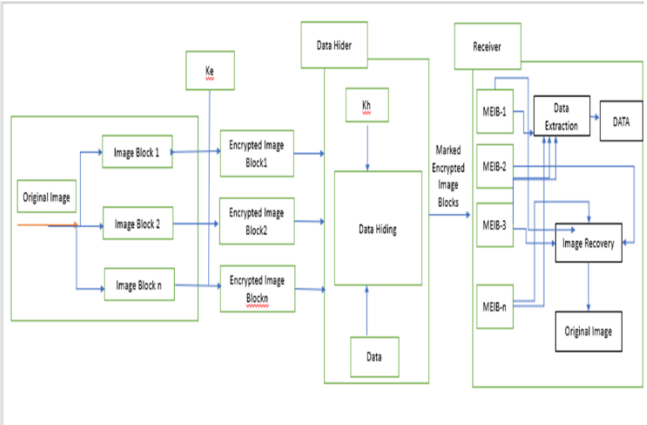
III. CONCLUSION AND FUTURE ENHANCEMENT

When we examined the previous system, we noticed flaws, such as the encrypted image being decrypted, but by implementing the newly presented ideas, we can limit the risk of the actual image being revealed.

Finally, this work presents a novel model for secret sharing that uses a single data hider and converts the original picture into numerous encrypted image blocks, which are then sent to a single data hider for data hiding. The receiver then pulls actual data from the image blocks that have been tagged while recreating the actual image.

As a result, the suggested technique has a lower likelihood of reconstructing the actual image than the present method, which employs a single encrypted image.

Future work: In the proposed method, we use a very single encryption key to process multiple blocks of the source image. In the future, there may be a series of encryption keys that can be used to encrypt the set blocks, and each block can carry its pretty own encryption key identifier, which will kind of be used by the recipient to decrypt the appropriate key for the source image set in a subtle way.



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Online System for Monitoring Water Quality, Leaks, Contamination and Managing Pipeline Network

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Abstract **- Online system for monitoring water quality, leaks, contamination and managing pipeline network entails several steps, including establishing admin login, comprehending the nature of managing pipeline network activities, and ensuring the legitimacy of the leaks and contamination. We have a portal in this project where clients can upload reports or mail in of themselves saying all their information, and it then helps in functioning correctly of the required standard operating procedure. This is done to increase the possibility of monitoring water system efficiently. It also ensures the veracity and authenticity of the information presented.**

Keywords – monitoring water, leaks, contamination, pipeline network.

I. INTRODUCTION

The system is simply all about management of the network and other factors. The working and important parts are the way we make it to communicate in easiest way possible. the problem is to manage the network, leaks, and contamination and above all is monitoring it as it can be costly if high-tech sensors and other tracking devices are used. Stating that pipeline networks are generally spread vast. This is important to keep in mind that any idea that can solve these issues must know that it must not be costly that it makes it difficult to apply and solve the issues efficiently. Managing water system being a challenging task since ages, but always has been evolved and will be using multi-level technologies and technologies evolving everyday makes it more possible to be managed accurately. It has been observed that managing water pipeline network has been a task for a while. Hence managing it has now been possible due to new technologies like IOT or electronic tracking devices which are connected to a neural network of computers. There are different aspects and parameters which make it difficult and so to manage well. In this project we have tested the problems and solution those which can be simple but need proper responses and risk management has been kept on priority. The pipeline network is complex in metropolitan cities and multilevel infrastructure, population, commercial sectors and, and housing affects managing it. Water leaks are one of the problems that need physical attention even as normal pipeline networks are over acres or kms. Monitoring them is a task and needs to be done on field but here the solution is not found. the solution is applied using the computers even if in this generation we have phones. The word management itself states its importance but when it comes to water management which have specific problems apart from awareness it stands apart from regularly faced issues. Water leaks can be a serious issue as it wastes water which is an essential for human being and other purposes. The contamination of water is more serious than just wasting water. There are several serious diseases that come to the picture when it comes to contamination. Human life can be seriously affected if consumed contaminated water. Lead, PH level and other contaminants can prove to be harmful to human life if not treated well. Keeping a track or monitoring it has been an important part in management of the water system. Water system clearly states that it must be just not be treated well but also can be managed using traditional as well as modern technology. Commercial sectors have contaminated the water and not keeping a track of how much MLD water is contaminated and its treatment must be to the water is not task but duty.

II. RELATED WORKS

A literature survey has been conducted for the related title of this project. In that Methodology used, results and the gaps must be found. The gaps that would be found will be trying to implement that in our project.

[1] Dipanjan Rakshit, et al. “Water level indicator” International Journal of Scientific & Engineering Research, Volume 7, Issue 4, April-2016 7 ISSN 2229-5518 IJSER © 2016 have a dynamic system but not fulfilling the requirement completely. The accuracy has been 95% as it is not cost friendly and lacks the current requirement.

[2] This paper uses Danve S and Barabde M 2015 Real Time Water Quality Monitoring System Int. J. Innov. Res. Comput. Commun. Eng. 3:6 pp 5064–5069 the perfect requirement and is best to learn from giving the accurate idea and the accuracy is as much as 95% to the project been made.

III. PROPOSED WORK

Admin portal: the admin portal is going the be the head of this project as it will be monitoring overall activities and the flow of the system. It will be the brain or can be

said the headmaster of this system. Client login: This will be the actual working part where people will be logging in to share queries and help in to monitor or will be making a two-way communication system. Pipeline network map: This is to show complete network in subdivisions when put into search nav bar. Contamination report portal: In this portal daily updates from the testing center will be updated about the contamination from sources of water to storage houses and use. Leaks report portal: this will the portal where the official or the workers and people can report about leaks of the pipeline and history and future repair data can be maintained, and work accordingly can be assigned to whomsoever concerned.

The main aim is to develop and constantly improve a comprehensive online water management system system that works with any type of monitoring, contamination monitoring, leaks monitoring.

Firstly, we will collect data. And apart from just collecting data understanding the need of such system is necessary or else working of this system will become hectic and difficult. Planning of pipeline network must be prepared after checking on the database which will become more efficient to use after gaining knowledge of past network and then work on new network required. Then we can monitor the network and all aspects of it.

The contamination is part where right reports and test that have been conducted the validation of test and its reports is a task and must be focused on. The contamination can be from the natural source or pipeline of the source or the storage house hence taking it into account 2 step contamination tests and its treatment must be done. One from the natural source of water and next before pumping from storage houses. This will make the physical part easy.

Monitoring leaks are easiest as they are all about constant physical monitoring which can be scheduled using database. The leaks and its repairs can be monitored here we can do it with use of data base as we will have the history of repairs and from there, we can schedule next repair and constant monitoring for the team which can do physical checks this will make their time efficient as they won't have to be constantly visiting the place or pipeline network again an again. The ground team cam work using the reporting systems and can visit the location using the reporting system between client login and admin login portals.

IV. SOLUTION

Here a simple website has been made to ease water management as it gives us more options where we can get updates on contamination and articles related to it. Bringing more awareness among people and is efficient in terms of keeping people away from falling into disease related to it.

The primary focus of the website has been to make sure that water management finds new ways to communicate and minimize management issues. From giving updates to taking in complains and giving out knowledge of pipeline and many other things. This brings in new experience and practices in the field of management that are concerned with water management.

The secondary focus is on the usability and true purpose of the website where in it is expected to offer more about how the contamination is contained and leaks are managed and what do we exactly give knowledge about the pipeline network in his/her town or city.

V. TECHSTACK

Language: HTML
CSS
PHP
SQL

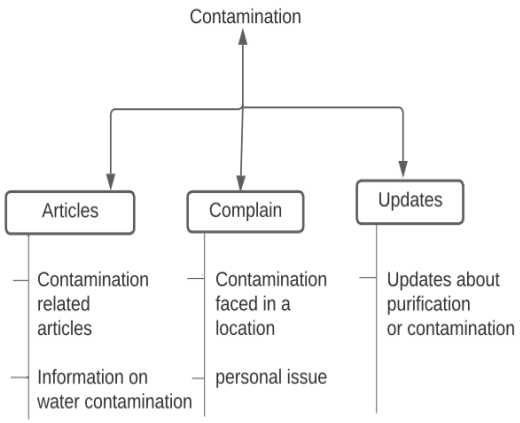
Software: Visual Studio Code

VI. WORKING

This project is a platform designed to cater information regarding to contamination, updates on leaks and repairs, also giving host of information on pipeline system. Here the login section gives option of two login ID. One for the admin that means the officials and one for the users. The project has been divided into three parts : Contamination , leaks and pipeline network.

Starting with part one: Contamination

In contamination , we have put in three sub sections: articles complains and updates. The article section contains contamination related articles wherein people will be aware about the causes of water contamination, what makes the water unfit for use and how one can make contaminated water fit for drinking. Here, the people will be made aware about the side effects of drinking contaminated water. The complain section is used to lodge a complain faced by the users. Here there will be a dialogue box where the individual can lodge any type of complain faced by himself in his locality. Another section is for updates where one can have a look about the updates about purification.



The second part is Leaks:

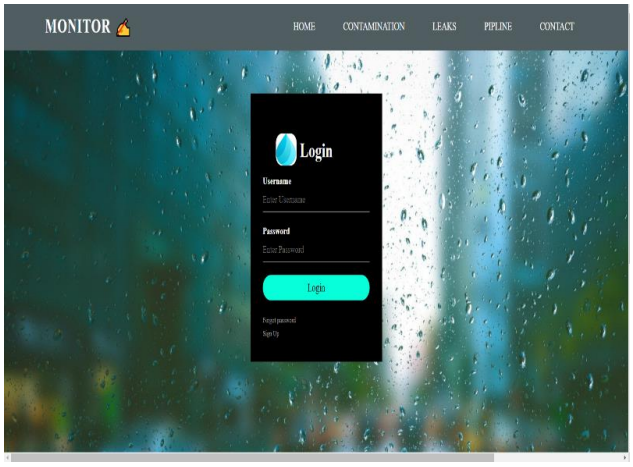
There are two subsections in Leaks: First part is reports where the consumer can report any leaks that occur in their societies or in corporations. The second part is updates where the people can see the current information about the leaks. Also, the previous history of repairs in the locality can be seen in this tab. Also, any further repairs can be seen under this banner. Any other maintenance about the leaks can be seen here.

The Third Part is Pipeline networks:

Here we have a search nav bar, where we can select the desired city or area and we can have a look of a pipeline network. This helps in giving knowledge on status of pipeline passing through city, locality, specific location. Putting these things all together new pipeline network can be planned well and strategic planning for repairs as well as better connectivity to the user can be planned.

VII. RESULTS

The image shown below depicts the exact view of our website that has been made.



VIII. CONCLUSION

The project of the online water management system has been successfully managing the water system well and monitoring the contamination, leaks and more importantly the pipeline network which in most important factor in today's world with growing population and rapid growth in modern infrastructure. The objective of test to contamination, planning of pipeline network and leaks if managed by the system with standard operating procedures and newly reporting system and feedback system which more often helps in monitoring and managing. Proving into real growth of managing water systems which has taken new turns into conservation and saving reserves of water and biotic life.

IX. FUTURE SCOPE

Our main aim of the project is to develop a system wherein the management of the system be it commercial, domestic, drinking or any other purpose must be clearly controlled and monitored thoroughly and treated In a manner that the water must not cause any more contamination but can be reused managed by the system and monitored as well and new can see the basic problems of managing water system has been done in the project using fusion of traditional and modern systems that can give great results in managing and monitoring the system. Eaze in management of online water management related to context of leaks, contamination.

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Lightweight Cryptographic Algorithms

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Abstract— **This study examines Internet of Things (IoT) lightweight cryptographic solutions (IoT). This review includes a full range of security measures, from comparisons of various block cyphers to Lightweight Cryptographic solutions. Additionally, it compares hardware and software solutions, as well as many modern architectural variants of the most well- known and extensively studied block cypher, Advanced Encryption Standard (AES), as well as attacks for IoT security. The study found that lightweight AES worked well as a security solution for IoT devices with limited resources.**

Keywords— Internet of Things, Lightweight Security Solution, Block Cipher, Advanced Standard Encryption, Hardware Attack

I. INTRODUCTION

In recent years, the Internet of Things (IoT) has become a topic of discussion that is both theoretical and practical. The Internet of Things (IoT) is a concept that integrates common objects with the ability to perceive and connect with other devices online. More devices and sensors are connecting to the broadband Internet as it becomes more widely available and its cost of connectivity decreases. Such circumstances are creating favourable conditions for the development of IoT. The IoT is incredibly complex because we want to be able to interact with every thing from anywhere in the world. The physical objects that surround us are equipped with sophisticated electronics and sensors that communicate important data. Internet of things (IoT) consists of several interconnected devices which continuously share information and data among each other. To protect that information, we need to know the basic characteristics of security for IoT devices:

- Confidentiality- We need to make sure that the information is only available to the authorized users.
- Availability- Multiple devices are connected, we need to make sure a device gets its required data when it needs.
- Integrity- We need to make sure that the data is accurate.
- Authentication- This is an important characteristic yet difficult to implement from IoT perspective. In IoT, we

have different entities connected which have different purposes and levels in the whole structure.

- Key Encryption- This is the most important step. To ensure a secured connection, the devices and the other entities need to have a lightweight key management system.

The devices themselves must safely communicate with the IoT platform to start the process of sharing such a massive volume of data. To share the most important data with the apps, this platform combines the data from numerous devices and applies analytics. As everything will be connected to the internet, the IoT is elevating the traditional internet, sensor network, and mobile network to a new level. The difficulties relating to confidentiality, data integrity, and authenticity that would arise as a result of security and privacy must be taken into consideration as a subject of concern.

In this report, we reviewed recent research on several IoT security solution phases. We thoroughly addressed the progression of security measures, from Lightweight Cryptographic solutions through a comparison of various block cypher variants. Additionally, we compared the most well-researched and reliable block cypher, Advanced Encryption Standard (AES), with several modern approaches for IoT security.

The sections of the paper are as follows: Asymmetric and symmetric cryptography, two major categories of cryptography, were covered in Section II's discussion of lightweight cryptography. Additionally, we talked about and gathered many Stream Cipher and Block Cipher types that may be appropriate for IoT applications.

The most well-researched and reputable block cypher was the Advanced Encryption Standard, which was covered in part III. We made an effort to compile numerous recent studies on AES for IoT in accordance with diverse criteria.

II. LIGHTWEIGHT CRYPTOGRAPHY

To protect our sensitive data, a variety of cryptographic methods are available, but sadly not all of them are appropriate for contexts with limited resources, such as IoT devices

In order to provide a system that is both space and power efficient, lightweight cryptography techniques are being intensively investigated. Industrial and commercial IoT devices are also susceptible to IoT-specific attacks [1]. We will soon be faced with a security catastrophe if we keep using the current IoT device design cycle. Two categories can be used to categorise the present cryptographic primitives. There are two types of key encryption: symmetric and asymmetric.

A. Asymmetric Key Cryptography

A pair of public and private keys are required for asymmetric key cryptography, also known as public key cryptography (Fig. 1). Asymmetric key cryptography has received more attention recently than symmetric key encryption, however the results are not yet as consistent and productive. The operation of lightweight asymmetric algorithms is complicated, and they are not time-efficient. These algorithms are also weak because of the size of the operands and the relentless development of

attack models. Here are a few of the most significant asymmetric algorithms:

Rivest-Shamir-Adleman (RSA), Diffie-Hellman, Digital

Signature Algorithm (DSA)

• Rivest-Shamir Adleman (RSA) – An attacker would have a very tough time performing the reverse procedure and creating the private key from the public key. Therefore, even though key generation is complicated and time- consuming, this method is exceedingly secure.

• Diffie-Hellman – The process is quicker because the private key is so short. Short private keys make it more vulnerable to attacks, and man-in-the-middle attacks can also be used against the process.

• Digital Signature Algorithm (DSA) – The digital signatures have a limited lifespan, and the sharing is difficult, but this method is quicker and more advantageous than other asymmetric algorithms.

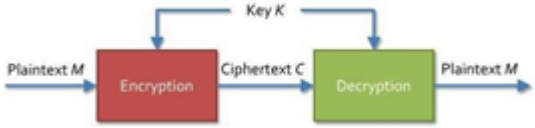

Fig. 1. Asymmetric Key Cryptography

A comparative study was done among RSA, Diffie-Hellman and Elliptical Curve Cryptography with Diffie-Hellman (ECDH) and they have found ECDH is better than other algorithms in terms of power and area.

B. Symmetric Key Cryptography

Secret key or shared key cryptography are other names for symmetric key cryptography. Through covert communication, the sender and the receiver in this procedure share a common key for both encryption and decryption. Due to its quick operations, which are mostly XOR and permutations, symmetric cryptography is better suited for IoT applications. They use fewer resources and absorb information more quickly.

The difference between stream and block cyphers in symmetric algorithms is crucial. A key used by stream cyphers has the same size as the data. In this procedure, plaintext is processed "bit by bit" to create the encrypted text. Despite having a poor throughput, Grain 128 is one of the most popular and appropriate lightweight cyphers for restricted devices. The lightweight cyphers below 1500 GE are reported to be the fastest with Espresso being the fastest.

Block cyphers use several phases of transformation that are determined by a symmetric key and have a set number of bits. The versatility of block cyphers is particularly advantageous from an IoT perspective. Another benefit is that the encryption and decryption techniques used in this procedure are nearly identical. Therefore, it might perhaps be done with minimal funding

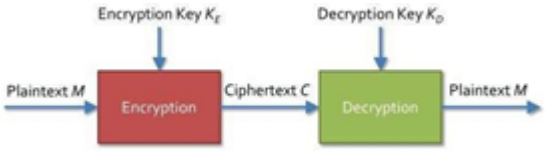

Fig. 2. Symmetric Key Cryptography

TABLE I. COMPARISON BETWEEN ASYMMETRIC KEY CRYPTOGRAPHY AND SYMMETRIC KEY CRYPTOGRAPHY

Symmetric Key	**Asymmetric Key Encryption**
It only requires a single key for both encryption and decryption.	It requires two keys, a public key and a private key, one to encrypt and the other one to decrypt
The size of cipher text is the same or smaller than the original plain text.	The size of cipher text is the same or larger than the original plain
The encryption process is very fast.	The encryption process is slow.
It is used when a large amount of data is required to transfer	It is used to transfer small amounts of data
It only provides confidentiality.	It provides confidentiality, authenticity, and non-repudiation
The length of key used is 128 or 256 bits	The length of key used is 2048 or higher
In symmetric key encryption, resource utilization is low as compared to asymmetric key encryption.	In asymmetric key encryption, resource utilization is high
It is efficient as it is used for handling large amount of data.	It is comparatively less efficient as it can handle a small amount of data.
Security is less as only one key is used for both encryption and decryption purpose.	It is more secure as two keys are used here- one for encryption and the other for decryption
The Mathematical Representation is as follows- P = D (K, E(P)) where K –> encryption and decryption key P –> plain text D –> Decryption E(P) –> Encryption of plain text	The Mathematical Representation is as follows- P = D(Kd, E (Ke,P)) where Ke –> encryption key Kd –> decryption key D –> Decryption E(Ke, P) –> Encryption of plain text using encryption key Ke . P –> plain text

Block cyphers are the most studied and changed IoT security solutions, despite their short latency. The Advanced Encryption Standard (AES), Data Encryption Standard (DES),

3DES, Blowfish, and Twofish are only a few examples of the various types of block cyphers. Researchers have used a variety of strategies to make these block cyphers acceptable for IoT and lightweight.

Various efforts to standardise cryptography take into account the security of both software and hardware. A comparison of a few lightweight block cyphers' software and hardware implementations was conducted.

Different metrics apply to software and hardware security solutions. Hardware measurements include throughput, area,

and throughout-area ratio, whereas software metrics include cycles, memory, and cycle per byte. Getting a straight

comparison between these two is challenging. By using a specially designed, lightweight reconfigurable CPU, the

authors were able to compare. They compared the size, throughput/area ratio, and hardware and software

implementations of AES, SIMON, SPECK, PRESENT, LED, and TWINE. Both in terms of hardware and software

performance, SPECK, TWINE, and PRESENT did well. Hardware and software security solutions are compared on a basiclevel.

It is significant to note that AES (Advanced Encryption Standard) is the most extensively researched block cypher algorithm out of all of them. To make AES lightweight and IoT friendly, several experiments have already been conducted on it, and more are being conducted right now.

III. ADVANCED STANDARD ENCRYPTION (AES)

1. The National Institute of Standards and Technology (NIST) standardised AES in 2001, and experts have since thoroughly examined it. It's probable that different devices will need varying levels of protection, as well as varied power budgets and throughputs, when it comes to security.

2. If we approach security from the level of the algorithm, it will rely on how the algorithm is built and how long the key is. Three distinct key sizes for AES offer three different levels of protection. To the best of our knowledge, it has security that has been proven, and it is frequently used for security measures and data encryption. AES has a high level of security and little complexity. AES core is split into halves : Key expansion path and the data encryption path. AES includes four meaningful rounds in total.

3. Key Expansion: Round keys are derived from the cipher key. This step has three rounds itself, Rotate, S-Box, and Rcon .

4. Initial Round:

Add Round Key: Each byte of the state is combined with a block of the round key using bitwise XOR.

5. Rounds:

a. Sub Bytes: A non-linear substitution step where each byte is replaced with another according to a lookup table.

b. Shift Rows: A transportation step where the last three rows of the state are shifted cyclically a certain number of steps.

c. Mix Columns: A mixing operation which operates on the columns of the state, combining the four bytes in each column and Add Round Key.

6. Final Round: All three rounds except Mix Column

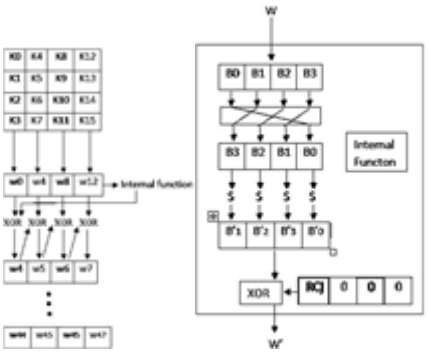

Fig. 3. AES – Key Expansion

TABLE II. PROPERTIES OF DIFFERENT BLOCK CIPHERS

Block Cipher	***Key Size (bit)***	***Block Size (bit)***	***No. of Rounds***	***Characteristics***
AES	128,192, 256	128	10, 12, 14	Excellent security,
DES	64	64	16	Not very secure but
3DES	112,118	64	48	Good security,
Blowfish	32-448	64	16	Excellent security, flexible
Twofish	128,192, 256	128	16	Can't be broken remotely
Humming Bird	256	16	4	Suitable for RFID tags or Wireless Sensor Network, Low power
SIMON	64~256	32~128	32~2	Excellent performance, easy
TWINE	80,128	64	36	Ultra-lightweight,Enough speed
LED	64, 128	64,	-	Efficient hardware implementation,

AES has a block size of 128 bits and key sizes of 128,

192 and 256 bits.

- For a 128-bit key 10 rounds are required.
- For a 192-bit key 12 rounds are required.
- For a 256-bit key 14 rounds are required.

Block diagram for 10 rounds of AES-128 is shown in Fig.

4. The total number of rounds is calculated by counting the most rounds for which shortcut attacks have been discovered and a sizeable security margin has been applied. An assault that uses shortcuts is more effective than one that does a thorough key search. No shortcut attacks for AES with block length and key length of 128 bits have been discovered for scaled-down versions with more than 6 rounds. Added as a security margin are 4 rounds. This is a cautious course of action. rounds. 4 rounds are added as a security margin. This is a conservative approach .

A. Recent Research Work on AES for IoT

The research on lightweight AES for IoT is still challenging. For IoT devices with power constraints that are implemented on UMC 130 nm technology, a power-efficient AES Core was described. The AES algorithm was provided with a completely asynchronous, quasi-delay-insensitive (QDI) implementation. For the AES 32-b datapath, many

cost, high-throughput, low-power, and energy-efficient design with numerous degrees of security. a brand-new AES microarchitecture with a 32-bit datapath that is geared for Internet of Things applications that use low power and low energy. AES circuit design that is ideal for Internet of Things applications was suggested as being small and light. Results for AES ideas were quite appealing. Also investigated was the energy efficiency of several block cyphers, including

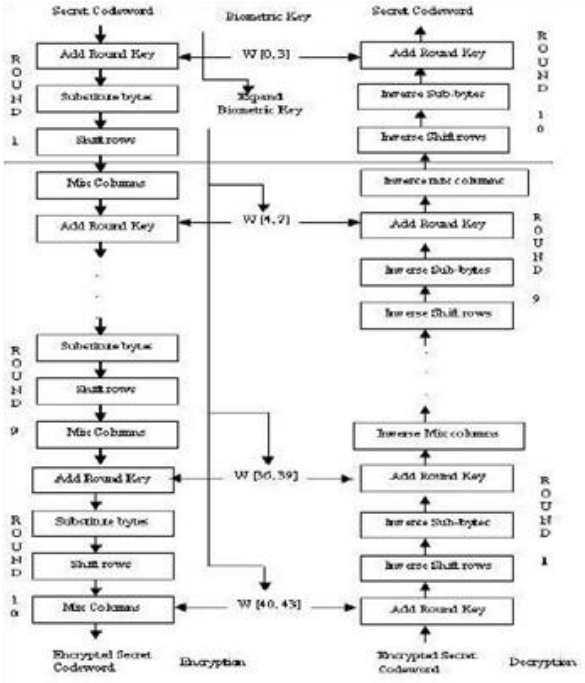

Fig. 4. 10 rounds of AES – 128 (Block Diagram)

B. Recent Research Work on AES for IoT

Mix-column round and S-box are the two main obstacles to an AES implementation on hardware. The primary objectives of the researchers are to decrease both the area and the delay of Hardware implementation of AES. To develop a lightweight AES that is appropriate for the Internet of Things, researchers have been working. Mix-Column and S-box have been the subject of research efforts up to this point

Utilizing the high performance Mix-Column and inv-Mix- Column approaches, which take advantage of the characteristics of binary computation, a novel FPGA implementation of AES was developed. Comparing the final design to the initial AES design, the area is reduced by 12% and the speed is increased by 20%. In a different publication, Mix-Column was also improved for speed and simplicity. In comparison to other similar studies, their results display less complexity and a smaller number of gates.

AES to become a compact and appropriate block cypher for the Internet of Things, S-boxes and Mix-Column rounds are two crucial issues. Regarding AES's level of security, there is no debate. A portable AES can protect the exposed IoT network. To accomplish the desired result, researchers have been putting out novel architectural designs and working on Mix-Column and S-boxes.

Attacks on AES

IoT hardware security attacks may target AES hardware implementation. Finding answers while keeping an eye on the attacks is crucial. Below are some current research articles about AES attacks.

It was established that the suggested Differential Fault Analysis Attacks for AES decryption were effective. Along with a relative key impossible differential attack on

7 round AES 192, a wireless interceptive Side Channel Attack technique was also suggested by to expose the secret key of the AES-128 encryption algorithm for IoT applications. A fake key and XOR gates based on Wave Dynamic Differential Logic were suggested as a defence against Correlation Power Analysis assaults.

IV. DISCUSSION

The key topic of interest for IoT researchers has been security. Finding a single, concise strategy that works for all IoT applications is challenging. In an IoT network, various types of devices are connected. Most IoT devices are resource constrained, however some may afford to have a heavyweight and a high security technique. They require a quick-acting security solution. It also needs to be more adaptable and less complicated.

We started our investigation by investigating lightweight cryptographic techniques. We have researched the use of symmetric and asymmetric keys in cryptography. We came to the conclusion that symmetric cryptographic methods have the speed and simplicity we require for the Internet of Things.

The two most significant symmetric cryptographic cyphers, stream cyphers and block cyphers, were further investigated and explored. Because block cyphers are more adaptable than stream cyphers, academics have developed a number of simple block cyphers that are suitable for IoT.

Finding the most reliable and well-researched block cypher was our next objective. We came to the

conclusion that Advanced Encryption Standard (AES) is the most reliable and thoroughly studied block cypher that can protect the world from the Internet of Insecure Things after reading and analysing numerous research papers. The problem with AES is that it wasn't intended to meet the block cipher's lightweight requirements when it was first proposed.

We also included a comparison of hardware and software security solutions in this article, and we came to the conclusion that we currently need to find a hardware solution for IoT.

Our next objective was to compile research on lightweight AES. We discovered various efforts to lighten the AES design. We also came to the conclusion that the complexity of AES is due in large part to two crucial components: Mix Column and S-box. We also reviewed previous studies that addressed similar topics.

Finally, we have provided the research on several AES attacks. This survey covered every avenue of potential security solutions, and based on our investigation, we came to the conclusion that lightweight AES can be an effective security option for restricted IoT devices

V. CONCLUSION AND FUTURE RESEARCH

In this survey, we discussed comprehensively a flow of lightweight security solutions for Internet of Things. We surveyed research work on Asymmetric cryptographic algorithms and Symmetric cryptographic algorithms (Stream Ciphers and Block Ciphers) for IoT. We also surveyed very recent research work (2015-2018) on AES for IoT in terms of architecture, Mix-Column/S-box modify strategy and attacks. According to our study we conclude, lightweight AES can be a very good security solution for constrained IoT devices. .

AES block cipher is the most researched and trusted block cipher. Researchers are still working on making AES lightweight and suitable for IoT. For our future work, we will work on AES architecture with a goal of proposing a lightweight solution for IoT.

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Lightweight Cryptography in IOT Devices

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Abstract – **The Internet of Things comprises devices that have low or constrained resources and are rather portable. These devices communicate with each other viathe Internet to exchange data. Some examples of such devices are Sensors, Integrated Circuits, small single chipcomputers and many more. Due to the inadequate resources available on such a device, applying traditionalcryptographic techniques is infeasible. There are many comparisons of cryptographic algorithms for devices which have plentiful resources but those are bulky and cannot be applied for a more mobile usage. Developing lightweight algorithms for devices that are memory efficient, portable and easy to attach is the need of the hour. This paper talks about one such application and its comparison with traditional lightweight algorithms that are used currently.**

Key Terms - Internet of things, Cryptography, lightweight Machines

I. INTRODUCTION

Many restricted devices are connected to the Internet via a new computer environment called "Internet of Things (IoT)" or "Smart Object" networks. Through the network, the devices communicate with one another and give us fresh experiences. To take pleasure in this novel setting, Constrained end node security is crucial. The network would be compromised if one of the nodes could sustain catastrophic injuries. However, implementing sufficient cryptographic methods is difficult. on restricted devices as a result of the resources available to them.

What is lightweight cryptographic:

The field of cryptography is developing, and new methods of attack, design, and implementation are being thoroughly researched. The state-of-the-art method known as "Lightweight Cryptography (LWC)" is one of them. A cryptographic technique or protocol called "lightweight cryptography" is designed for use in limited situations, such as those posed by RFID tags, sensors, contactless smart cards, medical equipment, and so forth.

In ISO/IEC 29192, ISO/IEC JTC 1/SC 27 has already covered the characteristics of lightweight cryptography. A brand-new effort to standardise lightweight cryptography, known as ISO/IEC 29192, is currently under way. Based on target platforms, lightweight features are outlined in ISO/IEC 29192. Chip size and/or energy usage are crucial metrics for assessing the lightweight properties in hardware implementations. The lower the code and/or RAM space, the better for software implementations.

Challenges faced:

Coordinating several innovation networks into a typical all- IP system to ensure that communication systems have unwavering quality and variety is the main problem of ubiquitous deployment. IoT is therefore dependent on the communication's availability and dependability on future internet engineering and the IPv6 convention, which meet the requirements of care and variety. The assurance of security, protection, data reliability, and user confidentiality represents the second challenge. Additionally, crucial and significant IoT applications provide a challenge to the system that handles key management, access control, authentication, and authorization. Furthermore, it is critical to strengthen the security of edge systems for the global network as the capabilities of forced devices that may interface with the Internet are degraded.

II. IOT SECURITY

It is clear that the disadvantages related to security, privacy, and vulnerability concerns are one of the main obstacles IoT must overcome. IoT systems have a significant SPF risk because of their centralised cloudbased setup. Data confidentiality and device authentication are additional issues with IoT. IoT systems can be hacked and misused if the right security measures are not in place. IoT systems need to be secured against DDoS and injection attacks, among other threats. For any real-time and life-critical applications, such as healthcare, transportation, and telecommunications, both availability and data integrity are crucial Through (device) authentication and (data) hashing techniques employed in blockchain ecosystems, blockchain can provide IoT with the necessary mechanism to provide publicly verifiable audit trail. Thus, this can significantly contribute to the solution of the non-repudiation problem.

III. LITERATURE REVIEW

Techniques	Year	Main focus	Results
PRESENT a benefit milestone in LWC with several light-weight designs	2007	Light-weight cryptography implementations	development of the light-weight block cipher
ECC based cryptosystems	2014	satisfy security and efficiency requirements	inspire other researchers able to classify challenges over Secure cryptosystems or light-weight ones
Chaotic map and genetic operations	2014	Light-weight encryption scheme	Secure and light-weight encryption scheme
Blow Fish algorithm on FPGA	2014	Application of Data Encryption for IOT	Using(FPGA) implementation is cheap, simple to implement, reprogrammed and high speed
the operation for 128bit plain text with 128bit key and corresponding output text Each algorithm performs	2016	Light-weight encryption	design of hybrid light-weight and secure encryption system
AAβ Encryption Scheme on Embedded Linux for IOT	2016	analysis of light-weight asymmetric encryption	99% improvement on encryption time and improvement of 94% on decryption time for 2048-bit primes.
CP-ABE scheme	2016	Light-weight Attribute-	Pre-computation technicality reduces

		based Encryption	the cost of(CP-ABE) encryption	
KLEIN-80, TWINE-80, Piccolo-80, SPECK (64,96) and SIMON(64,96)	2017	evaluation of light-weight ciphers	The evaluation show that the SPECK(64,96) cipher has been the best value of the perspective of energy and is appropriate for wireless sensor networks	[12]
block cipher including AES (Rijndael)	2017	Secure IOT (SIT)	Development a light-weight algorithm that presents substantial security in(IOT) environment	[13]

IV.APPLICATIONS OF LWC IN IOT DEVICES

Most popular applications of LWC in IoT appear to falls into three major categories as follow Controlled Lab Experimentation Infrastructure Initially, algorithms were evaluated within a controlled test bench comprised of Raspberry Pi devices. Specifically, Raspberry Pi devices were used in all experiments within the test bench. We evaluated algorithm performance using a real-world message broker, MQTT, that is used in many IoT networks to send and receive short messages.

To reiterate, the MQTT natively does not encrypt data being sent/received . Experiments were run on a Raspberry Pi Zero with a 1 GHz, single core CPU and 512 MB of RAM. Raspberry Pi 3 and 4 sets were also tested. Experimental setup included two Pi's connected via Wi-Fi. The results were collected based on a roundtrip timing approach where the times reported are the total time to send a message, receive the message, decrypt, re-encrypt, send back, and finally decrypt the message. This roundtrip time measurement provides an exemplar use case to measure the impact of these algorithms on IoT device communications. Messages are comprised of a randomly generated string of characters. The message lengths of 10, 100, and 500 bytes were determined using common message lengths within the test bench setup.

Weather Messaging System

The weather messaging system provides real-time weather metrics/readings of anoutdoor drone airfield located at the US Air Force Academy. The weather messages vary in length and provide insight into potential flying conditions. The weather data messaging system is critical to the USAFA given their real-time requirement for localized weather awareness and understanding to inform key and essential flight aviation operations. Given the USAFA campus is located at the foot of the Eastern Range of the Rocky Mountains, large variances of campus weather conditions as compared to weather reported at other nearby airfields requires additional monitoring capabilities and reporting performed using sensors located directly at the Stillman field drone launch area. Key weather data (wind speed, direction, temperatures and pressure) from numerous sensors is available to inform faculty and students of the necessary, safe conditions at their aircraft launch and recovery. Figure 2 provides an OV-1 model style overview of the IoT testbed at USAFA that includes the weather station for drone operations. Exact locations are not represented in the figure.

E-Iink displays are powered by Raspberry Pi devices that subscribe to these topics and display the stored weather messages. This provides cadets and instructors with real time weather measurements, giving them the ability to determine if conditions are safe and suitable for flying. Figure 33 below provides the general workflow for the weather messaging system's:

V.CHALLENGES IN LWC

1. Software and firmware vulnerabilities Ensuring the security of IoT systems is tricky, mostly because a lot of smart devices are resource-constrained and have limited computing power. Thus, they can't run powerful, resource-hungry security functions and are likely to have more vulnerabilities than non-IoT devices. Lack of computational capacity for efficient built-in security

2. Insecure communications Most existing security mechanisms were initially designed for desktop computers and are difficult to implement on resource constrained IoT devices. That's why traditional security measures aren't as efficient when it comes to protecting the communication of IoT devices.

3. Data leaks from IoT systems We've already established that by capturing unencrypted messages from your IoT system, hackers can get access to the data it processes. This might include even sensitive data like your location, bank account details, and health records. However, abusing poorly secured communications isn't the only way attackers can gather valuable data.

4. Malware risks A recent study by Zscaler found that devices most at risk of being hacked by a malware attack were set-top boxes, smart TVs, and smartwatches.

VI.CONCLUSION

Due to the exponential growth in the number of IoT de-vices in various domains, IoT security is one of the main concerns and as a consequence, there is need of lightweight algorithm(s)

with strong security and right balance of cost and performance metrics. For resource constrained devices, in particular IoT devices, lightweight cryptography is an effective way to secure the communication by transforming

the data. The well-defined LWC characteristics (cost, performance and security) by NIST are compared and further research gaps and open research challenges are highlighted in this paper. From the literature review, AES, PRESENT, CLEFIA and lightweight versions of DES are the most experimented and widely accepted block ciphers. However, new attacks are reported with the growth of new LWC algorithms which is inevitable and never ending process. The war between cyber security experts and attackers always opens a door of opportunities for new research in the field of cybersecurity, especially lightweight cryptography.

VII. ACKNOWLEDGEMENT

I pay gratitude to my supervisor Ms. Rahul Neve for guidance, support, patience and understanding throughout the research period, also my sincere gratitude goes TCET

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Online Student Evaluation and Assessment: Improving Student Performance through Technology

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Abstract— **Online learning has become a widely adopted mode of education in recent years, and with it comes the need for a reliable and efficient evaluation system. In order to address this need, this project aims to improve the assessment process for teachers and students. It provides a simple and effective way for teachers to assess student performance and for students to receive necessary tools and resources for their assignments. The system keeps students engaged with interactive features and performance analysis. Additionally, it delivers a more comprehensive evaluation of students' performance by considering different elements such as class participation, group work, and assignments. To maintain the authenticity of the finished assignments, unique certificates would be generated. This platform also implements measures to prevent instances of cheating among students. This enables teachers to have a better understanding of a student's overall competence.**

Keywords—assessment, student, certification, analysis

I. INTRODUCTION

The main aim of this project is to bridge the gap between student-teacher interaction in the online mode. To achieve this, separate modules have been created for both teachers and students, each with unique functionalities. Both the teacher and student have individual login systems for secure access. Teachers can create courses that students can join, and the teacher or faculty in-charge can assign different tasks and assignments that are time-based. To prevent cheating during exams, the system has been designed to be tab-restricted, which means that students will receive a warning each time they switch tabs, and time will be deducted accordingly. Professors can also award students with certificates based on their performance in specific activities. These certificates can be verified using an ID generated during the certificate creation process.

In addition to promoting student-teacher interaction, the project also prioritizes students' access to proper learning resources. With this in mind, a note sharing feature marketplace has been implemented, where students can access and share learning materials. The website has been designed to be dynamic and user-friendly, incorporating modern technologies.

II. COMPARITIVE STUDY

The demand for effective online evaluation has significantly increased in recent years, as the recognition of distance learning and online education has led educational institutions to revamp their delivery methods, teaching strategies, and learning environments [1]. Online delivery has the potential to offer numerous benefits in promoting sustainable education, such as offering academic opportunities to students from diverse backgrounds, and broadening the dissemination of education [2].

However, the current online assessment system for students is outdated and does not offer the same benefits as the traditional offline system. Most online evaluations only provide a general overview of a student's performance, without highlighting their mistakes, and do not offer any opportunities for interaction with the teacher. Additionally, the online system is prone to cheating as students can easily switch tabs and access external resources. Table 1 shows the acceptance rate of an online e-learning platform Google Classroom for a dataset of 305 people [3].

Table I

Students Acceptance of Google Classroom

Attribute	Values	Population	Percentage
Gender	Male	78	26%
	Female	227	74%
Age	18-22	242	79%
	23-28	35	12%
	28+	28	9%

Education is a crucial aspect of an individual's growth and development, and it is essential to have a system in place that promotes a culture of learning, generates genuine interest in the subject matter, and provides students with the necessary resources to succeed [4]. With the vast amount of information available online, online learning has tremendous potential to positively impact the future of ed-tech. Improving online learning and assessment would play a significant role in shaping

this future, and making the necessary enhancements to an already expanding system is vital [5]. Effective teaching techniques are crucial to a student's ability to absorb and understand the information being delivered, and good instructors create an environment that supports this learning.

The most noticeable issue found in the current system, as revealed by the comparative study, is the lack of a suitable learning environment for students and inadequate assessment system. To address this, the ideal solution would be a system that facilitates student learning and resolving doubts, with a user-friendly grading system.

III. TECHNOLOGIES USED

The website has been developed using the latest technology stack to ensure a seamless user experience. For the front-end, the proposed system has utilized ReactJS and Material UI. ReactJS is a highly effective JavaScript library that makes front-end development easier, and its component reusability and state handling capabilities making it the ideal choice. Material UI, a library of functional components, has further enhanced the user interface, making it visually appealing and interactive.

The back-end of the website has been built using NodeJS and ExpressJS. NodeJS is an event-driven asynchronous JavaScript runtime that is designed for building scalable network applications, making it perfect for the use case. ExpressJS is a minimal and flexible web application framework that provides a robust set of features for web and mobile applications, making it an ideal choice for the project requirements.

To store the data required by the application, MongoDB, a NoSQL database, and Firebase, a cloud-based database has been utilized. MongoDB provides a flexible database schema, which makes it an ideal choice for the proposed application. However, as MongoDB only allowed for video storage in chunks, Firebase was used to store the video lectures in their entirety. Firebase provides a range of features, including messaging, authentication, and storage, making it the ideal choice for this purpose. For testing the post and get methods, Postman has been used.

IV. WORKING & CHARACTERISTICS

The website has been designed and developed with three key modules in mind, each serving a specific purpose. These modules include the Student Module, Teacher Module, and Certification Module, each of which has been equipped with various functionalities to meet the specific needs and requirements. The website encompasses several key features, including:

- Login system: The website boasts a sophisticated login system that elegantly separates the set of features intended for students from those for teachers. This segregation is achieved through the utilization of a classifying attribute known as "type," as depicted in Fig. 1. To ensure the appropriate level of access, separate login credentials have been created for each group. The login system has been implemented using PassportJS and a session management mechanism, which securely stores the user's information. This information is then used to authenticate and validate each user's access to their respective modules.

The website's design considers the need to maintain a clear distinction between the student and teacher modules. This is to prevent unauthorized access and ensure that the website is used in an orderly, ethical, and organized manner. As a result, students cannot access the teacher module, and teachers cannot access the student module. This clear assignment of roles and responsibilities helps maintain the integrity of the learning community and reduces the potential for confusion or hastiness.

- Creating & joining courses: This platform aims to provide a comprehensive and organized learning experience for students and teachers alike. With its course creation module, teachers have the ability to create subject-specific courses that students can enroll in. These courses are designed to help reduce the amount of paperwork involved in the education process and provide an efficient means of grading and assessment.

The teacher is responsible for assigning tasks and assignments to students within the course. To prevent multiple entries from the same student, a unique course code is generated upon course creation and is distributed to students for enrollment purposes. This code is then used to verify the student’s identity and grant access to the course.

The implementation of course-based classrooms helps streamline the organization of coursework, allowing teachers to focus on lesson planning rather than administrative tasks [6]. The digital grade book reduces the need for physical paperwork and eliminates the repetition involved in manually grading several assignments. It also prevents the physical strain associated with manual grading.

Inclusion of assignments in these courses is a crucial aspect of the platform. Assignments promote independent learning, as students are encouraged to work their way around the questions and overcome difficulties. Each time a student completes an assignment, they become more capable of independent learning, which is a valuable life skill.

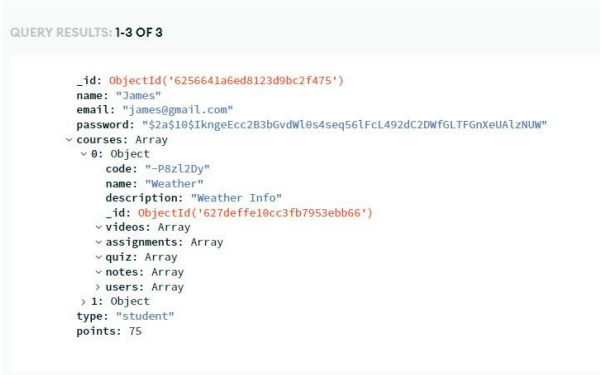

Fig. 1 User Schema Example

• Video lectures: The platform includes a video lecture feature, which is particularly beneficial for students who miss classes. The flexibility of the video lectures allows students to learn at their own pace and revisit certain concepts if they haven't understood them, promoting self- learning [7]. The combination of body language and tone of voice in video lectures makes the learning experience more engaging and impactful compared to the written word. Research has shown that video learning is beneficial for students in many ways, including motivation, learning depth, and critical thinking skills.

In a flipped classroom, students view video lessons as homework and engage in discussions with teachers during class time. The use of visual and aural clues in video learning enhances students' understanding and retention of new information. James McQuivey, an analyst with Forrester Research, states that one minute of video is equivalent to almost 1.8 million written words. Studies show that the combination of visual and audio learning leads to high engagement and improved outcomes [8].

The video lecture feature also enables the dissemination of educational knowledge to classrooms around the world [9]. A teacher from the comfort of their home can easily create a video tutorial for students, promoting cultural understanding and social empathy through information sharing. The platform's video uploading feature is an important tool for facilitating this type of global education.

• Time Based Assignments: Additionally, the platform's time-limited assignment feature as seen in Fig. 2, further promotes the integrity of the evaluation process. By setting a deadline for submission, the teacher minimizes the opportunity for students to engage in copying or cheating behaviors. Once the time limit has passed, the assignment is automatically submitted, and all marked answers are saved, providing a precise evaluation of the student's understanding and abilities. This feature not only ensures the validity of the evaluation process but also encourages students to prioritize their time and focus on their coursework.

Fig. 2 Time Based Assignments

• Anti-Cheating System: Platforms like Swayam provide intuitive assignments to students, but they lack anti- cheat measures [10]. To counter this, the platform has measures in place to prevent cheating during online exams The students are warned a few times against changing tabs during the exam, and after that, any violation of this rule would result in a penalty such as deduction of time or reduction of scores. These measures aim to create a fair and equal evaluation process for all students, ensuring that their performance is based on their own abilities and understanding of the subject. The platform also promotes academic integrity and helps prevent any kind of unethical behavior. This way, students are encouraged to perform to the best of their abilities and achieve their full potential.

Fig. 3 Certificate on Course Completion

• Reward System: Rewards play a crucial role in an efficient behavior management method in the classroom. Both intrinsic and extrinsic motivation are important for driving students to perform well and follow expected behaviors.

Intrinsic motivation is when students find pleasure in their work and engage in it simply because they enjoy it. This can be fostered through compliments, individually demanding assignments, and completing academic work purely out of a desire to learn. On the other hand, extrinsic motivation involves providing more tangible

rewards such as pencils, erasers, stickers, and even candy. It's important to provide rewards that are fair and consistent for all students, and also unique for each assignment. Extending rewards to students helps to promote positive and appropriate behavior in the classroom. Students are encouraged to follow class rules, be kind to each other, and prioritize safety, among other positive behaviors. With appropriate student behavior, teachers are able to focus on lesson content and interactive activities, rather than spending time on classroom discipline. Offering rewards also motivates students to give their full effort when attempting class projects, assignments, and various tasks. When a reward system is in place, students tend to show increased interest and participation in everyday classroom activities. The goal of assigning homework is to reinforce the subject matter, and without homework completion, students are not able to practice what they have learned. By rewarding students for completed projects and homework assignments, both in groups and individually, the teacher can promote a better understanding of the lesson. Finally, it's important to note that after the student completes a set of assignments, they can be rewarded with a certificate. The certificates can be auto-generated and will contain the student's name, course name, date of completion, email address, and a credential ID as seen in Fig. 3, which can be used to verify the credibility of the certificate. This helps to remove any concerns regarding the creation of fake certificates, as they cannot be validated.

Overall, a reward system is an effective tool for promoting positive behavior and encouraging students to be more productive in their learning.

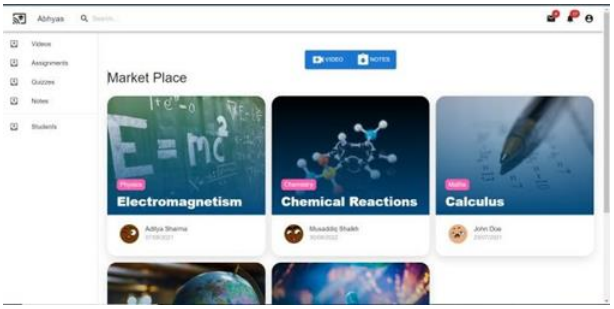

Fig. 4 Marketplace for Sharing Resources

• Marketplace: This helps students who do not have access to schools or colleges to get hands-on high-quality notes for further education and expand their knowledge base, as these notes can be accessed from anywhere with an internet connection. This also helps to bridge the gap between students from different socio-economic backgrounds, as all students will have equal access to the resources shared on the platform.

In addition, having a library of resources and study materials readily available can greatly benefit students in the long run. It can save students time and effort in searching for resources, and it also provides a platform for students to share their own resources with others. This not only supports student learning but also encourages collaboration and teamwork, which are crucial skills for success in both academic and professional settings.

In addition to notes, students can also share study tips, learning techniques, and other resources that have helped them excel in their studies. This can help create a supportive and collaborative learning environment where students can share their experiences and help each other grow.

Overall, the marketplace provides a unique opportunity for students and teachers to collaborate, share, and grow together, making the process of learning more efficient and enjoyable. An example of the mentioned feature can be seen above in Fig. 4.

• Interactive whiteboard: Interactive whiteboards are transforming the way education is delivered in the classroom. In addition to the many benefits, such as increased engagement and better learning experiences, there are even more advantages to using an interactive whiteboard in the classroom.

Firstly, interactive whiteboards promote collaboration between students and teachers. Fig. 5 shows both teacher’s and student’s perspective while using the whiteboard feature. With the use of interactive whiteboards, teachers are able to present learning materials in a more interactive way, allowing students to participate in the learning process by asking questions, providing answers, and working together on projects and assignments. This type of collaboration fosters a supportive learning environment, where students feel comfortable to engage with the material and each other, resulting in a deeper understanding of the subject.

Moreover, interactive whiteboards allow for immediate feedback and assessment. With the use of technology, teachers can quickly assess students' understanding of the material through interactive activities, polls, and games. This type of assessment not only helps teachers gauge students' learning but also provides students with instant feedback, allowing them to address any misunderstandings and reinforce their learning [11].

Interactive whiteboards also make it possible for students to save slides, which can be easily reused and adapted for future classes. This not only saves time but also ensures that all the lessons are consistent and up to date. Interactive whiteboards are cost-effective and eco-friendly. As mentioned earlier, the use of interactive whiteboards reduces the need for traditional teaching supplies, such as paper and markers, reducing the overall cost of running a classroom. Furthermore, the use of technology also reduces the use of paper, which is not only good for the environment but also saves schools and colleges money on printing and purchasing resources.

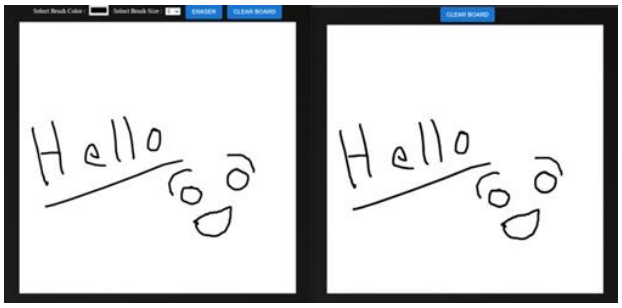

Fig. 5 Interactive Whiteboard for E-Learning

• Analytics Dashboard: One of the key features of the project is the Analytics Dashboard. This dashboard provides an in-depth analysis of the student's performance and their engagement with the course material. The Analytics Dashboard provides a comprehensive overview of the student's learning progress and provides insights into their strengths and weaknesses. The dashboard also helps teachers to identify the areas in which the student needs improvement, enabling them to customize their teaching approach accordingly. The analytics dashboard allows teachers to track the progress of each student in real-time and make data- driven decisions to enhance the learning experience. This feature provides teachers with the necessary information to create a personalized learning plan for each student, helping them to achieve their learning objectives and reach their full potential.

V. FLOWCHART

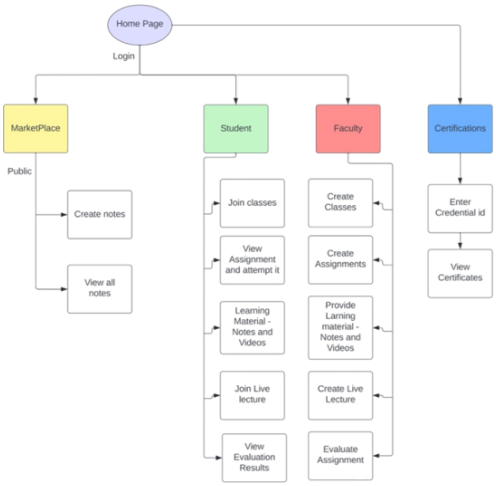

Fig. 6 Basic Architecture of the Project

Abhyas is a comprehensive platform for learning, teaching, and sharing knowledge that offers numerous features and benefits for both students and teachers. As mentioned in Fig. 6, here are some additional details about each of the four main modules:

1. Marketplace:

The marketplace is a platform where users can share their knowledge by uploading and selling their notes, video tutorials, and study materials. This platform serves as a hub for students and teachers to access a wide variety of resources and learning materials, making it easier for students to find the information they need to succeed in their studies. In addition, it also provides an opportunity for individuals to monetize their knowledge and skills by selling their materials to other students and teachers.

2. Student:

The student module is designed specifically to support students in their learning journey. This module includes a personalized profile that displays the student's certifications, as well as a dashboard that allows the student to access their enrolled courses, assignments, notes, live lectures, quizzes, and pre-recorded videos. With this module, students have everything they need to study effectively and efficiently, all in one place.

3. Faculty:

The faculty module is designed for teachers to create classes for their students, manage course materials, and assess students' progress. With this module, teachers can easily create classes, add assignments and quizzes, and keep track of student progress. Teachers can also assign certificates to students to recognize their achievements and progress, providing motivation and encouragement for the students to continue their studies.

4. Certifications:

Certifications are an important aspect of Abhyas, as they serve as a validation of the student's knowledge and skills. Certifications can be created by teachers, or they can be earned by students by completing a set number of quizzes from a particular class. Each certification includes a unique credential that can be used to verify the authenticity of the certificate, along with other relevant details, such as the student's name, course, and date of completion.

In conclusion, Abhyas is an innovative platform that provides students and teachers with a comprehensive solution for learning and teaching. With its numerous features and benefits, Abhyas makes it easier for students to access the information they need to succeed in their studies, and for teachers to create and manage effective learning environments.

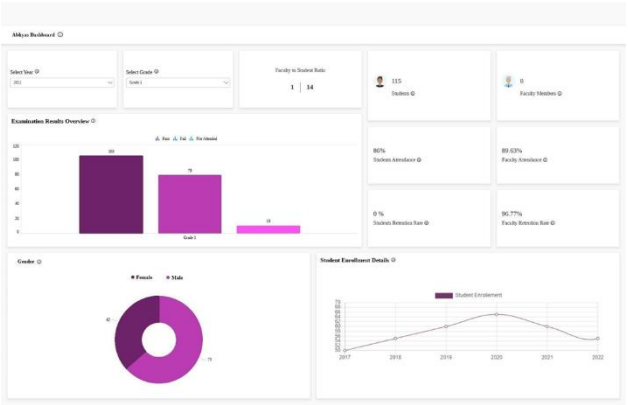

Fig. 7 Dashboard for Student Analytics

VI. CONCLUSION

With a thorough consideration of the various factors that greatly impact the current system of online learning, a meticulous study of the different methods and approaches in place has been conducted. Through this, several areas for improvement have been identified and necessary innovative and practical features to enhance the existing model of online learning and assessment have been developed. The proposed system aims to offer a comprehensive solution that meets the needs of both students and instructors, providing a seamless and efficient experience for all parties involved. The implementation of this project will be instrumental in furthering the advancement and success of online education.

VII. FUTURE SCOPE

The evaluation of performance in a test is an important aspect of any educational system. It helps students to understand their strengths and weaknesses and work towards improving in areas where they may be lagging behind. By feeding the results of these tests into a machine learning algorithm, the system can more accurately identify weak subjects and provide personalized recommendations for improvement. This can be a valuable tool for both students and educators alike. To make the system even more accessible and user-friendly, it can be ported into a mobile application that is easily loaded and used on the go. Additionally, a reward system can be implemented to encourage students to actively participate in the platform. This reward system can recognize not just the completion of assignments but also the most active contributors and resource sharers in the marketplace. This will create a sense of community and encourage students to collaborate and share resources with each other.To further enhance the system, the question sets in the assignments section can be broadened to include preparation for interviews and competitive examinations. This will not only help students to prepare for these important events but also give them a sense of the types of questions they may encounter in the real world. To keep track of individual performance, charts and graphs can be used to represent the academic growth of each student for each subject. This will provide a visual representation of progress over time and allow students and educators to track their success.

VIII. ACKNOWLDEMENTS

We are deeply grateful to our guide, Mrs. Pratibha Prasad, for imparting her vast knowledge and expertise, providing valuable feedback and mentoring us every step of the way. We would also like to thank our principal, Dr. B.K. Mishra, for providing us with the resources and facilities necessary to carry out our research. Finally, we are thankful to Thakur College of Engineering and Technology for providing us with a nurturing and dynamic environment where we could thrive academically and intellectually.

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Sure Help

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Abstract: **SureHelp is a system that eases the day to day life of the elderly society. The technological challenges that were faced while an analyzing and designing the system is to first consider every feature that might make an elderly person's daily life easier and to inspect if any such applications exist in the market. And if any such application or paper does exist what are their gaps and how can the system overcome them. The second difficulty was that how can the system be easy to use for an elderly, whether it be multilingual, choosing the colors which are easy to see for them, choosing the correct font, to think of adding speech to text feature, audio search feature etc. The major aim of this app is to make it as elderly friendly as possible and that's why the main technical parameter is to keep a check on its Graphical user interface (GUI) so that it is easy to use, and to see how conveniently the features can be used by them. The result achieved till now is to study the resources needed to plan the idea. Literature survey was done and gaps were identified which SureHelp aims to overcome. Finally, an android mobile application is developed which consists of the various features like medicine reminder, yoga/workout, view nearby hospital, learn technology, government facilities, and send location to emergency contacts.**

I. INTRODUCTION

All of us might have had experiences of our grandparents asking for our assistance in running a particular application or a highlight on the mobile phone and we tell them once or twice but they fail to figure it out and we become annoyed. It gets challenging for older individuals to follow such applications instantly or in one go as there are many mental and natural changes that they go through as they age. Their handle on it isn't on par with their ability to get a handle on it.

SureHelp is basically an application that is designed for aged people who belong to the age group above 60. This project intends to help elderly individuals. Old people have trouble keeping up with latest technologies. Currently, not many apps are in market for senior citizens. it allows the user to access all important government facilities and eases day to day activities. the main focus is to create an application with all unified features. the day-to-day activities of the older generation are made easier by this project. It is done by helping them with everyday activities like reminding medications, providing all information whether, legal or financial which is easily

accessible. Letting their dear ones know about their condition and location. Therefore, it is essential to ensure that they experience an effortless day in which they can be independent and exist with assurance.

II. IMPORTANCE OF THE PROJECT

Adopting such senior-friendly applications is a blessing for individuals suffering from fitness problems like sight impairment or memory deterioration. Let's review some of the perks of advancing senior-friendly apps.

1. Such applications will serve in staying in touch with their family.

2. Handy and connection to governmental assistance.

3. It provides them a sense of living independently.

4. It additionally improves self-confidence and gives them a feeling of accomplishment by acquiring new cognitive abilities.

III. PERSPECTIVE OF STAKEHOLDERS AND CUSTOMERS

The population is growing older, and according to UNO estimations, the number of individuals above 60 will touch more than 2 billion people by 2050. For advanced Western countries, this drift is particularly applicable.

Elders of the new world require technological solutions in various fields, from health supervising to retirement provision planning. More exceeding are sincerely engaged in designing apps particularly for those over 60 years old, and shareholders display considerable enthusiasm in such ventures. In advanced countries like the US, senior residents are progressively maturing a significant part of the audience for the industry. They are financially stable, have plenty of unoccupied time, and have already moved the responsibility of being parents.

As per a Pew Research Center, 74% of individuals matured 50 to 64, and 42% of individuals more than 65. An ever-increasing number of clients, remembering those for the 60+ class, use applications for all everyday issues. New companies that cover various spaces of senior residents' lives have been put in motion all over the world. The normal change of clients from moderately aged to old age involves the development of new necessities from applications. A wide scope of reasonable advanced cells and tablets invigorates the development of this high-likely market.

Developers have lately intensified their concern in this crowd. Nevertheless, in almost every mobile application

division for the senior age, conflict is currently truly less. This is a huge, however underrated industry.

IV. OBJECTIVES AND SCOPE OF THE PROJECT

Main objective of this system is to make life of elder people easier. Most applications are constructed, identifying the age group of 15 to 34. Applications are executed as per convenience while elder people don't have that much knowledge about technology, these applications are quite complex for them to learn. Mobile app developers believe that the broader audience adopting smartphones is the younger group, and creating applications as per their requirements will produce them gains.

Main features of this Application include:

- Government facilities notifications
- Medicine Reminder
- Handy technology manual which comprises of information regarding payment facilities, social media, etc.
- Speech to text search
- User-friendly UI
- Yoga/ workout
- Location Tracking - Notify dear ones about
- View nearby hospitals

V. PROBLEM DEFINITION

This project named Sure Help aims to make the day to day lives of elderly individuals easy by providing them with the features necessary for them and with an interface which is easy for them to use.

- According to the Pew Research Centre's Mobile Fact Sheet, older adults who are 50 and above are frequent smartphone users.

- With the advancement of technology, more and more seniors (aged 50 to 64) are purchasing smartphones, with the percentage rising to over 74%

- This demonstrates how elderly consumers represent a sizable population segment that mobile app developers should take in mind. After coming to a conclusion by reading several papers and also going through many apps on the android platform, a conclusion was made that there still aren't many apps which target this problem, which is why it gives this project a unique stand.

VI. ANALYSIS

Product Backlog for SureHelp App			
Story ID	**Story**	**Story points1**	**Priority**
1	As a app user, I want to Register and Login to the system.	1	1
2	As a app user, Once I logged in, I want to seeall the features of the app.	1	2
3	As a app user, I want to set a pill remainder.	2	3
4	As a app user, I want to see all the government facilities.	2	4
5	As a user, I want to a tutorial on yoga/workout.	3	5
6	As a user, I want to learn the trending technology.	5	6
7	As an app user, I want to see all the nearby hospitals/chemists.	8	7
8	As an App user, I want to notify my dear ones about my location when required.	8	8
9	As an App user, I want to give commands through voice.	13	9

VII. FLOWCHART

The flowchart of the project is as given below.

VIII. PROJECT PLANNING

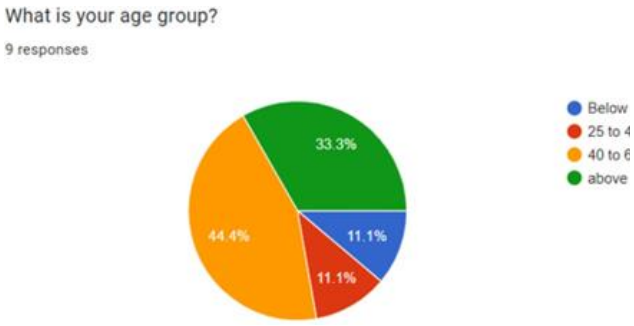
Tools used:

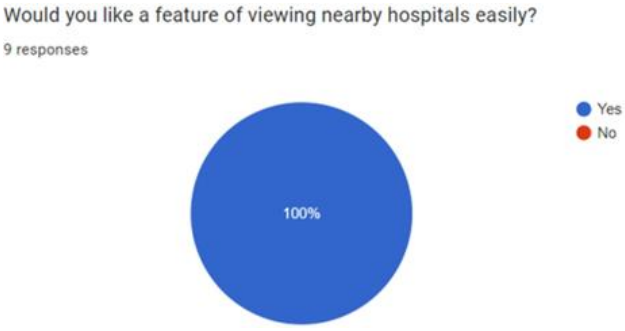
Figma – for making project prototype.

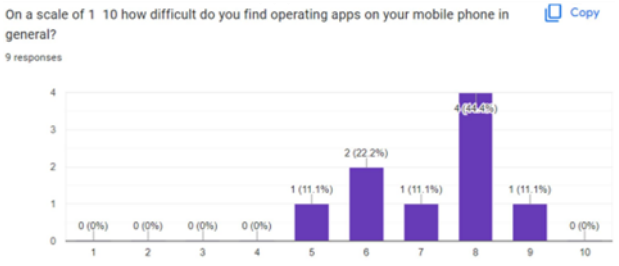
1. Android Studio
2. Build-in APIs
3. Java/Kotlin
4. XML
5. SQLite Database/Firebase.

IX. OUTPUTS

The idea generation started by recognizing social issues. After finding out that there were not many apps for elder part of the society, Soon, analysing and reading various papers and research about this particular topic began. Then, the idea was presented to the assigned mentor. She gave her inputs in return and showed great interest in this topic. After this, literature survey was completed and features of the project were established. The design of a basic prototype of the application like homepage, login, signup, features, etc. were done through Figma tool. A survey was taken where mostly people of age above 40 took part and their feedback was taken into consideration. The current phase at which the project stands is the successful implementation of features like sending location to emergency contacts, yoga and workout, medicine reminder and view nearby hospitals.







X. CONCLUSION

The undertaking is expected for more established individuals, mature 65 and over, who approach

innovation and use gadgets like PCs and touchscreens consistently.

This project includes some of the basic and important features like pill remainder, getting notifications for the government facilities provided them , yoga/workout needed for their age group , searching for nearby hospitals around them , text to speech , etc.

The elderly are, as of now, a dismissed section of the populace. Such a portable application for seniors has been created which will assist them with utilizing the innovation helpfully. These senior-accommodating applications will assist them in managing the huge issues that they are confronting. These applications will help their certainty and give them a feeling of fulfillment.

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Disha: A Module for Visually Impaired to Fill the forms by Voice

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Abstract: **As per the research, the world's visually impaired population is estimated to be around 2.2 billion people. These people face a lot of issue when it comes to filling out a form in several places such as banks or hospitals. They are also unable to access the services offered by various organizations via their websites. Many voice-based assistant systems are available, but they have limitations when it comes to filling the forms. To address this issue, DISHA, a module for filling out forms by voice, offers visually impaired people an experience that allows them to fill out forms online interactively on any portal that has the module integrated. Thereby, increasing the overall engagements and adding multiple other facilities focused on easing the tasks of visually impaired individuals. DISHA provides a fully voice-operated system that supports voice-based form filling by utilizing the concepts of Speech Synthesis (Text-to-Speech) and Automatic Speech Recognition (ASR). This system will make it simpler for those who are blind or have other reading and writing disabilities to fill out forms.**

Keywords –Text to Speech (TTS), Automatic Speech Recognition (ASR), Voice Recognition

I. INTRODUCTION

Voice-based form filling systems using automatic speech recognition (ASR) and speech synthesis are advanced applications that allow users to complete forms using their voice rather than manual data entry. These systems use cutting-edge technology to automatically recognize and transcribe spoken responses, and then convert them into text for form filling [1]. The synthesized speech then reads back the form fields to the user for verification and submission.

These systems are designed to improve accessibility and efficiency, particularly for individuals with limited mobility or vision impairment. With voice-based form filling, users can simply speak their responses, which are then transcribed and filled into the appropriate fields. This eliminates the need for manual data entry and can reduce errors that can occur with traditional form filling methods [2]. The voice-based form filling system is powered by advanced automatic speech recognition (ASR) technology, which can recognize and transcribing natural language speech. This technology is paired with speech synthesis, which uses artificial intelligence (AI) to produce natural-sounding synthesized speech for form field reading. Voice-based form filling systems can be implemented in various settings, such as healthcare, banking, and government services. By providing an accessible and efficient form filling solution, these systems can improve user experience, save time and resources, and enhance overall productivity. Overall, voice-based form filling systems using automatic speech recognition and speech synthesis are valuable tools for making form filling more accessible and efficient for users with varying abilities [3].

II. BACKGROUND

A. Speech Recognition systems

Speech recognition systems have been developed since the early 1900s. The first automated speech recognition system was created in 1952. In the following decades, speech recognition research advanced, driven by the military and medical fields. In the late 1990s, advances in digital signal processing and machine learning enabled speech recognition to become practical for consumer and commercial applications, such as voice-activated personal assistants and automated call centers. Today, speech recognition systems are integrated into a wide range of devices, including smartphones, smart speakers, and automobiles, and continue to evolve with improved accuracy and functionality. For more than 50 years, technology for speech processing has served as a foundation for research. The need for accessible computing solutions for people with disabilities and the early days of computer technology can be traced back to the development of voice-based form filling systems for visually impaired individuals. As early as the 1970s, researchers and computer engineers began experimenting with voice recognition technology to create assistive systems for people with visual impairments.

B. Voice based form filling systems

One of the earliest examples of voice based form filling systems was the Kurzweil Reading Machine, introduced in 1976, which utilized voice recognition technology to read aloud text from printed materials. Over the years, this technology has continued to evolve and has been integrated into a wide range of assistive technologies, including form filling systems. More advanced voice-based form filling systems that are able to comprehend and interpret natural language inputs have been developed in recent years as a result of the rise of artificial intelligence and machine learning.

Today, voice based form filling systems for visually impaired individuals are widely available and are used by individuals, government agencies, and businesses around

the world. These systems provide a critical tool for visually impaired individuals to access information, complete online transactions, and participate in daily life activities with greater ease and independence. The development of systems that are able to comprehend, generate, and code speech in a variety of human-to-human and human-to-machine interactions is the primary goal of speech research. Speech synthesis (also known as text-to-speech, or TTS) and speech recognition (also known as automatic speech recognition, or ASR) are the NLP technologies that are least readily available for indigenous and low-resource languages. Regarding the creation of linguistic instruments for these languages, the major hindrance is a lack of computing and data resources. We provide a methodology that does not demand massive GPU and target data resources while yet ensuring pretty decent end-product performance. In this paper, we use a low-resource configuration to connect TTS and ASR models and have them learn from each other.

III. LITERATURE SURVEY

H. Chen, X. Liu, D. Yin, and J. Tang in "A Survey on Dialogue Systems: Recent Advances and New Frontiers" (2017) provided a comprehensive review of recent developments in dialogue systems, covering a range of perspectives and suggesting possible areas for further research. The authors classified existing dialogue systems into two categories: task-oriented and non-task-oriented models. They also discussed how deep learning techniques have been used to enhance these models, providing specific examples of representative algorithms. The authors pointed out that designing an intelligent dialogue system can be challenging, particularly when attempting to imitate human responses. This is especially true when working with limited dialogue data in a specific domain. [4] Caranica Alexandru, Cucu Horia, Burileanu Corneliu, François Portet, Michel Vacher in "Speech Recognition Results for Voice- controlled Assistive Applications" (2017) conducted a usability test on the most popular speech-based systems used worldwide, including Alexa, Siri, Cortana, and Google's system. The authors identified several major issues with these systems, including a limited focus on addressing common problems, reliance on Internet and cloud services, complexity, and a lack of integration with third-party systems. Another key concern was the insecurity of personal data associated with these systems. [5] S. O. Arik, M. Chrzanowski, A. Coates et al in "Deep voice: Real-time neural text-to-speech" (2017), proposed a real-time neural text-to-speech (TTS) system in which every component of the TTS pipeline is replaced by a corresponding deep neural network (DNN). While this approach has several advantages, including real-time processing and high-quality synthesized speech, the authors noted a major disadvantage: since each component of the TTS system is trained independently, any errors that occur can accumulate and result in synthesized speech with errors. V. Ajith Mani, A. Dhanalakshmi, S. Dharani, B. Bharati in "Speech Enabled Automatic Form Filling System" (2021) proposed a system for filling forms in one language only i.e., English for preliterate and senior citizens using Hidden Markov Model Toolkit (HTK). This system was confined to a particular language and was accessible by the individuals known to that language. [7] S. Usharani, P. Manju Bala, R. Balamurugan in "Voice Based Form Filling System for Visually Challenged People" (2020) developed a system that enables the user to take a print of the form using OTG adaptor after filling the form. The outcome is an independent system to fill the forms for a particular organization and was also confined to English language. [8]

IV. SYSTEM REQUIREMENTS

The module has basic three requirements so that it runs smoothly without any hesitation. Firstly, a software tool named IDLE (Integrated Development and Learning Environment) is required as an integrated development environment (IDE) for Python. IDLE comes along with the Python installer for Windows as a default module. It serves as an alternative to Python Shell and allows the execution of single statements, writing, editing, and running Python programs. IDLE provides a comprehensive text editor with features like syntax highlighting, autocompletion, and smart indent for coding in Python. Additionally, it contains a debugger that includes stepping and breakpoints. Secondly, Google APIs, which are application programming interfaces (APIs) that help communicate and integrate Google Services with other services. These include Google Search, Gmail, Translate, and Google Maps, as examples. Lastly, to operate the module, a Windows 10 operating system and a stable internet connection is required.

V. METHODOLOGY

A. Model Architecture

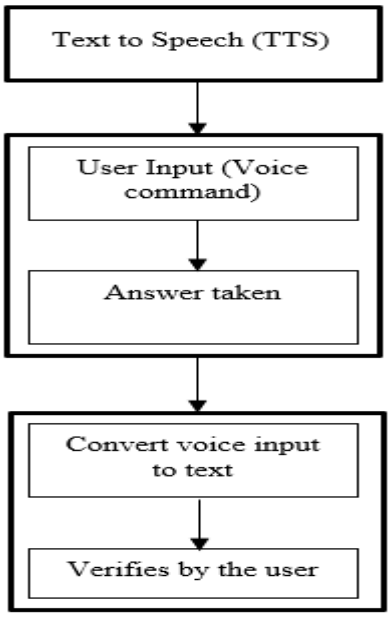

Fig.1. Model Architecture

The architecture includes the module's key components, which are shown in Fig. 1. The Text-To-Speech (TTS), Speech Synthesis, and Automatic Speech Recognition (ASR) components comprise the module. The organization's text instructions, which must be followed when filling out the form, are converted to speech by the TTS component. Speech Synthesis component further consists of User input which is voice based and the answer are recorded accordingly. The final element is the ASR component, which turns speech input into text and also allows for user validation by having the user confirm the input.

B. Working

Initiation of the module is done by providing the user with the instructions about the form. These instructions consists of the field inputs that the user inputs through spoken language. The basic flow of the system is to first take the speech input of the user and convert it to text using the Speech Recognition library in python as mentioned above in Fig.2. Further to validate and verify the recorded audio of the user, the pyttsx3 library is used which will convert the text into speech form and take the validation of the user according with a yes or no input.

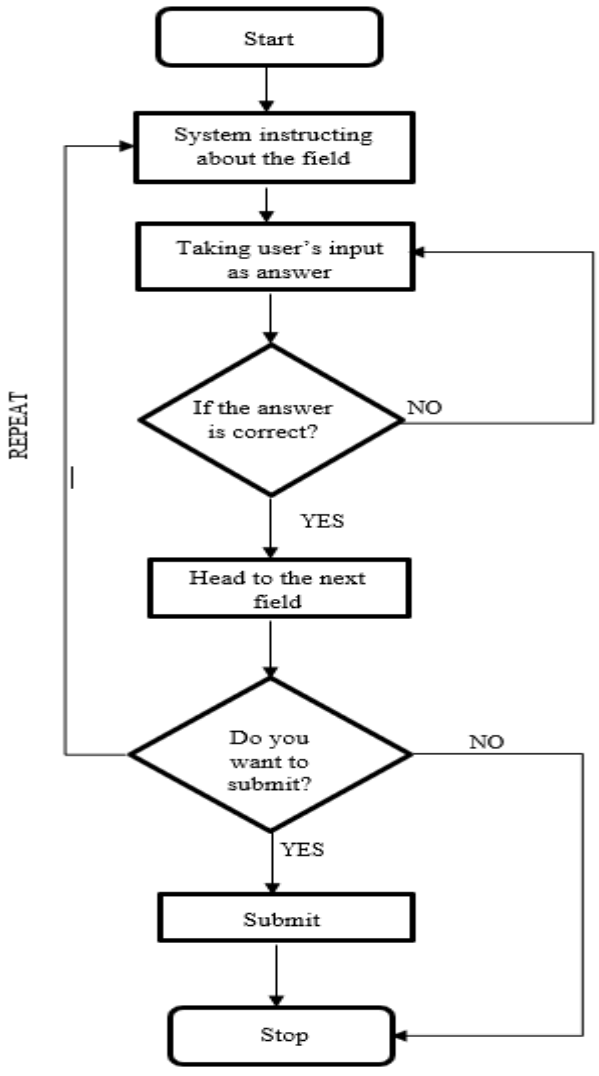

Fig.2. Flowchart

Disha is based on two fundamental technologies: TTS (Text-to-Speech) and ASR (Automatic Speech Recognition). This will allow the visually impaired user to communicate with the system as well as fill out forms. The process of converting written text into speech is known as text-to-speech (TTS) [9]. This technology collaborates with other language technologies, such as speech recognition, that seeks to transform spoken words into written text, and machine translation, that aims to convert either written or spoken language from one language to another. The Disha module employs TTS to convert system outputs into user understandable speech form; these are simply the system's speech instructions. ASR is the process of converting an individual's speech into readable text format using Machine Learning or Artificial Intelligence (AI) technology. This will help the system to interpret the user voice input by converting it into the text form which is human readable. To build the overall voice-based form filling module, Python is used. The speech recognition library in python is used to convert speech to text. Speech Recognition is a machine's ability to listen to and identify spoken words. Speech recognition technology is employed to transform spoken language into written text, inquire about something, or give a reply. This is achieved by computer programs that receive audio input from a microphone, process it, and convert it into the required format. Whatever speech the user gives will be recorded and captured using Python's pyaudio library. After recording the audio, it is converted to text using Speech Recognition and displayed on the output screen. The pyttsx3 library is used to validate the displayed text from the user. Pyttsx3 is a Python library that is used in this system to convert text to speech. It works offline and is a simple tool that converts entered text into speech. The module can also be used for different Indian languages such as Hindi and Marathi along with English so that it becomes convenient for the users to use the module.

VI. RESULT & DISCUSSION

```
🔊 This is a simple college feedback form. Say yes whenev
er you are ready
🎙 yes
🔊 Please say your name
🎙 Megha
🔊 Please say your contact
🎙 1234567890
🔊 Please say your class
🎙 BE
🔊 Please say your branch
🎙 Information Technology
🔊 Please say your message
🎙 This college is the best
🔊 All fields are filled. Say Yes,If you want to submit t
he form, Say Repeat, If you want to re fill the form, Say
Exit, if you want to leave
🎙 yes
{'name': 'Megha', 'contact': '1234567890', 'class': 'BE',
'branch': 'Information Technology', 'message': 'This coll
ege is the best'}
```

A voice-based form filling system is a technology that allows users to fill out forms using voice commands

rather than typing. Fig. 3 displays the output of the voice-activated computer program's instructions simultaneously with the user's input into the necessary form fields.

Fig.3. Demonstration of Module outcome

This technology aims to eliminate the need for typing or handwriting when filling out forms. Through the use of machine learning, there can be significant advancements in speech recognition and text-to-speech synthesis, which are essential speech-related technologies. The results of implementing such a system can be seen in the following ways:

- Increased efficiency and speed: Voice commands can be processed faster than typing, leading to a faster completion of forms.
- Improved accessibility: People with disabilities or mobility issues can benefit from using a voice-based form filling system, as it eliminates the need for typing.
- Enhanced user experience: Voice-based form filling can make the process of filling out forms more convenient and enjoyable.
- Reduced errors: Typing errors can be reduced, as users can dictate their answers rather than typing them.
- Increased adoption: A voice-based form filling system can attract more users, as it offers a more user-friendly experience.

VII. CONCLUSION

The software will help with filling out forms and make the process less boring. It is designed to primarily use speech communication, which means it can help bring the benefits of current digital strategies to people living in rural areas and those who are visually impaired.

VIII. FUTURE SCOPE

The module currently interprets three different languages i.e. English, Hindi and Marathi. More native languages can be added. Further the captcha system can be included in the module for verification purpose. These captchas will be based according to the visually impaired users so that the user can respond with ease.

IX. ACKNOWLEDGMENT

We express our gratitude to Afreenzehra Sayed, our guide, for providing us with continuous guidance and support, as well as keeping us on track. We would also like to acknowledge the project coordinators for facilitating the necessary resources to conduct our project. Our thanks also go to Dr. Sangeeta Vhatkar, the HOD, Dr. B. K. Mishra, the Principal, and the college management for their unwavering support.

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Sentiment Analysis of Charging Stations on Multiple Reviews

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Abstract—**The phrase "sentiment analysis" refers to a method of analysing online text in order to ascertain the author's intended mood. Text sentiment analysis entails dividing author's feelings about a topic into positive, negative, and neutral buckets. It goes by a few different names: subjectivity analysis, opinion mining, and value judgement extraction. Learning how buyers react to a product is crucial for any company looking to expand. Sentiment analysis plays a key role when trying to understand consumer opinion on a certain issue.The existing charging station requires us to charge by waiting in line, which is one of the most inconvenient aspects of auto ownership. The growing length of these lines is a major inconvenience for customers. The purpose of this system is to simplify the process of charging vehicles by keeping a virtual queue, and after a user has finished charging, they will receive a notification with a link to leave a review based on certain qualitative and quantitative feedback parameters concerning the station's service. Charge times, employee friendliness, security measures, wait times, and general remarks are all acceptable forms of feedback. We will use this information to compile a rating score for each charging station and then arrange them in order of this score. Whether a remark is favourable or negative may be determined by utilising the Naive Bayes Algorithm, the Logistic regression Algorithm, or the Support Vector Machine Algorithm. Each remark is read three times, and the overall score for comments at each station is updated after each round of analysis, taking into account whether the comment was favourable or negative. In order to get the average rating for charging stations, we first find the proportion of favourable comments for a certain charging station and then translate that percentage into a rating of 5.**

Keywords—Sentiment Analysis, Customer Review,Naïve Bayes Algorithm, Charging Station

I. INTRODUCTION

Sentiment analysis is a method for detecting ambiguity in written or spoken expressions of thought or feeling. The term "opinion mining" describes a similar practise. How a spokesperson and a user feel about an issue is revealed through sentiment analysisThere has been a flurry of algorithmic presentations recently aimed at analysing, anticipating, and evaluating attitudes in text data, such as product or customer reviews. The process of sentiment analysis has the potential to be very helpful in polarity detection. Spam and false information, domain-specific problems, negation, the computational burden of natural language processing, bipolar terminology, and a large vocabulary are further obstacles. If we want to see improvements in data mining's efficacy and efficiency, we must address the issues we've already discussed. After realising the significance of sentiment analysis, the system helps to improve the process of sentiment analysis in web-based daily life. The proposed approach yields superior or identical answers with the maximum degree of confidence and the least amount of processing complexity [8]. Data cleaning, normalisation, hashtag removal, punctuation removal, text to lowercase, and tokenization are just some of the pre-processing chores we've explored and investigated to see how they affect user evaluations. Data selection, pre-processing, and classification were all areas that saw significant improvements because to this study's contributions.

II. LITERATURE REVIEW

[1]. In this study, we focus on the problem of noisy, irrelevant, and redundant qualities that arise when using huge collections of different n-gram features for sentiment categorization. Due to these factors, it may be challenging to fully utilize the increased discriminating power that comes with using expanded feature sets. To this end, In this work, we introduce Feature Relation Network (FRN), a rule-based multivariate text feature selection approach that uses semantic information and the syntactic relationships between n-gram features. The purpose of FRN is to increase the precision of sentiment analysis by enabling the efficient assimilation of large, heterogeneous n-gram feature sets. Experiments were conducted using three different online review testbeds to evaluate and compare different methods of classifying reviewers' emotions. Because it can choose qualities that lead to considerably greater classification accuracy regardless of the feature subset sizes, FRN outperforms competing univariate, multivariate, and hybrid feature selection approaches. FRN is also able to choose features in a more computationally efficient manner than many multivariate and hybrid algorithms because it incorporates syntactic information about n-gram associations.

In this study, we explore the use of a rough k-Nearest Neighbor (k-NN) classifier and a method for increasing the size of the training set by creating artificially generated handwritten capital letters through the distorting of genuine photographs (see [3]). [4] The study argues that one has to do more than look at the words in an expression to figure out which way the feeling is leaning. In example, the polarity of a phrase can be influenced by the interplay of its individual words or components. This study takes a compositional semantics perspective on such subsentential interactions, and presents a unique learning-based technique that includes compositionally-motivated structural inference into the learning process. It turns out that (1) compositional semantics-based heuristics can outperform learning-based approaches that don't include compositional semantics (89.7% vs. 89.1% accuracy), but (2) a method that incorporates compositional semantics into learning outperforms all other options (90.7% accuracy). Our research also reveals the significance of "content word negates," which have been

underutilised in prior studies, in establishing polarity at the expression level.

[5] Based on the amount of detail they examine, sentiment analysis tasks can be categorised as either document-level, sentence-level, phrase-level, or aspect-level. By concentrating on sentiment analysis at the phrase/sub-sentence level and the aspect level, Wilson et al. investigated the repercussions of complex polarity change. They began with a glossary of words that were previously assigned polarities in order to identify the "contextual polarity" of phrases. Choi and Cardie [4] used numerous compositional semantic models, both heuristic and machine learning-based, to improve subsentential sentiment analysis by coupling multiple negators with lexical polarity When it comes to the challenging work of word sense disambiguation, Agirre and Martinez [2] suggested employing a Web search using monospermous synonyms or unique phrases in definitions from WorldNet to increase the amount of labelled data

III. MOTIVATION

There are several potential downsides to using BOW, despite the fact that it is one of the most often used feature extraction approaches, when it comes to learning from textual cases. In particular, a word may have varied meanings depending on the context, which might result in the situation where the same term is highly significant to the positive class in some circumstances but very relevant to the negative class in others. Students who put in extra effort can be told things like, "You completely deserve the success," whereas others who weren't as motivated could be told things like, "That is what you deserve." From a syntactic point of view, the same word can function as several nouns, verbs, adjectives, and adverbs. Consider the term "approach," which may function as either a verb or a noun, and the resulting differences in semantic discrimination. When employed as a verb, the aforementioned term might have an unfavourable meaning, as in "I approach you to perform something for me." As a noun, however, the connotation is less clear and more neutral. The two examples given above show that it is inappropriate to consider a word as if it only had one attribute when that word also serves as another element of speech or has several meanings.

IV. PROBLEM DEFINATION

One of the most fundamental jobs in sentiment analysis is to classify if the expressed opinion in a document, phrase, or entity feature/aspect is positive, negative, or neutral. "Beyond polarity" sentiment analysis takes into account more than just happy and sad feelings. What we need is simply this. In other words, if a consumer says something like "I've used your product XXX and I haven't been disappointed, only the contrary!," we may assume that not only is the client satisfied with the product, but so are hundreds or thousands of other customers. Unfortunately, many rule-based or keyword extraction approaches for sentiment analysis misclassify the overall tone of the text as neutral or negative because they ignore positive terms like "happy," "lucky," and "good" and focus instead on negative words like "disappointed" and "haven't." To avoid these and other problems, we can use cutting-edge machine learning strategies.

V SIGNIFICANCE OF PROPOSED WORK

Any company has a responsibility to learn about its customers and to respond to their wants, concerns, and overall levels of satisfaction. In the case of huge web-based firms, we need to analyse hundreds of thousands, if not millions, of responses about various items; and it is not sufficient to search for predefined "good" or "poor" terms in the comments. In recent years, thanks to advances in machine learning—and more specifically, deep neural networks and sentiment analysis—the challenge of identifying a text's underlying emotional tone has been effectively addressed. In this research, we want to demonstrate the state-of-the-art solution to this issue by using word representations and the Naive Bayes Algorithm to categorise positive, negative, and neutral sentiment.

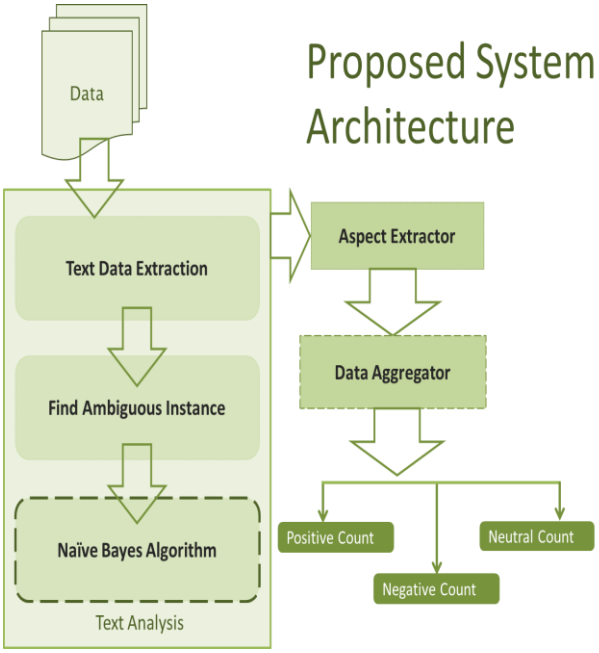

Fig. 1. Proposed System Architecture

VI. METHODOLOGY

Naïve Bayes Algorithm: Naïve Bayes algorithm is a supervised literacy algorithm, which is grounded on Bayes theorem and used for solving classification problems. It's substantially used in textbook classification that includes a high- dimensional training dataset. Naïve Bayes Classifier is one of the simple and utmost effective Bracket algorithms which helps in erecting the fast machine literacy models that can make quick predictions

Deep Learning-Based Classification of Bayes Algorithms : During this phase, the intermittent neural network- grounded LSTM classifiers are used for the task of bracket. Three different types of models were developed by changing network armature and parameters. These models are considered Model 1, Model 2, and Model 3, independently. In our studies, a corpus of reviews was considered for the training dataset, and the remaining,016 reviews were used to

assess the performance of named classifiers. Training and testing portions of the data were divided into two separate groups. The bracket algorithms were trained and estimated doubly for each analysis, formerly on the training and formerly on the testing

section reviews. In the posterior step, the review textbook was decoded into a numerical point vector before being taken care of by any bracket algorithm.

DataPre-processing: Datapre-processing is a crucial phase in textbook data analysis. Due to the reiterations and redundancies in tweets, blogs, reviews, and other types of textbook, textbook data come more complicated. Data normalization uses datapre-processing as a filtering system. The normalization, word tokenization, removing stop words, removing redundant spaces, padding, changing the textbook data to lowercase, and removing hash trailing are exemplifications of datapre-processing, etc.

VII. RESULT

Sr. No.	Charging Station	City	Area	No. of Chargers	Reviews	Recommendation
1	A1 Station	PQR	A Street	02	05 Positive 00 Negative 10 Neutral	Recommended
2	A2 Station	PQR	A Street	05	10 Positive 12 Negative 02 Neutral	
3	A3 Station	PQR	B Street	03	10 Positive 2 Negative 0 Neutral	Recommended
4	A4 Station	PQR	C Street	05	5 Positive 0 Negative 0 Neutral	Recommended
5	A5 Station	PQR	D Street	10	0 Positive 5 Negative 15 Neutral	
6	A6 Station	PQR	E Street	04	20 Positive 02 Negative 25 Neutral	Most Recommended
7	A7 Station	PQR	F Street	07	37 Positive 06 Negative 02 Neutral	Most Recommended
8	A8 Station	PQR	G Street	06	05 Positive 02 Negative 10 Neutral	
9	A9 Station	PQR	H Street	12	54 Positive 28 Negative 47 Neutral	Recommended
10	A10 Station	PQR	H Street	10	78 Positive 54 Negative 10 Neutral	
11	A11 Station	PQR	I Street	05	5 Positive 2 Negative 0 Neutral	
12	A12 Station	PQR	J Street	08	27 Positive 0 Negative 15 Neutral	Most Recommended

TABLE I. RESULT IN TABULAR FROMAT

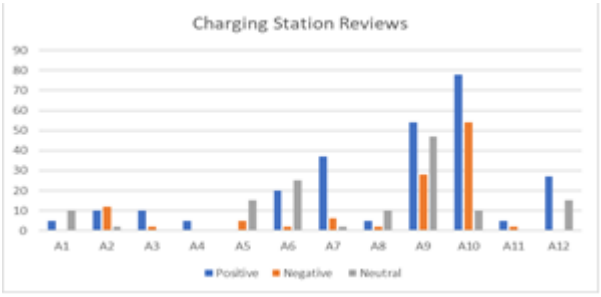

FIG.2 BAR GRAPH

VIII. CONCLUSION

Sentiment Analysis is considered as one of the most research topics in the sphere of knowledge discovery. Large quantum ofonline data is being added on weekly basis ranging from socialmedia posts and to movie reviews. Byusing sentiment analysis ways, these data sources can beused to cost theimportant information such as: getting user's feedback about any software,carrying public opinion before launching a new product etc.

IX. FUTURE WORK

In future,we will find out how this method can be used as further general system when applied to client reviews, product reviews etc. Focus will be on enhancement and more accurate results for sentiment analysis. Efforts will be made to add some fresh features in Naïve Bayes classifier algorithm so that it can be used to develop a farther general system.

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Expert Connect

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Abstract: Expert Connect is a website for connecting professionals working in the same field and helping them to build a community. It enables a professional to network and build connections with people and organizations in the technical industry. In this, users can add articles which can help produce information for potential audiences around the world, leave comments and likes, find similar articles, connect sections which will help users to see their connections and will be recommended to users with similar interests and skills. This is achieved by separating the project into two parts, the posting and the networking fragments, each of which with its own set of features. The posting part focuses more on technical readers and gives them valuable information. It can discuss new innovations, new projects in development, solve problems and provide more relevant information. In today's scenario, you have a choice of different blogging platforms such as WordPress and Blogger. However, there are a number of drawbacks, including the inability to customise the software to suit your needs and the impracticality of this website providing a specialized blogging environment for every organisation. The proposed work is being created using ReactJS, a JavaScript framework for frontend development which helps in creating a single page application. A single page application is comparatively faster and quicker to load as compared to traditional websites. For Backend, Express JS, a module for NodeJS is being used to handle the server-side scripting. MongoDB. A NoSQL database service handles the backend database in the proposed work.

Keywords- professionals, connections, articles, organizations, community.

I. INTRODUCTION

With technology evolving in each and every aspect, there arises a need of guidance and a community where one can interact, clarify doubts and grow individually or as a team. bridge the gap between the professionals working in the same field and help them to build a community in such a way which will help them learn and grow together. This is achieved by separating the project into two parts, the posting and the networking fragments, each of which with its own set of features. ExpertConnect enables you to build a network with people and professional organizations in your industry. This can prove to be a great way to stay up to date with the latest developments, and to share information with others in your field. The proposed work serves as platform where a user can with a professional with similar interests. When a user visits the portal, they can either signup or login if already signed up earlier then they can either read the blogs uploaded by other individual or either post the blog in the form of images, videos and in text format. The user also has a profile section where they can update the skillset, education details and their workplace. Also, user has a Connect section where they can connect with the professionals of similar interests. While the networking section focuses on building relationships between professionals in a healthy and learning environment. This can be extremely beneficial as they can exchange ideas, learn from each other and build business relationships with people that can lead to future business opportunities. It also includes a comprehensive profile system that allows users to list their skills, experience, education and contact details. The users can also search for other users based on specific criteria, such as job title, company or location.

II. IMPORTANCE OF THE PROJECT

Majority of the websites or applications do not provide the proper mapping system such that similar interest professionals can connect. Proposed work fills all the gaps & has created the project keeping that in mind all the aspects are covered and the recommendations are also of one's genuine interest. Many research papers & websites have failed to identify the existing problem. A user can connect with the professionals working in the same field and help them to build a community in such a way which will help them learn and grow together. Our website aims to bridge all these gaps which will help in efficient, and less time of user being used in performance redundant tasks.

III. PERSPECTIVE OF STAKEHOLDERS AND CUSTOMERS

According to literature survey done by our team, there hasn't been any technologically advanced solution which focuses on community building along with the blogging section, hence market potential for an idea which is relatively new and unthought of is on the positive side.

IV. OBJECTIVES AND SCOPE OF THE PROJECT

The objective is to create a website or an application with all the facility where one can groom himself along with the community and with lot of features right from connecting with the professional of similar interest, updating profile along with each milestone achieved to the posting or reading of blogs to gain or share knowledge of genuine interest. Along with the professional aspect, our objective is to inculcate a certain set of value in the person's personality which will make him groom in all the aspects and help him in becoming a better a better individual.

Main features of this Application include:

- To gain and share knowledge.
- Network with complete strangers who you feel you can learn a lot from.
- Navigating professional life including small business owners, students, and job seekers.
- Used for seeking employment and being found by the recruiters.
- For advertising jobs and headhunting suitable candidates.
- Advancing the company's profile and Gaining visibility in content marketing.
- Connection to professionals for business and harnessing the professional network.
- Connection with like-minded people and reaching out to old colleagues and classmates.
- Making connections for generating leads.

V. PROBLEM DEFINITION

The post on the website has mixed content so it makes user difficult to search post which related to technical content. It can be very frustrating to dedicate time creating a blog post, only to sit and wait for comments that never come. The interactive aspect of blogging is what draws many people to get started with their own blog, but in reality, many new blogs have trouble attracting comments. If you find that your blog posts don't usually get the attention or feedback that you had hoped for, you're not alone. In some website information of the user's professional skills and interests is not available. Saving or adding post to favourites is not available in the websites. Possibly the most frustrating challenge for many users is trying to attract more visitors. In fact, most users don't give very much thought to how they will attract visitors until after the blog has been launched and they find that not many people are visiting. Regardless of how much traffic you have, you'll always want more.

VI. ANALYSIS

A. Existing System

The significance of blogs in online applications and how to communicate with other users. Through blog websites, we can also obtain information and knowledge [1]. Blogs can also aid students in developing their writing abilities. Additionally, it can increase pupils' self-confidence, which will benefit them in the long run [2]. Blogs based on certain themes are popular in today's world, also blogs have been found to have influence on media coverage of politics [3].In the current scenario, the blogging system doesn't have filters for accessing a particular blog on particular subject. Also, there is no way of connecting the peers of the same field. In existing system. There is no readability which does not attract viewers. Also uploading video of large size is not supported on the existing blogging websites.

Blogging within an organization to share information has also taken centre stage in recent times [4]. A website can assist students in honing their writing abilities through the use of blogs. Additionally, it can increase pupils' self-confidence, which will benefit them in the long run [5].

B. Proposed System

With the proposed system, students in the various domain who are confused by their career path can connect with the individuals of the same domains. This system is to help such students reach, connect individuals, make a network and get guidance. Also, individuals can post, read a blog along with the functionality of uploading images, videos and text format. With the favourites section functionality, students can put a particular blog in this section for future reference.

VII. FLOWCHART

The flowchart of the project is as given below.

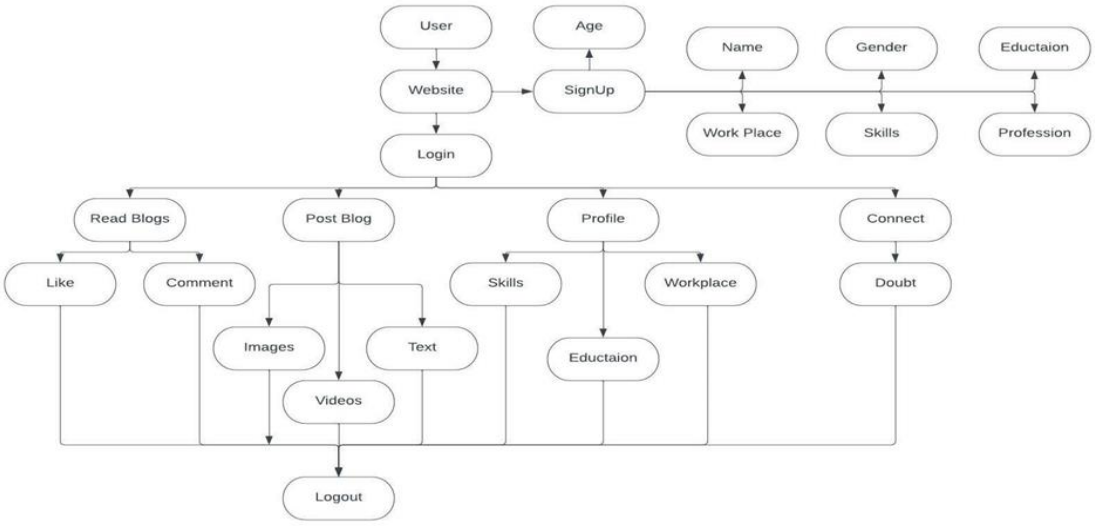

Fig 1: Flowchart.

VIII. PROJECT PLANNING

Tools used: Lucid Chart – for making project prototype.

1. HTML, CSS
2. React JS
3. MongoDB
4. Express JS
5. Node JS
6. Firebase

IX. OUTPUTS

The intent of the project is clear to give a simple and attractive application to simplify the work of going through all the information about posting, reading blogs and connection with the similar professionals, to eliminate the hassle of using separate platforms for each task and also instead of searching similar interest people to getting auto recommendation. This is a type of website that allows many records of members of an institution. Writing articles is a great way to learn how to start your own post This website is free and allows anyone to manage their own articles with the help of images and videos, conduct polls, ask doubts and form relationships with professionals with similar interests and skills. Proposed platform can provide user with the information to guiding someone, building a community for all technology aspects. It will also provide a feature of commenting on a particular post so that people can share their views on each and every post.

X. CONCLUSION

ExpertConnect has a huge scope in not only in specific area, right from the educational purpose to individual helping them in getting blogs and connecting with the professional in a specific category. Blogging had seen an upward income trend as monetizing articles is becoming easier as consumer purchases and business processes increasingly move online. Covid-19 has further helped to accelerate this trend. Our important feature is that it allows the user to read, write articles, add skills and connect with the individual with similar skills thereby giving the user a complete end to end solution. ExpertConnect will help the individual in shaping the personality and thereby guiding him the correct path. The purpose of this paper is to explain the need for blogging and forming relationships together. This is a type of website that allows many entries from members of an organisation. Writing articles is a great way to learn how to start your own post. This website is free and allows anyone to manage their own articles with the help of images and videos, conduct polls, ask doubts and form relationships with professionals with similar interests and skills.

As an add-on a feature called “Connect” is being provided so that a user can directly connects with the professionals of the same field. Also, we are bringing the awareness among community to help to build a community of each and every technical field so that there is a roadmap for each sector, thus helping the entire technology person who would like to pursue in a particular field is getting helped. Other additional features have been included in the proposed work to further improve the pace of eliminating this plaguing disease among the society.

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Educational Game Application

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Abstract: **As per the research, School shutdown due to the COVID-19 pandemic has resulted in a complete break from education for the vast majority of children or inadequate alternatives like community-based classes or poor alternatives in the form of online education options, including mobile phone-based learning. Students need assistance in completing their academic course and earning acquiring credentials. during this extraordinary crisis. To address this issue, educational game application helps students to learn at their own pace, helping students understand their strengths and weaknesses. Students can be more participate in their learning thanks to quizzes, games, polls, video content, and other media. Subjects that students typically find uninteresting can become more interesting. Remote learning and working are the main COVID-19 applications in the field of education. Advising systems, degree progress tracking, and other technologies to support student enhance student achievement will be equally important to help student's complete courses and attain credentials.**

Keywords – Educational game application, pandemic, technology learning,

I. INTRODUCTION

A sport is a sort of play where individuals follow described rules discusses instructional video games because the usage of video games to help coaching and getting to know. Games maybe used as a help tool to complement conventional teaching strategies to improve the studying experience of the inexperienced persons even as additionally teaching other skills together with following regulations, edition, hassle solving, interplay, crucial wondering skills, creativity, teamwork, and precise sportsmanship. Learning have to not feel stupid and it must no longer best suggest rote memorization wherein students learn and grasp concepts through repetition or cramming. Teachers can take gain of the strength and innovative thinking that is provided through the use of era in mastering to improve scholar performance.

II. OVERVIEW OF GAMES IN EDUCATION

Many exceptional styles of academic games are being implemented and utilized in academic institutions, faculties and homes. Using video games in schooling in most cases focuses on improving essential wondering talents at the same time as coaching a particular challenge, by means of allowing students to think out of doors the container as they follow policies. There are other video games that can be used which limit to improving know-how in a specific situation and the maximum famous ones are math games. (Yue, & Zin, 2009) discussed that games like chess cannot be viewed as educational video games as these improve logic skills, reasoning, and different traits valued in education however they're no longer taken into consideration educational due to the fact they do not deliver content material or relay curriculum fabric. Games that contain curriculum content or other academic fabric are known as instructional games (Michel, 2016).

III. PROBLEM DEFINITION

School shutdown due to the COVID-19 pandemic has resulted in a complete break from education for the vast majority of children or inadequate alternatives like community-based classes or poor alternatives in the form of online education options, including mobile phone-based learning. Students need assistance in completing their academic course and earning acquiring credentials. during this extraordinary crisis. Skill sets and dispositions embedded in well-designed games are a good match for the contemporary, technology-rich worlds students inhabit. They accommodate various learning styles and promote a complex decision-making context. Games have the potential to promote the 21st century skills recognized as critical for all citizens.

IV. ADVANTAGES OF USING GAMES IN EDUCATION

i. Engage students The main role of applying generation is to interact students and to encourage students to participate. The use of games in schooling performs an essential function in enticing students by encouraging a hands on technique.

ii. Help students remember The use of video games in education goals to assist college students recollect what they have got learnt as active participation is recommended. Learning have to not imply rote memorization but students can use games to keep in mind the vital points which they could observe in their examinations in addition to in real-global conditions.

iii. Visual and computer literacy This is something which is vital in mild of the truth that we stay in a international that is dominated by way of innovation. By playing video games, students benefit visual and computer literacy abilities if you want to put together them for the world of work.

iv. Rule following and problem-solving skills Game drills are primarily based on rule following and students are required to follow policies that allows you to acquire a excessive score and pass to the following level.

Students can without difficulty practice this understanding in actual international conditions as they may be endorsed to suppose outside the field.

v. Teach other skills Game drills are based on rule following and students are required to comply with policies so that it will reap a high rating and pass to the next degree. Students can without problems apply this knowledge in real international situations as they're advocated to assume out of doors the field.

V. DISADVANTAGES OF USING GAMES IN EDUCATION

However, gaming in schooling has setbacks which want to be addressed.

i. Providing a platform for college kids to play revision video games will become a assignment when teachers or instructors can not manage such an environment. Students could have get entry to to different platforms which might be harmful.

ii. Students who depend upon games are often secluded from real existence interaction.

iii. Using computers and different digital gadgets can purpose health risks such as eye strain and other bodily problems.

iv. The technologies required for full participation can be quite luxurious and this will create an opening between the scholars who have get admission to the technology and those who donow not have access. The diagram below summarizes the role of games in education.

VI. TOOLS USED

1. Android Studio will help you develop your app in a more productive way at scale. Android Studio provides the fastest tools for building apps on every Android device. Code with confidence. Eliminate tiresome tasks. Building without limits. Build rich experiences.

2. Sublime Text is a commercial source code editor. It natively supports many programming languages and markup languages. Users can expand its functionality with plugins, typically community-built and maintained under freesoftware licenses.

VII. CONCLUSION

The application of serious games and simulations for learning provides an opportunity for learners to apply acquired knowledge and to experiment, get feedback in form of consequences thus getting the experiences in the “safe virtual world”. There are specific educational domains where game-based learning concepts and approaches have a high learning value. These domains are interdisciplinary topics where skills such as critical thinking, group communication, debate and decision making are of high importance. Such subjects, if learned in isolation, oftencannot be applied in real world contexts.

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Leveraging E-Healthcare for Improved Healthcare Services in Rural India: An Assessment

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Abstract - **In developing countries like India, access to healthcare services remains a challenge, particularly in rural and remote communities. With over 800 million smartphone users and 227 million internet users in India, utilizing e-health solutions can help bridge the gap in healthcare access. This paper aims to evaluate the potential of e-health in providing healthcare services to rural communities in India. A survey was conducted to gather public data and opinion on the subject, exploring existing healthcare applications and analyzing the issues faced by civilians. The results of this study indicate the need for improved e-health solutions to enhance healthcare access in rural areas. The findings provide valuable insights for further development and implementation of e-health solutions in India. The actual impact on the doctor-patient ratio will depend on the effective implementation and adoption of the proposed e-healthcare system.**

Keywords – healthcare, artificial intelligence, rural healthcare, online healthcare, e-health, chat bot, medicine

I. INTRODUCTION

The provision of quality healthcare services in rural and remote areas of India remains a challenge, with limited access to healthcare facilities and medical professionals being a major issue. The objective of this project is to develop an application that can help address these challenges by providing healthcare services to individuals in rural areas through their smartphones. The main problem faced in rural areas is limited internet connectivity and slow internet services, along with a lack of awareness about the use of healthcare applications on smartphones. The aim of this project is to bridge this gap by spreading awareness and making the application easily accessible to every individual in rural areas. The application will connect rural populations with nearby doctors, as well as with doctors located in urban areas. This will not only improve access to healthcare services, but also increase the availability of medical professionals in rural areas, thereby improving the overall health of the population. The goal is to create a solution that is affordable, scalable, and easily configurable, making it accessible to everyone in rural areas.

II. BACKGROUND

In developing countries like India, access to quality healthcare remains a significant challenge, particularly in rural and remote areas. The majority of the rural population is unable to access quality healthcare services, leading to poor health outcomes and an increased burden on the healthcare system. With over 800 million smartphone users in India, accounting for approximately 57% of the population, and with around 25% of the rural population being smartphone users, the use of mobile health (mHealth) solutions has the potential to greatly improve access to healthcare services in rural areas. According to the Internet & Mobile Association of India (IAMAI), there are 227 million internet users in the country. The widespread adoption of smartphones and the internet presents a unique opportunity to deliver healthcare services in rural areas using e-health solutions. By leveraging emerging technologies, healthcare professionals and industries can shift towards more accurate, prompt, and real-time treatment of patients. The development and implementation of a cloud-based e-health solution has the potential to improve healthcare delivery in rural areas by centralizing and managing patient data, making it easier for healthcare providers to access and share information in real-time. Additionally, the use of cloud technology can reduce the cost of healthcare delivery, making it more affordable for rural populations. The goal of this project is to develop and evaluate a context-sensitive cloud-based e-health solution for rural communities in India, with a focus on improving healthcare delivery and increasing access to healthcare services.

III. LITERATURE REVIEW

E-health solutions, including telemedicine and mHealth, have gained significant attention in recent years as a means of improving access to healthcare services and improving patient outcomes. A number of studies have demonstrated the effectiveness of telemedicine and mHealth solutions in rural areas, particularly in increasing access to healthcare services and improving patient outcomes.

In 2006, Mrs. Gurujit Kaur and Dr. Neena Gupta published a paper on "E-health: A New Perspective on Global Health"[1]. The key findings of the paper highlight the potential of e-health to allow patients to maintain their independence longer and for healthcare providers to monitor conditions more closely. However, the authors also describe the barriers and challenges that

exist in the adoption of e-health and provide an overview of the current status of e-health globally, including an examination of the e-health scenario in India. One of the gaps identified in the paper is that, while an electronic health record system can provide patients with access to their medical data, it can also lead to misinterpretation of information and cause unnecessary alarm or panic. In the study, "eHealth in India Today: Nature of Work, Challenges, and Finances" by Szymon Jaros Awski and Gayatri Saberwal (2014), a qualitative approach was taken to understand the current state of eHealth in India through interviews with a diverse group of stakeholders [2]. Thirty interviews were conducted with individuals from 28 organizations involved in the implementation, design, evaluation, and provision of eHealth programs. The study found that a range of programs, such as point-of-care in both rural and urban areas, treatment compliance, disease surveillance, and distant medical education, are being run in India. However, the major challenges faced by these programs include a shortage of suitable health personnel, especially in rural areas, and financial sustainability concerns. The findings highlight the need for addressing these challenges to further the growth and impact of eHealth programs in India.

The study "Private Cloud Solution for Rural Healthcare" by Mrs. Deepa Lakshmi in 2016 aimed to improve access to healthcare for rural populations through a mobile-based application [3]. The project analyzed doctor-patient conversations to develop a chatbot that could provide medical advice. The study identified several challenges including compliance with ethical and privacy laws, ensuring data security, the potential for loss of connectivity, and difficulties in integrating with other platforms. Additionally, a lack of standards in the field was also identified as a gap.

The study "Exclusive E-Health Care using Centralized Health Management System" was conducted by Mrs. Arthi CI and Mrs. Priya RL in 2016 [4]. The methodology involved the construction of a nationwide health database system that would provide access to detailed patient records and help medical personnel perform technical tasks more efficiently. The system aimed to streamline healthcare processes and improve patient outcomes. However, the implementation of such a system required a significant amount of time and effort, particularly in regards to moving to a centralized access service. This process was found to be challenging, as a considerable amount of time had to be spent dealing with daily bed management problems and sometimes repeating the same events as the day prior.

In "Contexts and Opportunities of e-Health Technology in Medical Care" by Mr. Sojib Bin Zaman, Mrs. Naznin Hossain, Mr. Shad Ahmad, and Mr. Zubair Ahmed, published in 2017, the authors explore the potential benefits and challenges of eHealth technology in the healthcare sector [5]. The key findings of the study indicate that eHealth has the potential to be a game-changer in the medical care system if it is properly integrated with the traditional medical system. The authors emphasize the need for more strategic planning, development, and evaluation of eHealth to fully realize its benefits. They also discuss the existing and future opportunities of eHealth in health support systems. However, the authors also identify several challenges, including concerns about electronic and internet-based data transmission, data storage, data safety, and confidentiality. These issues highlight the importance of careful consideration and implementation of eHealth technology to ensure its success.

"Health Monitoring using Cloud-based Processing" is a research study by Mrs. Alex Page in 2017 [6]. The study adopted a methodology to examine the current state and future potential of remote health monitoring technologies in medical care. The study found that the system allows users to receive health care services anytime and anywhere, realizing the purpose of remote health monitoring. However, the study also identified several challenges in the areas of sensing, analytics, and visualization that must be addressed to ensure seamless integration into clinical practice. Applications of Cloud Computing in Health Systems" by Mr. Hamid Moghaddasi, 2018, is a study that explores the potential of incorporating cloud computing in healthcare to enhance patient care [7]. The key findings highlight the benefits of implementing cloud computing systems in healthcare and the positive impact it can have on patient care quality. However, the study also identifies a gap in the need to synchronize these systems with other external systems to ensure seamless maintenance and continuity of care. In 2019, Mrs. Repu Daman conducted a study on the application of Cloud Computing in the medical field [8]. The methodology involved using the web service method to pack the data access interface of the medical data service layer. The key findings of the study revealed that implementing cloud computing in healthcare could lead to cost-effectiveness, energy savings, and improved collaboration between hospitals. However, a gap was identified in the form of limited access to the cloud only through high-speed internet. Cloud Computing in Healthcare Industry" by Mrs. G Nikhita and Reddy Vanga in 2020, utilized the Alma-Ata declaration to approach primary healthcare as the basis for their study [9]. The methodology focused on presenting essential healthcare through practical and scientifically sound methods and technology. The key findings of the study showed that cloud computing can help physicians effectively communicate and examine their patients. However, the study also identified that cloud computing is still a developing technology in the healthcare industry. Chatbot for Healthcare System Using Artificial Intelligence" is a study conducted by Mrs. Lekha Athota, Mr. Vinod Shukla, Mr. Nitin Pandey, and Mr. Ajay Rana in 2020 [10]. The methodology used involved having the client input a question into the user interface which then sends it to the chatbot application for processing. The

preprocessing steps include tokenization and removal of stop words, followed by feature extraction using ngram, TF- IDF, and cosine similarity. The chatbot retrieves the answers from its knowledge database. The key findings of the study include the development of an application that provides quality answers in a short period of time and reduces the burden on the answer provider by using an expert system. However, one of the gaps identified is that the chatbot's inability to take into account all the personal details associated with the patient may lead to inaccuracies in medical practice, raising medical liabilities and new ethical issues.

In India, telemedicine and mHealth solutions have been implemented in rural areas with a focus on providing healthcare services to remote and underserved populations. Despite these efforts, the adoption of e-health solutions in rural areas remains limited due to various challenges such as limited internet connectivity, lack of awareness about the use of healthcare applications, and limited access to healthcare services.

Cloud-based e-health solutions have the potential to overcome these challenges and improve healthcare delivery in rural areas. The centralization and management of patient data through cloud technology makes it easier for healthcare providers to access and share information in real- time, improving the accuracy and promptness of healthcare delivery. Furthermore, the cost-effectiveness of cloud technology can make healthcare delivery more affordable for rural populations.

IV. METHODOLOGY

To develop and evaluate our e-health solution, we will conduct a study in rural areas of India. The study will include a survey of healthcare providers and patients to understand their needs and preferences, as well as to identify the challenges they face in accessing healthcare services. We will also conduct a user-centered design process to develop the e-health solution, taking into consideration the needs and preferences of healthcare providers and patients. The e-health solution will be tested and evaluated through a pilot study in rural areas of India, and the results will be used to make improvements and fine- tune the solution.

V. PROPOSED SYSTEM

The proposed system is an e-health solution that aims to provide healthcare services to rural communities in India. The system consists of a user-friendly mobile application that connects patients with healthcare professionals, providing them with access to medical information, diagnosis, and treatment. The application also provides a platform for online communication between patients and healthcare professionals, enabling real-time consultation and monitoring of treatment progress.

The system is designed to address the unique challenges and limitations of rural healthcare in India, including low levels of digital literacy. The proposed system features a user- friendly mobile application with multilingual functionality, allowing patients to use the application in their preferred regional language. The system is scalable and configurable, allowing it to adapt to changing needs and requirements over time. It is also designed to be secure, ensuring that sensitive medical information is protected and maintained confidentially.

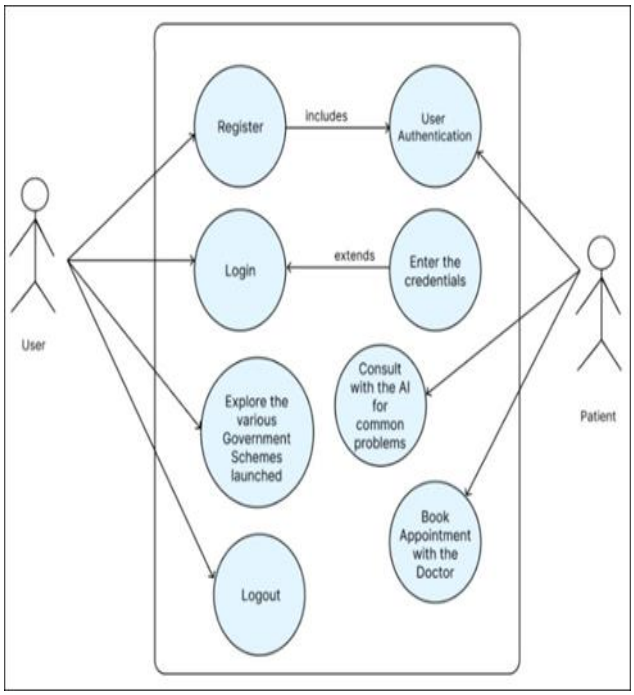

Fig.1 Use Case Diagram

As shown in Fig.1, the proposed system aims to revolutionize the delivery of healthcare services in rural areas of India, by connecting them to certified doctors. By using innovative technology and design, the proposed system aims to close the gap in healthcare services between rural and urban areas and to provide improved health outcomes for rural communities in India.

VI. MODULE DESCRIPTION

The system consists of four key modules: the admin module, the Patient module, the Doctor module, and the Health Bot (Chatbot) module.

6.1 Admin Module

The primary role of the administrator is to maintain the functionality and updates of the application. This includes adding information about nearby medical facilities and laboratories, as well as updating information about government-sponsored campaigns and schemes. The administrator is also responsible for monitoring the performance of doctors and analyzing patient feedback to ensure the quality of care provided. The administrator also has the capability to block users who are booking fake appointments with doctors.

6.2 Patient Module

Patients have the ability to communicate their healthcare concerns to the HealthBot through a chat interface. The chatbot is designed to provide instant remedies for

common health problems, such as fever, colds, and headaches. Additionally, patients can seek assistance from doctors through the application using a text message or video call feature.

6.3 Doctor Module

Doctors can respond to patient inquiries and provide care through the application. They can also interact with patients through video calls if necessary. Doctors have access to a patient's medical history, which can aid in their understanding of the patient's healthcare needs. In emergency situations, doctors can also communicate with the patient's circle of care.

6.4 Artificial Intelligence Chatbot Module

Artificial Intelligence (AI) refers to the development of algorithms that are capable of performing tasks typically associated with human intelligence, such as learning, problem solving, and decision making. In the context of this application, AI is utilized to create a Health Bot, a chatbot that provides patients with instant remedies for common day-to-day healthcare issues. The chatbot was trained using a dataset specifically designed for disease and their symptoms, sourced from the well-known Kaggle Healthcare Analytics platform. The dataset contains comprehensive information on various diseases, their symptoms, and other relevant data, which was leveraged to train the chatbot to accurately identify and diagnose different health conditions. By utilizing this comprehensive dataset, the chatbot is equipped with the knowledge and insights necessary to provide reliable and efficient healthcare solutions to users.

VII. STRUCTURE AND IMPLEMENTATION

The flowchart in Fig.2 provides an overview of the functioning of the application. Patients and doctors can register on the application or log in if they have already done so. Both will have access to a menu with all the features available in the system. The patient can choose to receive assistance either from the HealthBot or from a doctor. If the patient chooses to communicate with the HealthBot, they will be asked to provide information about their symptoms, and the chatbot will offer a remedy or suggest that the patient contact a doctor. If the patient decides to see a doctor, they can book an appointment and conduct a video call with the doctor, who will provide a prescription and receive feedback from the patient. Users can also stay informed about various healthcare activities and avail of opportunities, such as free eye cataract campaigns and yoga training sessions. The map feature allows users to locate nearby healthcare facilities, such as hospitals and medical shops.

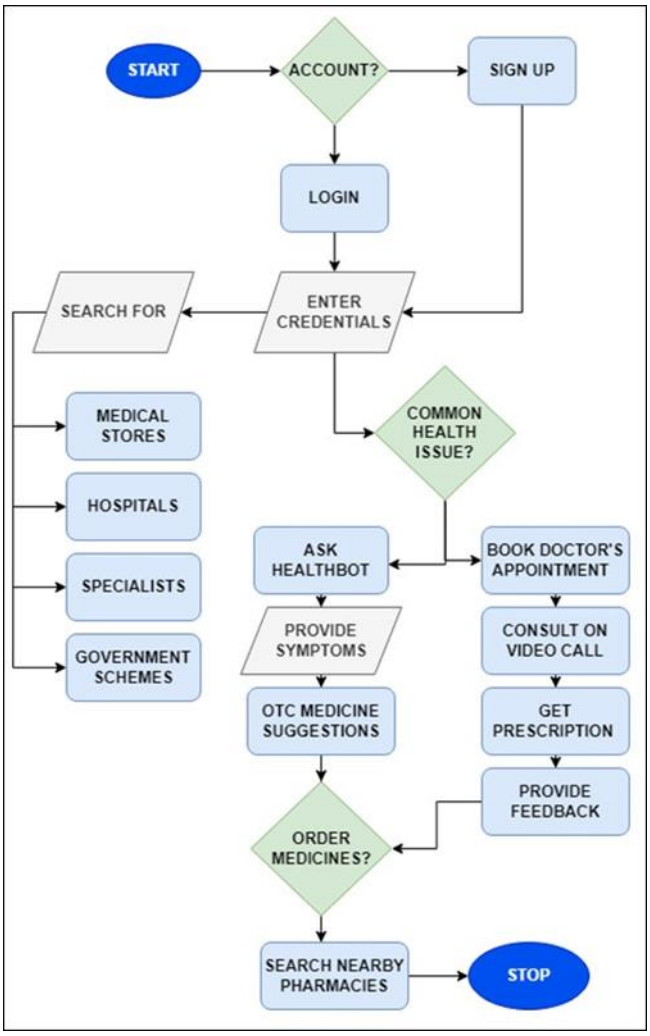

Fig.2 Flowchart

VIII. FUTURE SCOPE

In this age of technology, there is a need for making healthcare more accessible and convenient for individuals. The proposed mobile application-based health care system aims to provide a comprehensive solution for the masses by offering various conveniences during emergencies. The future goal of the system is to integrate Artificial Intelligence to enhance disease detection accuracy and make the application more reliable, efficient, and user- friendly. To further enhance the experience, the system will also be integrated with appointment booking automation to save the user from manual data entry. The development team also plans to connect with more hospitals and use API integration for real-time information regarding bed and operating room availability. In addition, the system will be customizable to meet individual requirements and provide an all-in-one medical service. Lastly, the plan is to integrate a chatbot to offer initial support to users before the ambulance arrives.

IX. RESULT AND DISCUSSION

Based on the survey results, we gained a deeper understanding of the current state of healthcare services in both urban and rural areas. Our ultimate goal is to

bridge the gap between the two and provide the same level of care and access to healthcare services in rural communities. Our aim is to prevent avoidable deaths due to a lack of basic healthcare facilities in these areas.

We realized that many people in rural areas avoid routine check-ups, so our application will allow them to consult with doctors virtually and maintain their health and well-being. According to the survey, many participants believe that AI chatbots have the potential to solve common health- related issues. One of the most pressing needs identified was the availability of doctors when needed, and our application aims to address this issue.

Fig.3 Login page

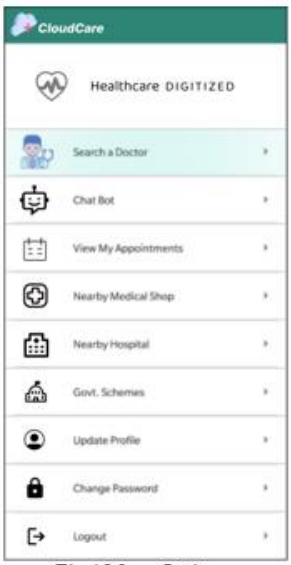

Fig.4 Menu Options

Fig.5 Book Appointment

Fig.6 HealthBot

We successfully introduced an innovative healthcare solution for rural areas, as shown in Figures 3 to 6. Our user- friendly interface is easily navigable for both doctors and patients, ensuring a smooth experience. To guarantee accuracy, we conducted thorough testing of our system. As a result, our application is functioning seamlessly, with all data being accurately recorded in the database and the user interface operating optimally.

X. CONCLUSION

The increasing advancements in science and technology have made it easier for people to find solutions to their everyday problems. In particular, the healthcare sector is attracting the attention of engineers and researchers who are developing innovative systems to improve lives and health outcomes. This paper presents a mobile application-based healthcare tool that aims to provide users with convenient access to health services. The app offers a range of features that can simplify and streamline emergency response, reducing panic and allowing for quick and effective problem-solving. In the future, we plan to continue developing this technology to provide even better support to individuals, especially those in underserved communities. Additionally, we hope to leverage artificial intelligence to improve the accuracy of disease detection based on symptoms, making mobile healthcare a crucial aspect of daily life for all.

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Link to Survey Report:
https://drive.google.com/drive/folders/1VglRuDYOvkCP_oG68y2jCghJREvbQ_I0?usp=share_link

Alumni Connect – TCET

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Abstract - **Today's this type of portal is useful for various colleges to manage their pass out student. In this portal administrator verify and authenticate the alumni's, manage events, notices, achievement and approve register student. Pass out student register in this portal and view all type of event and participate in this. Student have secure login with OTP verification to access the events and achievement updates. The proposed system will be web based applications so it can be accessed by alumni and students with the help of admin. It enables quick and easy communications. Each user will be responsible for updating their own information's. Alumni will be able to organize meetings and find out about job opportunities using this system. This system will help the students to connect with their seniors which will help them in their doubt solving or attending any event regarding to higher studies or placements.**

Keywords – Alumni Connect, TCET, Technology, Alumni, Alumni events, Mobile Application

I. INTRODUCTION

The greatest asset any Institution can have is the Alumni system. Alumni are the people who represent the Institution in the real world. Many institutions manually maintain student data.

Efficiency is not possible in this. There are certain downsides to the conventional approach to managing student and alumni data and issues. These paper record keeping methods' shortcomings include:

1. The typical method of transferring the material to the students involves a longer delay. At first, it must be pasted on the notice board, and students must view the notice board in order to learn the news[7].

2. It is difficult to keep and update the values in paper records, and they are prone to harm. To store the paper records, a sizable storage space is required[6][3]. Especially in a country like India, efficient management institutes with the practiced industry institute-alumni interface have always been the inspiration to engage, consult and communicate effectively in helping them develop and succeed in a new outlook[4].

We are developing the best alumni portal to provide efficient connection between the institute's three stake-holders - TCET-College, College students, and Alumni through online chatting, profile viewing, and personal messaging. This portal emphasizes the ability for current students to communicate with college alumni in order to receive various updates on current business trends, internship opportunities, sponsored projects, and numerous referral opportunities in the corporate sector. Alumni and students can sign up on their own, and with the administrator's approval, they can log in to their accounts and update their profiles. The alumni portal's significance comes from the fact that it automatically takes care of a problem that is more vital and significant for the wellbeing of the university.

II. BACKGROUND

The existing system is built with numberless excel sheets that are created by each user. These sheets may be collated by an alumni organization and shared with all the alumni but this activity may not be frequent.

The system has privacy difficulties and is difficult to maintain on a regular basis.

- It is not intended for frequent use.
- This system cannot be frequently maintained; data loss is a possibility.
- There may be issues with privacy and security. The procedure of maintaining all user information is extensive.

The suggested system will be a web-based application, allowing alumni and students to use it with the support of administration. It makes communication simple and rapid. Each user is in charge of maintaining their own information. The proposed system will assist former students and the concerned institution in forging close connections through sharing their perspectives, ideas, direction, inspiration, and methods[14] .Information about alumni is freely accessible to users and administrators. Once a student has graduated from the institution, they can pursue higher education in their professional lives or careers. playing a significant part in developing one's professional reputation[14].

III. ADVANTAGE OF PROPOSED SYSTEM

•It is very easy to manage historical data in database.

•It is very easy to record the information of the colleges and about the students in the databases. This system is secured.

•This system provides a single point of network as they connect all the people connected to the university at a single place allowing interactions, exchange of ideas and other information.

•The system is an application for managing and accessing Alumni information regularly.

IV. LITERATURE REVIEW

Alumni Re-Union Using Android Application- Many people are using mobile phones but non-communication between their school and college friends and staffs

because they forget their contacts [5][8]. To overcome the above issues this android application is used for the reunion of alumnus and connect alumni members regularly, to displays, share recent news and photos, offline alert, inaugurate forum, video streaming, online seminar talk [5]. In the proposed system, the app allows students to register and then search the database on different criteria. Then include video streaming, online seminar, event management, gallery. This does not allow efficient data management and retrieval process. It is complex and time consuming

Alumni Smart Connect through Android Application- This system makes an effective communication among different batches of graduates from the same institution[3]. The purpose of this connect application is to provide a mobile user interface, which facilitates a data storage, authenticate a user and provide different services[3]. The services includes connect and communicate an individual alumnus. In this there is no video streaming. There is no section for the ongoing or upcoming cultural events.

Harvard Alumni- Front page of this portal shows the features like login tab so that the alumnus can login easily, ways to connect for connecting the junior and the pass out students, make gift for various occasions like birthdays or anything else [2]. With that Harvard provides Features News for surrounding information's ,Lecture details which describes the schedule , events and the Notice are displayed on home page itself with the present event [2]. Also gives the Donor Initiative Chance for the scenario when the alumni student he/she feels that they can help the college in terms of donation so that will be possible with this[2]. With all this we have observe the unique feature that , it provides the clubbed video on the home page and this thing makes the whole portal very much attractive [2].

IIT Kanpur Alumni- IIT has Gallery with many images, Lectures details with Specific day and time , contacts which shows whom all are Connected with this portal, woman alumni convention as Separate for the woman only on the Home page [9][13]. Features Are Gallery present on the home page , visit for guide Allocations is given so that the junior student can get the Solution or the advice for their difficulties [9]. Notice with Highlighted form is shown for better visualization . also gives The Donor Initiative Chance [9]. IIT Kanpur shows information Events about present on every page where the current events are Highlighted also there is a separate women alumni convention And that is the unique feature [9][13].

Alumni Princeton University- This portal has different things in their front page like Calendar for the current and the in coming occasions and in Order to get about their own information there is a tab i.e. About us [10]. This portal is provides the features that is same as The IIT KANPUR like Gallery present on the home page , visit For guide allocations is given so that the junior student can get the solution or the advice for their difficulties [10]. But the different thing is that this portal provides the scholar ship in terms of donor initiative for the collage requirement purpose [10]. Providing the unique feature like the alumnus are categorized on the basis of regions communities of networks so that the students who belongs to the same area will get listed together [10].

ITMB Alumni Association -In the home page this portal shows the search tab for searching the alumni student whether he/she is connected in the portal or not [11].The notice are present in the highlighted form not only for the better visualization but also for making the portal active[11].And the unique feature which makes ITMB Alumni Association more unique is the search tab which is shown on every page[11]. Also provided Donor initiative for college[11].

UCLA Alumni- The UCLA Alumni Portal's home page layout is very much attractive , shows the similar features like all the portal which we have discussed yet [12] .But unfortunately there is no notice section because of that the portal not shows any surrounding information[12]. And also the donor initiative is present in the form of scholarship but the basic concept is same[12]. Here the alumnus are connected by the social networks which reduce the distance between the pass out and the junior students and that makes the portal unique as compare to the other portals[12].

Commonly Identified Weaknesses- Majority of the alumni portals do not provide the feature of direct communication of the students with the alumnus although the institute remains in direct contact with the alumni. And also the conservation is hidden or not displayed from the other student who all are connected with that particular portal[1]. No chat rooms specific to topic/ interest / domain. No direct registration

V. MODULE DESCRIPTION

The system after careful analysis has been identified to be presented with the following modules User, Admin.

User

- Register – User has to register their basic details to get access with this application service.
- Authenticate
  - SMS OTP will sent to the user registered mobile number
- Security – MD5 Hash
  - Encrypt the password using md5 hash function
- Login – Once they have registered admin will approve the account for login to avail the service at the needy time.
- Publish Event Details – Logging in with the application will provide you to publish the events.

- Publish Achievement Details – Logging in with the application will provide you to publish of achievement that have the approval of the application.
- Search records – So that the users can search the details among the list according. Administrator
- Provide Approval – Administration has to give approval to the registering user after verifying their details.
- Login –Can login their accounts.
- Search records – So that the users can search the details by year among the list according.
- Publish Event details – Here admin have to post their details of event for the alumni
- Publish Achievement details – Here admin have to post their details of Achievement details of the alumni students.

VI. STRUCTURE & IMPLEMENTATION

An alumni connect app is a platform for alumni of a specific institution to network, communicate and connect with one another. The app typically has features such as:Profile creation: Users can create profiles and update their personal and professional information. Search: Users can search alumni based on criteria such as graduation year. Communication: The app provides a platform for alumni to communicate with each other through messaging and notifications. Events: Alumni can be informed of and RSVP to upcoming events and reunions organized by the institution or alumni community. The goal of an alumni connect app is to create a centralized hub for alumni to stay connected, engaged, and involved with their alma mater and with each other[7].

Fig 1 shows the architecture of our application

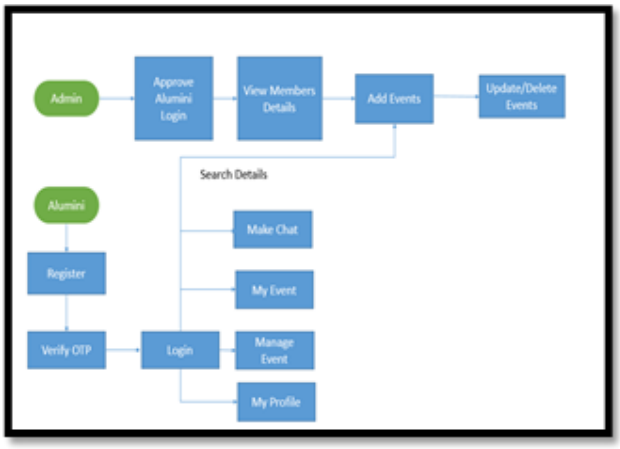


Fig 1. Model Architecture

The architecture of an alumni app is frequently used as a first step to create an overview of the alumni process without going into too much detail, which can then be explained. It includes the user flow and all of its components, such as login, admin, chat, events, profile, etc.

Fig 2 shows the work flow of our application

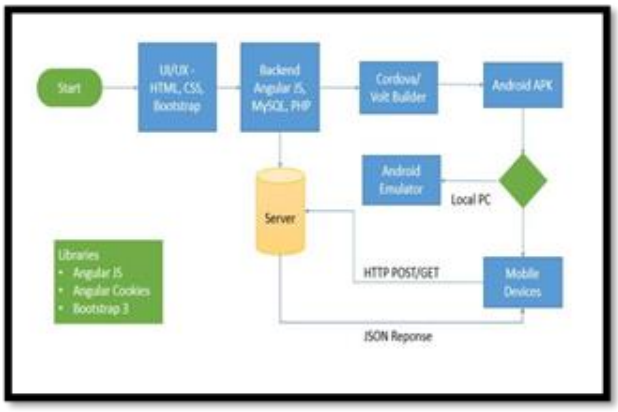


Fig 2. Work Flow Diagram

A work flow diagram of the system's features and functionality provided a description of the system. In order to build the overall system architecture, the system was then designed to match the requirements to the hardware or software system. The programme design that depicts a software system's functionality in a way that allows the user to engage with it and determine how well it satisfies their needs.

Fig 3 shows the Entity Relationship of the objects entity in our application.

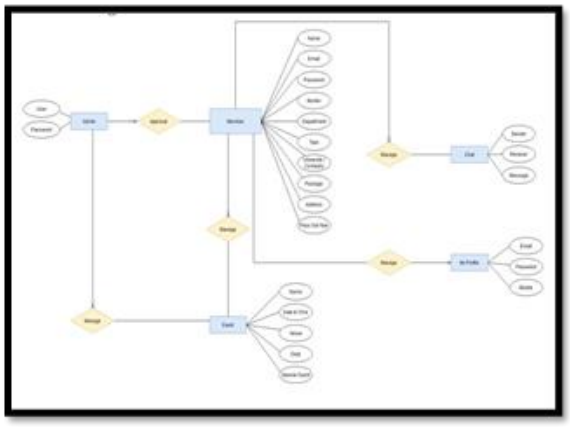


Fig 3. ER Diagram

The Alumni app's entity-relationship diagram displays every visual representation of database tables as well as the connections between colleges, social networks, alumni, alumni news, etc. To describe the relationships between structured data groups of the Alumni app features, it used structure data. The database, college news, chat, events, and admin and user logins are the key components of the alumni app.

The ALUMNI CONNECT – TCET mobile application has been developed with the following section.

5.1. Admin Login
5.2. User Registration
5.3. User Login

Fig 4. Home page of application

Here user gets an option to select any one of the three options as per their requirements and proceed further.

5.1 ADMINISTRATION LOGIN

This module is developed to create user interface to get the administrator in the application with the help of admin login. Admin can login with help of email id and password. The module allow the admin to create an account, view profile, alumni members, publish events, view events, view user. The admin login process is very simple and easy to use. After admin login , admin can view the home page as in fig5.

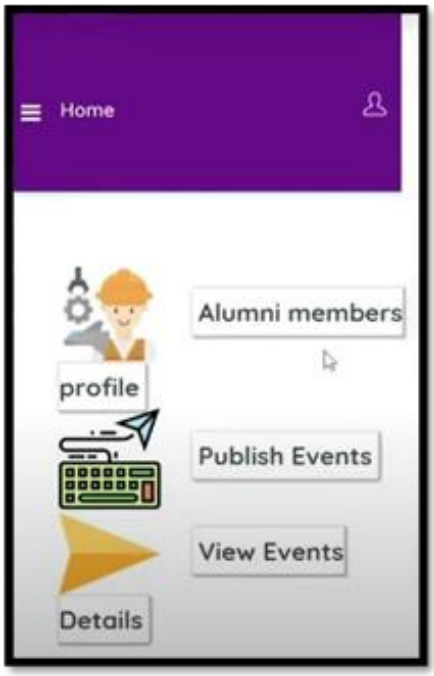
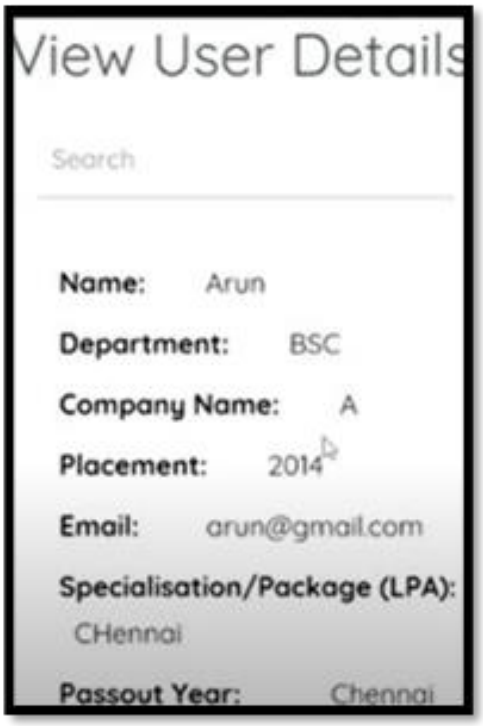


Fig 5. Home page of Admin

Admin can view all the details of users and has feature to search the user with help of any user detail.

Fig 6 shows the users details that can be viewed by administrator.



5.2 USER REGISTRATION

This module is designed to build a user interface for entering a user's fundamental registration information into the system. The module gives the user the option to register before entering any personal data. The process for creating an account is incredibly easy to use and understand. While registering user has to fill the details such as name, Reg no, email id, password, contact no, department, placement type, pass out year, etc

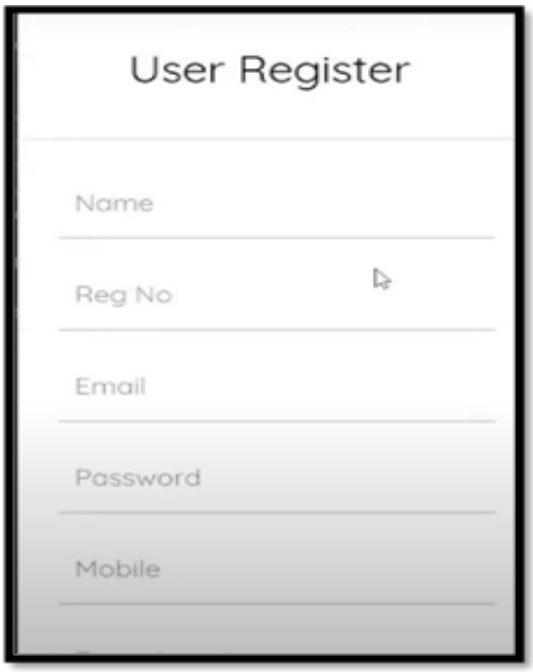
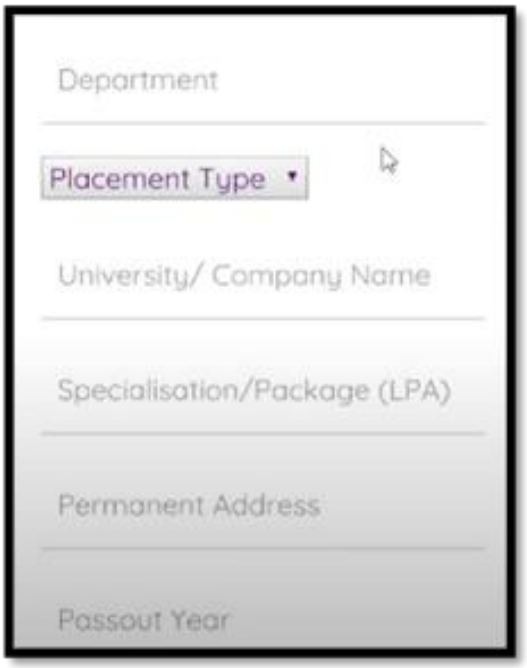


Fig 7. User Registration1



5.3 USER LOGIN

A user login feature in an alumni connect app enables alumni to register for an account and sign in to use the app's features. Typically, the procedure entails providing a special username, email address, and password that are checked against the app's database. The user is given access to the app's capabilities after successfully authenticating themselves, including the ability to read their profile, interact with other alumni, access resources, and take part in activities. The user login contributes to the privacy and security of app users and their data

VII. FUTURE SCOPE

The project's explicit goal is to provide a user-friendly programme that will make tasks easier to complete offline, or via alternative methods, while also requiring less effort. In this application we will be able to save database of all current and past students. Login /registration Module, Chat System Module, Events News section ,Video streaming. If former college students who are members of the alumni website could get in touch with the alumni officer directly through the website, that would be very helpful. This functionality is not provided by the system that was put in place. However, the alumni officer's email address is simple to locate because it will be displayed on the website of the online community. Asp, which is also used to build the broadcast email capabilities that the alumni web site offers, might be used to implement the contact alumni officer capability with ease. If the website featured a forum where any topic that was relevant to a person's field may be opened, that would be another valuable feature from which the alumni members could profit.

7. CONCLUSION

Alumni Portal for any college website is very important. During covid pandemic ,when education was in online mode interaction of students with their seniors is almost none so it has been setup to increase interaction, knowledge sharing and networking among the alumni students and also focuses on bringing together alumni students of college and the primary goal of this report is to connect the alumni students with the college and existing college students with the help of alumni web portal where they can have communication with existing students and college.

VIII. ACKNOWLEDGMENT

We sincerely thank our guide Dr. Anil Vasoya for his guidance and constant support and also for the stick our backs. We also thank the project coordinators for [1] [2]arranging the necessary facilities to carry out the project work. We thank the HOD, Dr. Sangeeta Vhatkar, the Principal, Dr. B. K. Mishra, and the college management for their support.

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The Impact of Personalized Fitness Applications on Physical Activity, Body Composition, and Health and Well-Being

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Abstract **Smartphones and tablets are slowly but steadily changing the way we look after our health and fitness. Today, numerous high quality mobile apps are available for users and health professionals and cover the whole health care chain, i.e. information collection, prevention, diagnosis, treatment and monitoring. There are thousands of fitness-related smartphone applications available for free and purchase, but there is uncertainty if these apps help individuals achieve and maintain personal fitness. This study aimed to investigate the factors that contribute to the success of personalized fitness applications and the user experience. The results showed that the key factors contributing to the success of personalized fitness applications are personalization, goal setting, and progress tracking. The user experience was also found to be positively impacted by these factors, as well as by the availability of resources such as workout plans. This study highlights the importance of considering personalization, goal setting, and progress tracking in the development of personalized fitness applications to improve user engagement and satisfaction.**

Index Terms - Personalized fitness application, apps, health, fitness, smartphone

I. INTRODUCTION

The use of technology to monitor and improve physical health has become increasingly popular in recent years. Personalized fitness applications provide users with personalized fitness plans, track progress, and offer incentives and rewards. The convenience and effectiveness of these applications make them an attractive solution for individuals looking to improve their physical health. However, little research has been done to evaluate the impact of using these applications on physical activity, body composition, and overall health and well-being. Through Using app, we can have young people involve in physical exercise. We Barely get any time from morning to evening to do some workout due to Extensive work and busy social life. Healthcare applications will encourage to Keep body fit and lead a healthy life through using it. Our aim will be to create App which we can update according to trends. Personalized fitness applications have become increasingly popular in recent years as a means of tracking exercise and promoting healthy lifestyles. With a wide range of features, including workout plans, nutrition tracking, and goal-setting tools, these applications aim to provide users with a customized approach to fitness and wellness. However, despite their growing popularity, there is limited research on the effectiveness of these applications in improving fitness outcomes and user engagement. This study seeks to fill this gap by examining the benefits and challenges of personalized fitness applications and exploring the key features that contribute to their success.

II. IMPORTANCE OF THE PROJECT

Fitness apps offers the freedom to work out anywhere as per their convenience. We all have different body types some have Endomorphs, some have Ectomorphs and some have Mesomorphs and substantially to know your type you just have to give some inputs to the operation like weight, height, etc and it'll show your body type and the required workout for that type. Fitness apps are like " anywhere, anytime " where your just need a Mobile Phone and Internet Connection and you can indeed download the Workout or Diet if you want to avoid using Internet Connection. So, whether you're on a business trip, family holiday, or out of the city for any other reason, you have no reason to miss your Workout. Those who are formerly-fit and want to maintain this fitness position can choose from hundreds of workout plans given in the fitness apps. Monitoring your Progress and Diet is veritably easy using fitness apps. Fitness apps are like a one- stop station where you can cover all your life parameters like step count, diet, water input, blood parameters and drill routine. You do not need to maintain different journals or books to keep a record of all these effects. Fitness apps help ameliorate your life habits, as they've a huge positive impact on your health. One of the most Important benefits of using fitness apps is ' Motivation '. Notification and Reminders from fitness apps keep reminding you about your health and Goals, therefore keeping you motivated. Fitness apps keep track of your goals and remind you to follow them. With the Perfect fitness apps, you can achieve your goals and stay healthy.

III. OBJECTIVES

The following are the objectives of this research on personalized fitness applications:

To determine the effectiveness of personalized fitness applications in improving fitness outcomes such as weight loss, muscle gain, and improved overall health.

To evaluate user satisfaction with personalized fitness applications, including ease of use, personalization, and overall enjoyment.

To identify the key features and functions that contribute to the success of personalized fitness applications, including workout plans, nutrition tracking, and goal-setting tools.

To understand the challenges faced by users in using personalized fitness applications, such as difficulty in adherence to workout plans and barriers to long-term engagement.

To provide insights into the current state of the personalized fitness application market and offer recommendations for future development.

To contribute to the existing body of literature on personalized fitness applications and their impact on health and wellness.

IV. SCOPE

The fitness industry is experiencing a steady pattern of growth, whether it's health clubs or fitness app development companies. One of the most important tasks of fitness app developers is protecting the user's data from being leaked. Pay close attention to the subject of data security. Another challenge is delivering exceptional user experience for the apps to be fast and easy to use. If you're not well- experienced in this business, you might find yourself in need of help from the team of UI/UX designers during this stage of fitness application development. Fitness industry trends reflect global trends in society. Technologies are seamlessly integrated into our lives. They are finding their place in people's fitness and health routines. Our aim will be to create app which we can update according to trends.

V. TECHNICAL KNOWLEDGE

The development of apps requires multidisciplinary collaboration with partners that have a background in software development. Such a team should include members capable of content design, software coding and usability testing of the product (e.g., alpha testing). Although it is possible for a mobile

app to be developed by a single individual, it is unlikely that a mental health provider will be able to individually develop a comprehensive app independently, especially given the advanced technical and programming skills required. The mental health provider may find it easier to collaborate with qualified teams of software developers to facilitate the technical components. The provider would offer expertise in content to guide development and communicate user needs, whereas the programmers would complete the technical components. However, it would be helpful for the mental health provider to possess, or involve other mental health professionals who possess, basic training in software design to facilitate communication with technical staff.

VI. APP MAINTAINANCE

New mobile technologies and evidence-based mental health care continues to evolve. As such, app developers and mental health providers should identify methods to maintain, modify and improve existing apps to incorporate these advances in technology and psychological research. These methods should include strategies to fix technical problems that arise as hardware and software systems are updated. Developers are encouraged to create a plan to maintain the app after the initial development is completed. Maintaining and updating an app can be challenging due to limitations in funding. Traditional research funding mechanisms, including multi-year research projects, are conducive to initial development, usability testing and preliminary evaluation but are limited in their ability to support continued revision. Fortunately, apps themselves are products and can be integrated into a self-sustaining business model. This approach would also promote the development of high-quality apps that are more likely to be used in order to generate such financial support. However, the need for sustained funding leads to challenges in identifying ethical and manageable revenue streams. The most common approach is to charge for the initial download of the app itself. Additional models include offering an initial free download and then selling supplemental content for the app. For example, a mood monitoring app could offer a supplemental feature that communicates with an external heart rate monitor for an additional fee. Alternatively, arrangements with a specific institution (e.g., a university or hospital) or health insurance agencies could be made to allocate funding to successfully sustain an app. Such an agreement islikely to succeed when the app offers direct benefit to the larger organization, such as coordinating care amongst disparate service centres. Although no one strategy has emerged as consistently successful, there is a continued need to identify approaches that balance costs of development and continued maintenance with wide-scale dissemination of such software.

VII. MOBILE DEVICE TRENDS AND HEALTHCARE

As described, mobile devices have numerous functions that are of direct utility to mental health treatment. The present discussion has highlighted the ability of such devices to asynchronously communicate with patients in specific contexts at all stages of the treatment process. Such functions rely on the expanded communication functionality of the mobile device (e.g., messaging, telephone conversations and video chat). Additionally, such devices offer increased functionality through integrated hardware (e.g., global positioning systems and camera) and supplemental hardware that connects to the device directly or wirelessly through Bluetooth.

Mobile devices contain a number of embedded sensors that can be used to improve the timeliness of a given intervention. These sensors include global positioning

systems capable of determining locations as well as movement in a given area, accelerometers capable of measuring movement of the device, microphones capable of recording sounds in the area, camera capable of video and pictures and Bluetooth sensors capable of identifying and communicating with nearby devices. These sensors can be used in conjunction with one another to obtain a comprehensive understanding of an individual's behavior at a given time and have the potential to predict subsequent behavior (Burns et al., 2011).

The future of mobile devices will involve advances to functionality within the device such as improving the breadth and precision of sensor capabilities, as well as enhancing interactivity with other devices. This interoperability includes seamless communication with other mobile devices (e.g., Bluetooth and near field communication), software systems (e.g., electronic medical records) and other hardware (e.g., actigraphy). These features are likely to improve opportunities for passive data collection, which requires minimal input from the user and reduces the overall burden of usage. The ability of the mobile device to communicate with other devices and

systems around an individual represents a potential shift in the functionality of the device from that of an additional tool to be used in treatment to the central device that manages the process of treatment outside of care. This feature will be increasingly important as high-powered wearable sensors become more prominent.

VIII. CONCLUSION

Health and fitness apps make it easier to motivate, track progress, and reach your goals. Today, there a ton of apps devoted to all kinds of workouts, from yoga and available, known Exercises For better Health and strength training sessions. We have started creating M-healthcare application for Mobile devices which will be Open source, User friendly, Helpful for many People.

Mobile applications that focus on mental health treatment can be used for a variety of purposes. They show great promise in promoting healthy behaviour changes, increasing adherence to treatment programmes, providing immediate psychological support, facilitating self-monitoring and reducing the demand for clinician time (Spurgeon & Wright, 2010). As mobile applications grow in popularity among the general public, so does the potential to increase the quality of care and access to evidence-based treatments through this technology. Mental health providers and researchers are encouraged to thoughtfully develop and evaluate mobile applications for use in clinical practice and research. As the mental health field continues to adopt new technologies to increase access and quality of care, it is imperative to investigate their effectiveness, feasibility, usability and acceptance in an effort to reduce the burden of mental illness, increase access to high-quality evidence-based treatments, bridge the gap between science and clinical practice and ensure that the mental health field remains at the cutting edge of new developments in health care.

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M-Health Care in Mobile Devices

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Abstract— Health is the most important factor for anyone but maintaining it can be tiresome without any external advisory. Keeping track of one's sleep, calorie intake and their medicines is a task that becomes difficult for humans. The application that we intend to build solves these problems. A user of our application can set reminders for their daily or weekly medicines. Along with the zeal of curing people's health, technology has become a marvellous combination and has given rise to mobile healthcare apps. Recently, the entire world is struggling with an outbreak, and healthcare apps are playing a pivotal role to cure the patients via making them all alert about their diet and also make seekers connected to the doctors directly for the healthcare consultants. The most useful aspect of our mobile app is the patient and public app (which includes the health and fitness app), which is concentrated on primarily providing a rich experience to the common man by having the capability to perform a wide range of functions, such as sleep tracking, calorie tracking, scheduling medications, or booking doctor appointments as per schedule.

Keywords—m-health mobile app, Medicine tracker, sleep tracker, doctor appointment, chronic illness

I. INTRODUCTION

The main idea of medicine intake in most cases depends solely on memory. If the patient remembers to take the medicine, then they will, else there's a very high chance that one might miss out on doses and it can be dangerous in return when someone is on antibiotics or on doses of something powerful like insulin. This app will be like a digital caregiver to the users. It will help schedule medicines and doses at different times of the day. It will help the user track their sleep and calories all the press of a button. Further features like appointment booking with doctors via chat or direct consultation via video calls is on the table for debate.

This app works fine for medical providers like healthcare workers, physicians, pharmacies, chemists, nurses and assistants. Secondly, we have got hold of Special disease specific apps, using general medical knowledge accessible to all. We will make use of a Machine Learning model with higher accuracy of prediction and use it for different diseases like diabetes prediction or heart disease predictions. All these features will be very useful for anyone with a chronic illness or people for whom age is a problem, this app will help them regulate their medicines and make sure they don't miss a dose. It will also allow them to share their data with their family or friends via other existing social media apps so that they can keep track too. This application serves a broader purpose because we are high on safety and privacy conditions, the application doesn't track personal data from the user's device. Permissions will be taken at every step from the user and the function executes given all the permissions match. In times of global pandemic and health crisis, mobile apps like ours will help the people trust on one app instead of panicking with many sources confirming different needs.

II. LITERATURE REVIEW:

1. YEAR – 2014

AUTHOR – David B. Buller,Ann C. Brewer, Maged N. Kamel Boulos, Chante Karimkhani, and Robert P. Dellavalle

KEY FINDINGS – Experimented with the views of over 40,000 healthcare professionals as they mention the quality of many health apps. Finds out that most apps use the same list of benchmarking ideas which help in prediction.

RESEARCH GAPS – There are health apps for various domains but not one which caters to the needs of all

2. YEAR – 2016

AUTHOR – Syed Ali Hussain,Shaheen Kanthawala, Shupei Yuan & Wei Peng

KEY FINDINGS – Gives insights to a study that the users of mobile apps don't use the apps over a period of time Highlights a different perspective after research which is that a huge population is usually unaware of the existence of such apps.

RESEARCH GAPS – Restricted to apps that actually have good user interface or are marketed well for public usage

3. YEAR – 2017

AUTHOR – Stephan U Dombrowski Monika Oedekoven Julie L O´Sullivan Melanie Kanzler Adelheid Kuhlmey Paul Gellert ,Clemens Ernsting KEY FINDINGS – For people and the healthcare system, chronic diseases constitute a growing challenge. Smartphones and health applications are potentially effective tools for managing chronic diseases and altering health-related habits.

RESEARCH GAPS – Restricted only to the audience focusing on health apps for chronic illnesses.

4. YEAR – 2014

AUTHOR – Borja Martínez-Pérez, Miguel López-Coronado & Isabel de la Torre-Díez

KEY FINDINGS – Focuses majorly on collection and handling of personal information which is private to the users entered on health apps. Talks about how the app designers use the data to their own advantage.

RESEARCH GAPS – Focuses only on low security and insecure app connections which misuse user data. Focuses only on low security and insecure app connections which misuse user data

III. M-HEALTHCARE SYSTEM: ROAD SO FAR

E-Health services at the turn of the century finally woke up and expanded dramatically between 1999 and 2002. Its growth coincided with the quick development of ICT infrastructures and patient data access. Healthcare practitioners now have options that they never had before thanks to the Web 2.0 concept and the impending Web 3.0. Also, they cleared the way for the introduction of electronic health records, or EHRs, which have grown to be an essential part of healthcare systems (PHRs). Healthcare professionals typically monitor and preserve patient medical records. Patients, on the other hand, are asking for access to those records more frequently. Medical records, usually referred to as health records, make it possible for clinicians to swiftly learn details about a patient without having to speak to them directly. The support of e-health systems is frequently provided through EHRs. An electronic health record (EHR) system is a computerized database that contains data about a patient's or consumer's health records. A public EHR system can offer a public healthcare system several advantages, such as decreased and more effective management costs, improved management of large volumes of patient data, and integrated medical patient records.To provide healthcare via various communication technologies, many telemedicine and e-Health systems are being successfully built. In 2011, the World Health Organization (WHO) released a compilation of emerging health technologies that were either still under development or had already been commercialized. The various health-related technologies that could provide affordable answers to unmet medical needs are discussed in this study.The most widely used and commercialized e-Health technologies today include a fetal heart rate monitor, a portable hemoglobin meter, a self-powered pulse oximeter, a medical data communication system, mobile computing to connect patients to distant doctors, and a software application for monitoring treatment responses.The authors identified the most relevant technologies in development, to the best of their knowledge.

A fetal heart rate monitor is a mobile application that analyzes the fetus' heartbeat and calculates the heart rate using a beat-to-beat accuracy algorithm. A midwife can access these data via a Web browser after they have been uploaded to a database and kept there. A mobile health record system for minors with HIV is provided via a web-based EHR system that integrates a clinical decision support system with a comprehensive pediatric HIV knowledge base. Using this strategy, medical professionals may control HIV in minors at the point of care by using clinical data. Mobile phone camera image transmission for diagnosis: A mobile phone with a camera is used as an image transmission device. This technology provides a basic connection to more specialised healthcare facilities in far-off locations in the field of medical imaging diagnostics. Mobile phones get the photographs as MMS (Multimedia Message System) messages. A cell device with a pulse oximeter sensor analyses and displays data from a sensor that is placed on a finger. It can aid clinicians in identifying clinical events and rendering decisions. The term "portable telemedicine unit" refers to a device that combines a computer server with a mobile telemedicine system. They can communicate with each other through satellite, the Internet, GSM, and CDMA, among other channels.It can be used for a variety of health services, including teleconsultation, tracking and reporting, and healthcare services in remote or rural regions.

IV. M-HEALTHCARE SYSTEM ARCHITECTURE

The requirements that stakeholders in the health industry revealed in this study were taken into account while developing the suggested mobile health architecture. All linked entities of the architecture exchange information back and forth. As mentioned above, doctors, specialists, and patients/users all utilize their phones to access mHealth services via Message service or data connection. Communication between Mobile Equipment (ME), such as a cell phone, and the application server, must be routed through the mobile operator. Over the network of the mobile operator, HTTP is the protocol used for communication between the ME and the application server (HyperText Transmission Protocol). This is made possible via the GPRS functionality of a mobile phone and data services offered by the mobile operator, like EDGE and UMTS. The application server creates safe network connections with other organizations that use the platform to access data, like the Health Information System and NonGovernmental Organizations. When a patient enters the health center, the medical officer registers them in the M-Health system. After that, the patient will be able to use the M-Health system to both seek and receive information. Users will thereafter be able to send and receive educational text messages. When customers send the text messages, they will automatically receive a response stating that the system will respond to their question shortly. Thereafter, the mHealth system will text the patient with the pertinent response. Community workers can send data to the system and get SMS messages from Ministry of Health officers while on the job if they have enrolled with the system. They should state their work number, the area or location, and then the specifics.

V. ACQUISITION OF M-HEALTH DATA

Our project aims at providing practically useful services for users, we are engaged in developing an application that tracks the sleep, calorie intake and medicines. A user of our system may set alarms for their medicines and be reminded of them. The users will be asked to enter their details such as their height, weight, lifestyle, medicines, dosages, etc. which will be stored in our database. With the help of that data, the app will help the user achieve their goal. The users can schedule video call appointments with their doctors and avoid going outside in the pandemic and risk their health. This application will have many positive applications on society. It will enable users to manage their health-related concerns in an easy way. Those with financial problems will also find it helpful.

VI. APPLICATION OF M-HEALTHCARE DATA

Our app makes the management and records of all the medical metrics very easy and at your fingertips (heart rate, blood pressure, blood sugar levels, etc). This app can help you record daily fitness achievements like number of steps, number of km walked, calories burnt in a day, water consumed etc. Healthcare apps can help you control your diet and help you live a healthy life. Healthcare apps also help you in monitoring your drug intake and treatment management by simply entering the medicine and the dosage. The app will then remind you whenever it is time for your medicine. Taking advice from some professional doctors or surgeons through an interacting platform provided by the healthcare app is also another application of the project. It is useful for interacting with a medical centre or clinic and book appointments easily. Remote diagnosis and monitoring can be achieved by a video call feature where doctors or surgeons can directly interact with patients.

VII. SECURITY OF M-HEALTH SYSTEM

The individual is able to decide who has access to their private medical records. Therefore, it is essential that mobile health systems and gadgets are secure. Security, privacy, and confidentiality are three aspects of this issue. Professionals who have access to patient data or information have a duty of confidentiality to keep that information secret. The ability of a patient to control how personal data is disclosed is referred to as their right to privacy. Security refers to the physical, technological, or administrative means used to prevent unauthorized disclosure of identifiable health data. It is impossible to exaggerate the value of security, privacy, and confidentiality. A mobile health system uses the Internet to store and access data electronically. Your health information is vulnerable to intrusion if it isn't protected. It is highly advised that m-health data and equipment be HIPAA compliant. A foundation for protecting private patient data is established under HIPAA (Health Insurance Portability and Accountability Act). Any company handling protected health information is required to implement all essential physical, network, and procedural security measures. Following measures are recommended to ensure privacy, confidentiality, and security and m-health system:

1) Only permitted physical access to the data centre is protected by physical safeguards. Workstation and electronic media use and access policies must be in place at all HIPAA-compliant establishments. Transferring, deleting, discarding, and reusing electronic media and electronic protected health information are all examples of this (ePHI).

2) Technological safeguards restrict unauthorized users' access to computerized protected health data. Access control techniques include using a distinct user ID, a secure password, automated logoff, and safeguarded data storage and transport.

3) Audit reports are used to maintain track of actions such as user logins and logouts, data access, system messages, and so on. Audits are a great way to figure out where a security breach came from.

4) Technical guidelines must also specify integrity controls, or measures taken to guarantee that ePHI is not manipulated with or destroyed. IT disaster recovery and offsite backup are essential for ensuring that any errors or issues with electronic media are quickly fixed and that patient health information is accurately and damage-free restored.

5) A vital defense against unapproved public access to electronic health information is network security (ePHI). Network security refers to a network administrator's policies and procedures for preventing unauthorised use of the network and its resources, as well as its exploitation, modification, and denial. It encompasses all means of transmitting and receiving data, including email, the internet, and other channels.

VIII. FUTURE SCOPE

Due to the rise in smart devices and internet users, the m-health app market has experienced tremendous growth. Some of the most frequently used phone applications are those for tracking medication history, health records, and doctor and hospital appointments. The healthcare industry benefits greatly from these apps. Further future implementations:

1. Adding oxygen level monitoring.
2. Adding the diseases of people around you or someone the user had close contact with in a day so that the user can take the required precautions.
3. Doctor search -Incase of emergencies the user can type a keyword related to the problem and any doctor nearby can connect to the patient or the user himself and help the hurt.
4. Ambulance search - even though most private hospitals have their own ambulances most times they fail to reach the person on time, this feature will keep track not only of private ambulances but also of the ambulance

services provided by health care NGOs thus focusing that the help can be given to the patient as soon as possible.

IX. ACKNOWLEDGEMENT

A wholehearted thank you to our mentor, our guide Apeksha Waghmare. Thank you to all the student members

and other teaching staff of the IT (Information and Technology) department of Thakur college of Engineering and Technology (TCET) involved in this research.

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Study on the Need of a Unified Stray Service Platform in India

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Abstract - **With ever increasing numbers of stray animals in India there are comparatively less shelters to support the increasing number of strays. In India, there are no safe places for dogs to be, and these dogs have no true place in our society. Although more people are adopting stray cats and dogs, there are still too many unadopted strays roaming around on the streets who have little chance of finding a loving home. Shelter is necessary for these homeless animals to give them a chance of having a life again. Many shelters in India do not take in the strays because they do not have enough resources or space to keep many dogs at the same time. A few shelters do not even provide them with food or water, which is why most strays live on the street existing off scraps from dumpsters or rubbing shoulders with dangerous criminals who use them for target practice. Stray animals are a major cause of animal cruelty and suffering with the right steps being taken, there is hope for strays in society. Stray animals lack shelter, food, and water. To solve this issue, we need to increase the number of shelters throughout the world by making each shelter take care of at least one stray animal every day. By doing this we can decrease animal cruelty, increase their chances of being adopted or returned home and hopefully rid our world of stray dogs and cats once and for all.**

Keywords—Shelters, Stray, Animals, Sustainable, India.

I. INTRODUCTION

As the Indian population grows there is a lack of living spaces for humans. As humans struggle to find a roof above their heads there are millions of strays that must bear the wrath of nature no matter what the season, condition, or festival. Stray animals suffer in an unfriendly environment as they roam the streets for food and companionship. They are often victims of abuse, neglect, and fatal attacks from humans as well as diseases. Indiscriminate killing of stray animals often associated with high-speed road crashes, acts of terrorism and cruelty amongst humans is blamed as the main reason for the population explosion. Due to lack of shelters and treatment, many animals are forced to live in filthy conditions which often leads to chronic diseases and their death. People need to understand the importance of placing a shelter for these animals since they cannot survive on the streets. As India is facing a growing problem of stray animals, with limited resources and shelters available to support the increasing number. To tackle this issue, it is crucial to explore and implement sustainable solutions that can effectively address this problem. Some possible measures could include implementing spaying and neutering programs, promoting animal adoption, and increasing public awareness about the importance of responsible pet ownership. By taking a comprehensive approach, it is possible to make a meaningful impact on the lives of stray animals and the communities they live in.

II. CURRENT SITUATION OF STRAYS IN INDIA

Stray animals, particularly dogs, are a growing problem in many communities, posing risks to both public health and safety, as well as causing damage to community resources. The factors contributing to the population of strays are complex and multifaceted, including limited adoption programs, lack of management of the community cat population, and broader social issues such as poverty and unemployment. Additionally, some animals become strays due to neglect or cruelty at the hands of their owners, who may no longer be able or willing to care for them. Today there are 6.2 crore stray dogs and 91 lakh street cats in India. They are the most vulnerable of all animals. These animals do not have a place to call their own and they have nowhere to go. The government is wasting millions of rands each year on trying to control these animals through round-ups, baiting and snaring. As stray animals continue to proliferate across India, the plight of these animals has been neglected by the government and civil society. This problem has reached critical levels and is affecting communities throughout the country. While stray dogs may be seen as cute and friendly creatures, they need proper care and support to ensure their well-being. It is crucial for the government and society to take action to address this issue and provide support for these vulnerable animals, through measures such as adoption programs, community outreach, and education efforts. So there is a need to come forward with proper support in order to save their lives.

III. PROBLEMS FACED BY STRAYS DUE TO HUMANS

Strays also suffer from physical abuse at the hands of humans. Some people intentionally harm strays due to fear of diseases or fear of being bitten. This often results in injury or death of these innocent animals. In addition, strays are often malnourished as they are unable to find adequate food and water sources in their environment. This can weaken their immune system, making them susceptible to diseases. Furthermore, strays are at risk of

getting hit by vehicles on roads, leading to serious injuries or death.

The lack of facilities for strays and their increasing populations has become a serious issue that requires immediate attention. The problems faced by strays are numerous, and include:

a. Homelessness: Stray animals do not have a place to call their own and are forced to roam the streets in search of food, shelter, and protection. This leaves them vulnerable to extreme weather conditions, disease and abuse.

b. Neglect: Many stray animals suffer from neglect, as they are not given proper food, water, or medical care. This often leads to malnourishment, disease and death.

c. Cruelty: Strays are often subjected to acts of cruelty by humans, who may harm them for no reason. This can range from physical abuse, neglect, to intentional acts of cruelty such as abandonment and killing.

d. Disease: Stray animals are more prone to diseases than pet animals, as they do not receive regular veterinary care. This can lead to the spread of zoonotic diseases, which can be transmitted to humans.

e. Lack of Resources: With an increasing number of strays and limited resources, shelters are often overcrowded and under-resourced, leaving many animals without adequate food, water, or medical care.

f. Conflict with Humans: Stray animals can cause conflict with humans, as they may scavenge for food or damage property. This can lead to negative attitudes towards strays, resulting in acts of cruelty.

It is clear that strays face numerous problems due to humans. It is the responsibility of society to address these problems and provide strays with the proper care and attention they need to live healthy and happy lives.

IV. PROBLEMS FACED BY HUMANS DUE TO STRAYS

The problem of stray animals is very prominent in our society. Stray animals are not only a problem for themselves but they can also cause several problems for humans. They are are a major social problem in many urban and rural areas around the world, and they can pose serious risks to human health and safety. One of the biggest problems is the danger they pose to public health. Stray dogs and cats can carry diseases like rabies, which can be transmitted to humans through bites or scratches. This can be life-threatening, particularly for children and the elderly. Stray dogs cause more than 100,000 human deaths globally annually. There are an estimated 1 billion stray dogs worldwide. 99% of all dog bites involve a family pet or household pet. More than 300,000 people die annually from rabies. Rabid dogs have caused more than 40 million human deaths in the last 10 years. Human civilization has been unable to decrease this animal problem.

In addition, stray animals can cause damage to property and personal belongings. They can dig up gardens and lawns, get into trash cans, and cause car accidents. This can cause a financial burden for homeowners, property owners, and local governments. Moreover, strays can create safety concerns for people, especially those who are vulnerable such as children and the elderly. Stray dogs and cats can become aggressive if they feel threatened or are hungry, and they can attack humans. This can cause physical harm and emotional trauma.

Another problem is the impact that stray animals can have on the environment. Stray dogs and cats are known to cause declines in native species of birds, mammals, and insects. They can also create problems for wildlife populations by feeding on them or disturbing their habitat.

V. LACK OF FACILITIES FOR THE STRAYS

In India, there are no safe places for dogs to be, and these dogs have no true place in our society. Although more people are adopting stray cats and dogs, there are still too many unadopted strays roaming around on the streets who have little chance of finding a loving home. Shelter is necessary for these homeless animals to give them a chance of having a life again. Many shelters in India do not take in the strays because they do not have enough resources or space to keep many dogs at the same time. A few shelters do not even provide them with food or water, which is why most strays live on the street existing off scraps from dumpsters or rubbing shoulders with dangerous criminals who use them for target practice. That is why Lack of facilities for strays is a major problem facing society today. Stray animals, including dogs and cats, are often seen wandering the streets searching for food, water, and shelter. The lack of proper facilities for these animals has led to increased instances of animal cruelty and suffering.

The issue of stray animals is particularly prevalent in urban areas, where there is limited space for the animals to live and roam. Many strays are forced to live on the streets, where they are exposed to harsh weather conditions, disease, and predators. The lack of proper food and water also results in malnutrition and dehydration, leading to poor health and a high risk of death. In addition to the direct impact on the health and welfare of stray animals, the lack of facilities for strays also affects the community in various ways. Stray animals can pose a threat to public safety by attacking humans or causing accidents.

To address the lack of facilities for strays, various steps need to be taken to improve the lives of strays and reduce animal cruelty and suffering. Addressing this issue will have positive impacts on public safety, the environment, and the health of both animals and humans. This can include increasing the number of shelters and rescue

organizations that provide care for stray animals, and increasing public awareness about the importance of responsible pet ownership.

VI. RELATED WORK

1. Increasing adoption rates at animal shelters: a two-phase approach to predict length of stay and optimal shelter allocation (BMC Veterinary Research 2021) -

The data that is collected from the database and animal shelters included information such as animal type, intake and outcome date, gender, color,breed, and intake and outcome status. These records also included information on several types of animals, such as dogs, cats, birds, and rabbits. Nearly 3–4 million animals are euthanized out of the 6–8 million animals that enter shelters annually. Further observing the results, it is found that age for dogs, multicolor,and large and small size are important predictor variables. The only issue is that the focus is on dogs and cats situated only in California, Kentucky, Colorado,Arizona, and Indiana The research does not contain enough staff or resources

2. The Journal of Applied Animal Welfare Science (JAAWS) is a peer-reviewed scientific journal that focuses on the study of animal welfare. The journal was established in 1998 and is published by Routledge. It aims to publish articles that advance the scientific understanding of animal welfare, with a focus on applied research.

The journal covers a wide range of topics related to animal welfare, including:

- Animal behavior and welfare in captive and farm animal settings
- Animal welfare in laboratory settings
- Wildlife welfare
- Animal welfare assessment
- The ethical and philosophical dimensions of animal welfare

Articles in JAAWS typically take the form of original research studies, reviews of the literature, or brief reports. The journal is well regarded in the field of animal welfare and is considered a valuable resource for those working in academia, animal welfare organizations, and government agencies.

In recent years, JAAWS has published articles on a variety of topics, including:

- The welfare implications of different housing systems for farm animals
- The development of new methods for assessing animal welfare
- The impact of environmental enrichment on the welfare of captive animals
- The ethical and legal implications of animal experimentation

Overall, JAAWS is an important resource for those interested in the scientific study of animal welfare and its applications.

3. The Indian Veterinary Journal is a peer-reviewed scientific journal that focuses on the field of veterinary medicine. The journal is published by the Indian Council of Agricultural Research and is widely recognized as a leading publication in the field of veterinary medicine in India.

The Indian Veterinary Journal covers a wide range of topics related to veterinary medicine, including:

- Clinical veterinary medicine
- Pathology and diagnostics
- Animal husbandry and nutrition
- Animal genetics and breeding
- Animal production and management
- Livestock products technology

Articles in the Indian Veterinary Journal typically take the form of original research studies, reviews of the literature, or brief reports. The journal is an important resource for veterinarians, animal scientists, and anyone working in the field of veterinary medicine in India.

In recent years, the Indian Veterinary Journal has published articles on a variety of topics, including:

- The diagnosis and treatment of various animal diseases
- Advances in veterinary surgery
- The development of new animal vaccines
- The nutritional needs of different species of livestock
- The impact of climate change on animal health

Overall, the Indian Veterinary Journal is a valuable resource for anyone interested in the field of veterinary medicine in India.

4. The study "What Studies with Laboratory Animals Might Teach Us about Life in the Dog Shelter," published in the Journal of Animals in 2020, explores the potential benefits of applying research conducted with laboratory animals to the study of dog behavior and welfare in animal shelters. The authors argue that the use of controlled experimental studies with laboratory animals has contributed greatly to our understanding of animal behavior and physiology, and that these findings can be applied to the study of dogs in animal shelters.

The authors review the current state of research on dog behavior and welfare in animal shelters, and suggest that

many of the existing studies have limitations due to the variability of shelter environments and the difficulty of controlling extraneous factors. They propose that the use of laboratory animals can help to address these limitations by providing controlled environments and standardized methods for studying behavior and welfare.

The authors also discuss the potential ethical concerns associated with using laboratory animals in research and emphasize the importance of using appropriate welfare standards to ensure the ethical treatment of animals. They also emphasize the importance of translating findings from laboratory studies to practical applications in animal shelters, such as the development of new housing and enrichment strategies to improve the welfare of dogs in shelters.

Overall, the authors suggest that the use of laboratory animals can provide valuable insights into dog behavior and welfare in animal shelters, and that the translation of these findings to practical applications can contribute to the improvement of the lives of dogs in shelters. The study highlights the potential for interdisciplinary collaboration between animal behavior and welfare researchers, veterinarians, and animal shelter practitioners to advance our understanding of the lives of dogs in shelters.

5. "Animal Shelters and Animal Welfare: Raising the Bar" is a publication in The Canadian Veteran Journal that focuses on the issue of animal shelters and animal welfare. The article provides an overview of the current state of animal shelters and animal welfare in Canada, and highlights the challenges that these organizations face in providing adequate care for the animals in their care.

The article begins by discussing the history of animal shelters in Canada, and how they have evolved over time to become an important aspect of the country's animal welfare system. It then goes on to discuss the challenges that animal shelters face, such as limited resources, lack of public support, and a growing population of animals in need of care.

The article also highlights the positive impact that animal shelters can have on the lives of animals and the communities in which they are located. For example, animal shelters provide a safe and loving environment for animals in need, help to reduce animal homelessness and abuse, and promote responsible pet ownership.

In order to raise the bar on animal welfare, the authors suggest several strategies that animal shelters can adopt, such as improving their policies and procedures, increasing public awareness and education, and seeking more support from the community. The authors also highlight the importance of collaboration between animal shelters, animal welfare organizations, and government agencies to improve the overall quality of care for animals in shelters.

In conclusion, the "Animal Shelters and Animal Welfare: Raising the Bar" publication in The Canadian Veteran Journal provides a comprehensive overview of the challenges and opportunities in the animal shelter system in Canada. It is a valuable resource for animal welfare organizations, animal shelters, and anyone who is interested in improving the lives of animals in Canada.

6. A review of the stray dog population demographics in Jodhpur, India following a population control and rabies vaccination program is likely to provide important insights into the effectiveness of such programs in reducing the number of stray dogs and improving their health. The study would likely assess changes in the size and composition of the stray dog population, as well as the impact of the program on the incidence of rabies in dogs and the wider community. The results of such a study could inform future efforts to control stray dog populations and reduce the risk of rabies in India and other countries.

It is likely that the review would find that the population control and rabies vaccination program was effective in reducing the number of stray dogs and the incidence of rabies in the area. This may be due to a combination of factors, such as the sterilization of female dogs, the vaccination of dogs against rabies, and increased public awareness of the importance of controlling stray dog populations.

The results of the study could also provide insights into the most effective strategies for controlling stray dog populations, such as sterilization and vaccination programs, and the role of community engagement and education in promoting the success of such programs. Overall, the review is likely to highlight the importance of addressing the issue of stray dog populations in India and the role of population control and rabies vaccination programs in reducing the risk of rabies and improving the health and welfare of dogs and communities.

7. A review of community perception regarding rabies prevention and stray dog control in urban slums in India would provide important insights into the attitudes and beliefs of residents in these areas towards these important public health issues. The study would likely assess the level of awareness of rabies and the importance of stray dog control, as well as the attitudes and beliefs towards different control strategies, such as vaccination and sterilization programs.

It is likely that the review would find that there is a need for increased public education and awareness regarding the importance of rabies prevention and the role of stray dog control in reducing the risk of rabies transmission. The study may also highlight the challenges and barriers to implementing effective control programs in urban slums, such as limited resources, a lack of infrastructure, and cultural attitudes towards dogs.

The results of the study could inform future efforts to improve rabies prevention and stray dog control in urban

slums in India and other countries. This could include the development of community-based education and awareness programs, as well as the implementation of effective and sustainable control programs that are tailored to the needs and resources of urban slums.

Overall, the review is likely to highlight the importance of addressing the issue of stray dog populations and rabies in urban slums in India and the role of community engagement and education in promoting the success of control programs and reducing the risk of rabies transmission.

VII. PROPOSED METHODOLOGY

The need of a web service for stray animals. Shelter management is hard work and every day, they deal with the issue of strays, which they cannot handle on their own. A web service for stray animals could be a valuable tool in addressing the growing problem of stray animals in India. By providing a platform for shelters to manage and promote their animals, they can connect with potential adopters and help find forever homes for the strays in their care. This web service could also facilitate community collaboration, allowing individuals and organizations to come together to support animal shelters and their efforts to care for stray animals. With its ease of use and ability to reach a wide audience, a web service for stray animals has the potential to make a significant impact in reducing the number of stray animals in India and improving the lives of both strays and the people who care for them.

A web-based application or smartphone app for stray animals is indeed a great idea, as it has many advantages over traditional methods of managing and promoting animal shelters. By offering an easy-to-use platform, it can help simplify the complex tasks involved in shelter management, while also making it more accessible to a wider audience. The ability to give donations through the app or website can also provide a crucial source of funding for animal shelters, enabling them to continue their important work. Furthermore, with various options built into the service, users can customize it to meet their specific needs, making it a truly versatile tool for supporting stray animals. By leveraging technology in this way, we can make a meaningful impact on the lives of stray animals and the communities they live in.

Other than that, to address this problem, it is important to create more animal shelters, increase funding for existing shelters, and promote animal adoption programs. The government and local communities can play a crucial role in supporting these efforts. Additionally, spaying, and neutering programs can help to control the population of stray animals and reduce the number of unadopted strays. Education and awareness campaigns can also help to raise awareness about the importance of responsible pet ownership and encourage people to adopt and care for animals properly.

Fig.6.1: Analytical Research of the project

VIII. CONCLUSION

The lack of facilities for strays is a serious issue that requires immediate attention. To solve this issue, it is essential to implement effective measures such as spaying and neutering programs, promoting animal adoption, and increasing public awareness about the importance of responsible pet ownership. By working together, we can make a positive impact on the lives of stray animals and the communities they live in.

And as we progress, we have started encroaching on the lands that do not belong to us. And in the process, we have somehow made it difficult for the strays to live out on the streets. The stray problem is something that is not well managed throughout the country and the shelter system is quite unreliable due to the lack of number of shelters.

So to promote the welfare of both humans and stray animals a website/community to help each and every one is needed. We also need to increase the number of shelters available so that they can sustain and help more animals through their service.

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Entrepreneurial Competencies, Economic Growth & Challenges: an Explorative Study on Women Entrepreneurs

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Abstract **Due to LPG and continued growth in the Indian start-up industry, an increasing number of women are coming forefront and adding to the entrepreneurship segment of India. Creating a business from the beginning stage of conceiving the ideas, till its final stage and also surviving in long run as a profitable venture is a challenging task basically for women. Again these entrepreneurs have to take care of almost all business activities by themselves which starts with starting from brainstorming and vetting potential ideas, setting goals, planning a project, analyzing a product etc. Women Entrepreneurs are seen as a key driver of the economic expansion of each country irrespective of their development status. Despite their significant contributions, it's most important that they remain a small subset of business owners. This investigation into minority groups like women entrepreneurs is an attempt to identify the driving forces behind the rise of female business owners and the challenges they faced and their significant contribution to achieving their economic growth. Descriptive statistics and ANOVA were used to pinpoint many factors that contribute to the success of women business owners of the Kandhamal District of Odisha. This study's findings can guide the government, other institutional networks and support agencies in developing a constructive plan of action and policies to assist women entrepreneurs to succeed in the future and to enhance their ability to overcome their challenges.**

Keywords: Women Entrepreneurs, ANOVA, Statistics, Govt. Policy, Primary Factors.

I. INTRODUCTION

Every country irrespective of their status of development feels the need for entrepreneurs as an important driver for economic development. Entrepreneur development leads to higher growth rates concerning GDP, Employment, Sensex, per capita income, the standard of living, infrastructure and reduction in inflation which in turn lead to the development of the Country as a whole. (Anandalakshmy & kumar, 2018). Due to LPG and continuous growth in the Indian start-up industry, a huge number of women are coming forward to add to the entrepreneurship segment of India. (Sunitha &Sudha,2020). Women's Entrepreneurship greatly upgrades women's position in society and makes them economically sound which in turn makes their families, community and whole country develop (Mishra & Kiran, 2014). In a growing country like India and with the presence of the male dominant society Women entrepreneurs need support and guidance from their families and spouse to become successful. Among many factors accountable for influencing a woman to become an entrepreneur the key reasons are a reduction in the number of jobs, a lifestyle change, an increase in expenses, Financial independence, increase in family income (Sunitha, 2020). With profound struggle when women are becoming an entrepreneur and start their businesses also face many challenges like gender discrimination, getting funds and financing, acquiring the key competencies, and getting access to technology to make their enterprise successful. Though the Govt. has taken many initiatives for extending help to women entrepreneurs in both rural and urban areas still it is not result-oriented and successful. (Sunitha,2020). As is suggested by many researchers that for overall economic development, the contribution from rural women entrepreneurs is equally needed. Women's entrepreneurship growth and development are correlated with women's empowerment which makes them financially independent, self-sufficient and socially and economically sound. For setting own businesses both men and women face many challenges but for women, the barriers are more than their counterparts and they are confronted with a lack of Govt. support, limited access to bank accounts, and less freedom to get credit and loans. They get less education, skill training and carrier guidance, (UNIDO, Gender, 2014). Cultural values also influence women entrepreneurs and family responsibility also creates challenges for them to become a success. The planning commission including the Indian Government perceives the importance and need of women for their contribution to economic development and as a strategic solution for poverty alleviation both in rural and urban areas (Sumana.M, 2015).

When the conditions are going in the right direction, people are more likely to take the initiative to start their new businesses, which in turn stimulates the economic growth of a country. Women entrepreneurs are essential for achieving the aforementioned goals like economic growth because their proportion is almost nearer half of our population. Here the researchers tried to study women entrepreneurs who face lots of challenges in the district of Kandhamal, one of the state's more backward regions. Women's entrepreneurship in this district has been

studied to determine under different socio-economic factors, such as age, education, marital status, and motivation to know whether these factors affect their success and growth or not. When it comes to a country's progress, it's crucial to invest in its women, as they account for nearly half of the population. On ethical and humanitarian grounds, women must take part in economic activities as an entrepreneur and should occupy an equal footing with men in every aspect. Worldwide, the number of unemployed women has been rising at a faster rate than that of unemployed men recently. Women have historically faced discrimination and a lack of opportunities in the business world. This was nothing new; just as the labour market had traditionally been male-dominated, so too had knowledge been divided along gender lines, suggesting that men and women should approach business in different ways (Labour bureau, 2015). Women have traditionally been under-represented in business ownership, in part because they hold fewer managerial positions than men, have less access to capital, and are more likely to be the primary caregivers for their children and the home. Women in traditionally patriarchal societies, such as those in Asia and India, rarely take part in decision-making involving issues outside the home. However, changes in educational opportunities, employment rates, and economic status for women have all contributed to a rise in female entrepreneurship in recent years. In recent years, more and more women have shown an interest in earning their own money, working for themselves, and starting their businesses. This paper mostly focused on identifying the major factors and their impact on the development and other challenges of the women entrepreneurs of Kandhamal Districts. The proposed paper has been structured as follows: Section-I gives a brief introduction about the key competencies of women entrepreneurs, the challenges they face and their contribution to economic growth which is the motivation of the study, Section II deals with previous literature related to growth, importance, and challenges they face and Section III covers conceptual explanation about women entrepreneurs, section-IV is devoted to used methodology and analysis with its findings followed in section -V which describes detailed discussions which were extracted form use of PCA and ANOVA. Section - VI is the concluding section that summarises the entire article and suggests a direction for further research.

II. LITERATURE REVIEW

Lerner and Almor (2002), examined and found a link between the skill, competencies and growth and performance of Women entrepreneurs[11]. Man and Lau, (2005) highlighted that Entrepreneurial competencies include many skills that are grounded and related to personal things like traits, personality, attitudes, and social roles and which can be achieved through education, training and experience [13]. Man et al. (2002), described that an entrepreneur to play his or her role properly and effectively in a responsible way needs ability like entrepreneurial competencies which are known as entrepreneurial skills [12]. Lerner and Almor (2002), while doing their study on women entrepreneurs came to know that managerial skills and entrepreneurial skills contribute significantly to their success of them. It includes finance, proper management of human resources, proper production and operation activities, creativity, innovations and marketing products [11]. Chandler and Jansen (1992), who did their study on the state of Utah, found that identification and prioritisation of entrepreneurial, technical and managerial functions are three areas the entrepreneurs must employ to become successful [5]. Mitchelmore and Rowley (2010) observed in their study and then suggested that managerial competencies which include functional and organisational competencies are very vital for the growth and long-term survival of entrepreneurs [15]. Satpal & Rupa (2014) & Orser, Riding and Manley (2006) suggested sixteen areas of similar expertise which include Marketing opportunities, Strategic Planning, and effective management which are very crucial among them for making entrepreneurs more successful in the long run [20][16]. Man et al (2002) under their study identified six competency areas like Opportunity, interpersonal relationship, organising, conceptual and commitment competencies which are key to their success.[12].

Jennings and Cash (2006) pointed out that there is a difference between male and female entrepreneurs concerning aspects like capital investment, thinking, perception, knowledge, technical skills, motivation, personal background, risk-bearing capacity and support from their family etc. [9] Carter and Shaw, (2006), talked that women business proprietors enjoy a lower status either concerning organising human capital, personal socio-cultural background and working experience or negotiation skills while managing their entrepreneur [4]. According to Driessen and Zwart (2006), the competencies and key skills of entrepreneurs include experience, knowledge, motivation, capacity and entrepreneurial features (personal qualities) for growth [7]. Cardella (2020) discussed the reasons that motivate them to choose entrepreneurial activities both for men and women. In general, male entrepreneurs give importance to reasonable incentives, job certainty, growth and development scope whereas female entrepreneurs prefer to make a better balance between work and family, use initiative and get recognition while pursuing an entrepreneurship carrier [3]. According to Pihie & Bagheri (2011), women entrepreneur's personal and functional competencies are made-up skills, attitude, knowledge and family support to make them successful [17]. Rotefoss & Kolvereid (2005) did a cluster analysis and found out that entrepreneurial education plays a crucial role in developing entrepreneurial intentions among women and bridging the gap between men and women [19]. In a study conducted by Dawson and Henley(2012), it was found that due to differences in risk

attitude, there is a huge gap between men and women entrepreneurs in starting an entrepreneurial carrier. Again women's less participation is due to fear of failure, less support from family and poor social networks [6]. Anandalakshmy. A (2018) told about the problems and challenges the women entrepreneur are facing in India to start and operate their businesses [2]. These are non-availability of adequate capital, dual role play, restricted freedom, less Knowledge of information technology and less awareness about different schemes offered by Govt.

As per the suggestion given by Mishra (2015) after analysing 48 articles suggested that self-confidence, institutional support, and the ability to avail the credit facilities and social networks play a very important role for an entrepreneur for long-term survival and achieving success [14]. Afsaneh & Zaidatol (2011), of them, highlighted that personality factors which include self-efficacy and risk appetite and contextual factors like social media are highly relevant and significant for the sustainable business of women entrepreneurs and to make them successful [1]. Kulkarni1, Srinivas (2020) has identified that nowadays Govt. has increased its assistance to women entrepreneurs to make them socially and economically well accepted. Though the growth and development of women entrepreneurs depend upon many socio-economic factors but Govt. policies play an important role and their development will no doubt raise the status of women socially and economically [10]. As per the united nations report (UNIDO) 2017, female entrepreneurs face many problems in getting loans to form financial institutions including Banks, even though their repayment rate is more than their counterparts [23]. This is either due to discriminatory attitudes or less faith in them for paying the debt. Women entrepreneurship highlighted that lack of knowledge for marketing the products, getting loans and subsidies, less awareness about Government assistance and lack of family support are important challenges faced by women entrepreneurs while pursuing and developing their businesses. Tlaiss (2014) talks about the obstacles women entrepreneurs are facing in many developing countries including India [22]. Women entrepreneurs lack to access finance from banks get proper relevant education and expertise, are overburdened with household activities, are incapable to get proper practical and self-employed training, attending meetings conducted by Govt. bodies etc. All these bottlenecks are limiting the capacity of women entrepreneurs to excel in their competencies in performing their responsibilities towards the development of business establishments.

Women Entrepreneurs, Challenges & Economic Development

As per the survey conducted by the sixth economic Census (Ministry of Statistics, 2021) that only 13.76% of women entrepreneurs out of the total entrepreneurs of India. Again 2.76 million work in agriculture and 65% approximately 5.29 million are workings in the non-agriculture sector out of total business establishments. Among the different states of India, Tamilnadu has the highest 13.5% followed by Kerala at 11.35% and Andhra Pradesh at 10.56%. While running their business women faces many obstacles and challenges which hinder their growth and success. These problems may be concerning Finance, Marketing, Health, Entrepreneurial Attitude, Technology Access, Availability of workspace and boost of confidence. Rakesh(2016), pointed out that for the growth of rural areas, there is significant growth of women entrepreneurs but their development is very low as they face many challenges & problems. Studies conducted by many researchers suggest that among many obstacles lack of education, knowledge & Skill, biased attitude, and poor infrastructure support, are the major barriers which restrict the growth and development of entrepreneurial activities of rural women entering into this segment. In some situations, it is also observed that psychological and physical pressure also acts against women entrepreneurs to proceed further.

Entrepreneurship is a human endeavour that significantly contributes to economic growth and one of the identified findings is that there is a strong correlation between entrepreneurship and of economic growth of a country. It's not hard to draw parallels between the role of entrepreneurs and the growth of economies. Generally, women enter into the entrepreneurship segment due to economic factors and the mindset to do something independently, (Shabunath,2021). The role of Women entrepreneurs in the economic development of any country needs to be considered for several reasons as reported by (Nicholas and Victoria, 2010). It has been observed that there is a positive connection between economic growth and women entrepreneurs as they help in accelerating growth through the creation of a job, increasing savings and thereby creating growth in the industry. Rural women entrepreneurs no doubt will contribute to the wealth improvement of their family and their nations, (Kiran 2014). For the improvement of the rural economy through rural development, rural entrepreneurship is very much needed and it works like a growth engine for the quality of life of rural people and their economic and sustainable development. (Raju & Bhubaneswar, 2014). Women are crucial to the success of the household economy. Govt Schemes, policies, & programmes have made the growth and development of women entrepreneurs across the Tamil Nadu state and their economic and social status has improved after entering into this profession, (Joseph,2020). Women's attitudes have undergone dramatic shifts due to the technological and industrial revolutions in the realms of education and social and economic necessities. The last decade has seen a rise in women's access to economic opportunities. Women's participation in the workplace is a relatively recent phenomenon. Women's emergence as business owners is a major step toward their economic independence and the recognition and respect they deserve in all spheres of society. Women's involvement in

business would bring a calming influence to today's troubled world, paving the way for more harmony and cooperation. Women in India are encouraged to pursue self-employment by both the government and private organisations in several different states, including Gujrat, Kerala, Punjab, Delhi, Karnataka, Andhra Pradesh, and Tamil Nadu. The growth of the women-owned business sector in the country is undoubtedly boosted. Women's entrepreneurship in India is typically associated with more traditional industries, such as the production and sale of papad, pickle, clothing production and so on. Manufacturing, exports, the service industry, businesses with high revenue generation, etc. are all areas where women are gradually being encouraged to start their businesses.

III. OBJECTIVES AND HYPOTHESES

The study tried to pursue the following objectives

- Identify the crucial factors/ Key Competencies accountable for the expansion and magnification of women's entrepreneurial occupation.
- Examine the relationship between Challenges faced by Women entrepreneurs and Govt. Policies
- Determine whether business networking influences the performance of women's entrepreneurial activities.

IV. HYPOTHESIS

- H10: There is no significant relationship between entrepreneurial activities and their contribution to the economical growth of women entrepreneurs.
- H1a: There is a significant relationship between entrepreneurial activities and their contribution to the economical growth of women entrepreneurs.
- H20: There is no significant relationship between Govt. policy and the economic challenges of women entrepreneurs.
- H2a: There is a significant relationship between Govt. policy and the economic challenges of women entrepreneurs.
- H30: There is no significant influence of business networking on the performance of women entrepreneurs.
- H3a: There is a significant influence of business networking on the performance of women entrepreneurs.

V. METHODOLOGY AND ANALYSIS

The following conceptual models proposed here require first being operationalized so that they can be empirically tested. Therefore, a set of indicators is required to evaluate the conceptual model's frameworks. Care has been taken in selecting parameters for overall satisfaction to fully exploit the theoretical constructions available. In the following paragraphs, researchers look at some of the possible applications of these frameworks.

Conceptual Framework of the Study

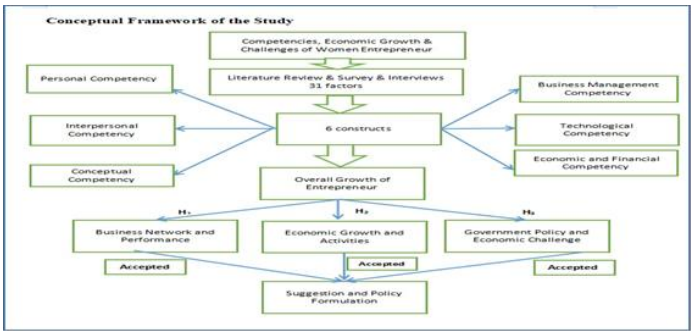

Figure 1: Conceptual Framework

This study involves the collection of primary data through our survey and interviews and secondary data from books, Journals and different reports. The researcher surveyed with our designed questionnaire from the women entrepreneurs, from the Kandhamal districts of Odisha which were collected from the sample size of 148 respondents as per random sampling. Our questionnaire is designed with six major parameters of Entrepreneurial Competencies i) Personal, ii) Interpersonal, iii) Conceptual, iv) Business Management, v) Technological, and vi) Economic & Financial Competencies. Each parameter are having five questions on a five-point Likert Scale. After collecting data, the empirical research provided an overview of data analysis and demonstrated the hypothesis through PCA and ANOVA. Statistical methods are the mathematical formulas, models, and techniques used to analyse raw study data statistically. The reliability of the findings can be evaluated with the help of statistical methods gleaned from survey data. Before conducting the pilot test and determining the sample size for our questionnaire, we performed a factor analysis to determine the relative importance of the factors under consideration. Then we used analysis of variance (ANOVA) to assess the economical growth and challenges of the key competencies of women entrepreneurs.

Data Analysis and proved hypotheses:

This empirical study explained the data analysis and proved the hypothesis in statistical analysis using PCA & ANOVA.

Eigenvalue			
Questions	Eigenvalue	Mean	Std. Dev
Q1	2.476	1.268	1.518
Q2	1.112	2.185	1.678
Q3	0.919	3.241	1.62
Q4	0.873	1.173	1.051
Q5	0.889	4.081	1.462

Table 1: Data Reliability of Hypothesis

After Principal Component Analysis (PCA), we can assess the validity of our data and the precision with which we measure it. Cronbach's alpha is 0.842, which indicates an extremely high degree of reliability of the data. All five questions are met by the eigenvalue Q1: 2.476, Q2: 1.112, Q3: 0.919, Q4: 0.873, and Q5: 0.889. So we can consider all questions for our analysis because all values are in the higher range and greater than 0.7 of the eigenvalue.

Hypothesis H1:

ANOVA TEST

Dependent Variable: Score Score

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	16.9114198	4.2278549	5.62	0.0002
Error	715	537.8649691	0.7522587		
Corrected Total	719	554.7763889			

R-Square	Coeff Var	Root MSE	Score Mean
0.030483	27.28163	0.867328	3.179167

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Source	4	16.91141975	4.22785494	5.62	0.0002

Table 2: ANOVA Table of Hypothesis H1. Fit Statistics

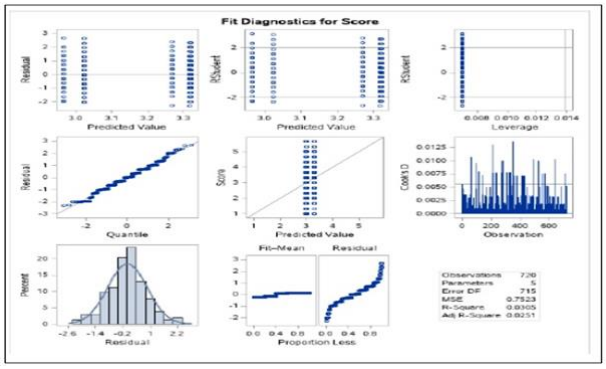

Figure 2: Fit Diagonestics of Hypothesis H1.

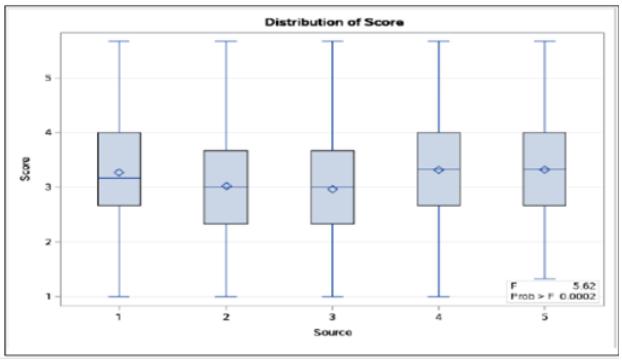

Figure 3: Box Plot of Hypothesis H1.

Table (1) shows the consistency of the eigenvalue, which is critical when verifying data. Each of the eigenvalues for each of the six criteria is larger than 0.7, which is a very good sign of the criteria's reliability. Since our data has high Cronbach's Alpha and eigenvalue reliability, we can conclude that our analysis is rigorous. Figures 2 provide clear depictions of the PCA scree plot and the component scores matrix, respectively.

Hypothesis H2:

Eigenvalue			
Questions	Eigenvalue	Mean	Std. Dev
Q1	1.326	3.028	1.218
Q2	2.128	1.131	1.718
Q3	0.983	1.541	1.612
Q4	0.975	2.124	1.271
Q5	1.299	4.081	1.241

Table 3: Data Reliability of Hypothesis H2

After Principal Component Analysis (PCA), we can assess the validity of our data and the precision with which we measure it. Cronbach's alpha is 0.802, which indicates an extremely high degree of reliability of the data. All five questions are met by the eigenvalue Q1: 1.326, Q2: 2.128, Q3: 0.983, Q4: 0.975, and Q5: 1.299. So we can consider all questions for our analysis because all values are in the higher range and greater than 0.7 of the eigenvalue.

Dependent Variable: Score Score

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	98.0669753	24.5167438	36.82	<.0001
Error	715	476.0871914	0.6658562		
Corrected Total	719	574.1541667			

R-Square	Coeff Var	Root MSE	Score Mean
0.170803	26.79070	0.816000	3.045833

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Source	4	98.06697531	24.51674383	36.82	<.0001

Table 4: ANOVA Table of Hypothesis H2

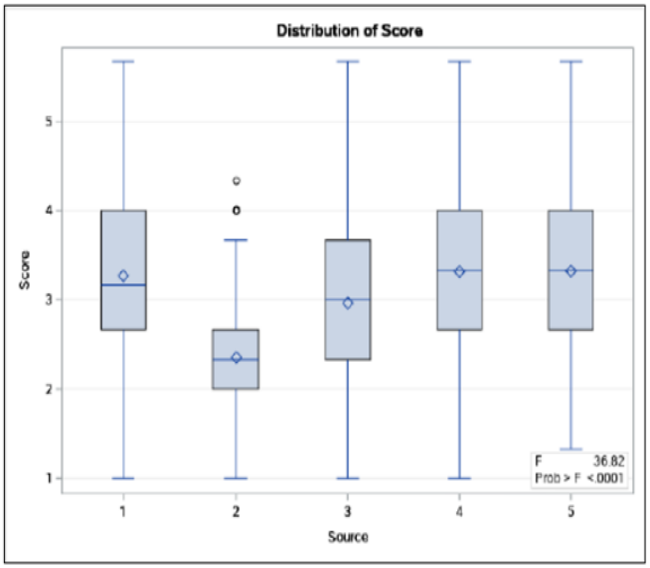

Figure 5: Box Plot of Hypothesis H2

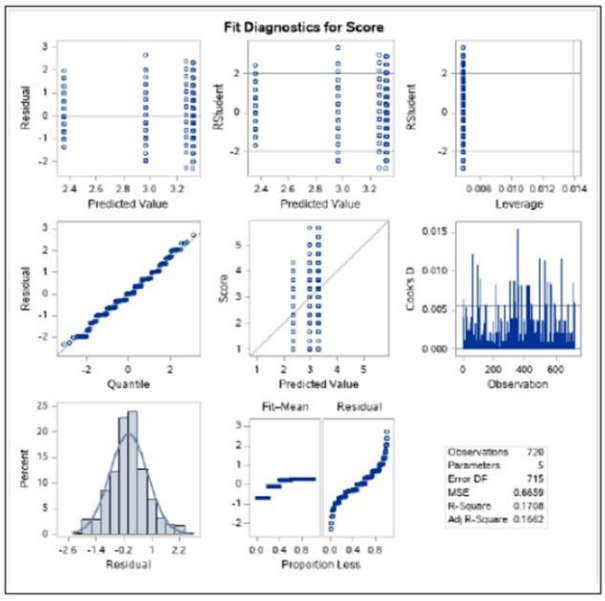

Figure 4: Fit Diagonestics of Hypothesis H2

The above ANOVA is applied to test the hypothesis. The ANOVA results as given in table 3, show that the calculated "F" value is (36.82), which is quite good and the "P" value is (0.0001), which is less than 0.05 of significance. Hence the null hypothesis H20: "There is no significant relationship between Govt. policy and the economic challenges of women entrepreneurs" is rejected, whereas the alternative hypothesis H2a: "There is a significant relationship between Govt. policy and the economic challenges of women entrepreneurs." is accepted. It is inferred that the Govt. Policy and schemes are most important to overcome the challenges faced by women entrepreneurs at different levels may it be Block, Panchayat, or District or State level.

Hypothesis H3:

Eigenvalue			
Questions	**Eigenvalue**	**Mean**	**Std. Dev**
Q1	1.219	3.218	1.118
Q2	2.273	2.132	1.653
Q3	1.325	1.441	1.204
Q4	1.649	2.024	1.381
Q5	2.173	4.691	1.412

Table 5: Data Reliability of Hypothesis H3.

After Principal Component Analysis (PCA), we can assess the validity of our data and the precision with which we measure it. Cronbach's alpha is 0.823, which indicates an extremely high degree of reliability of the data. All five questions are met by the eigenvalue Q1: 1.219, Q2: 2.273, Q3: 1.325, Q4: 1.649, and Q5: 2.173. So we can consider all questions for our analysis because all values are in the higher range and greater than 0.7 of the eigenvalue

ANNOVA TEST

Dependent Variable: Score Score

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	133.7253086	33.4313272	45.74	<.0001
Error	715	522.6296296	0.7309505		
Corrected Total	719	656.3549383			

R-Square	Coeff Var	Root MSE	Score Mean
0.203739	29.83370	0.854956	2.865741

Table 6: ANOVA Table of Hypothesis H3

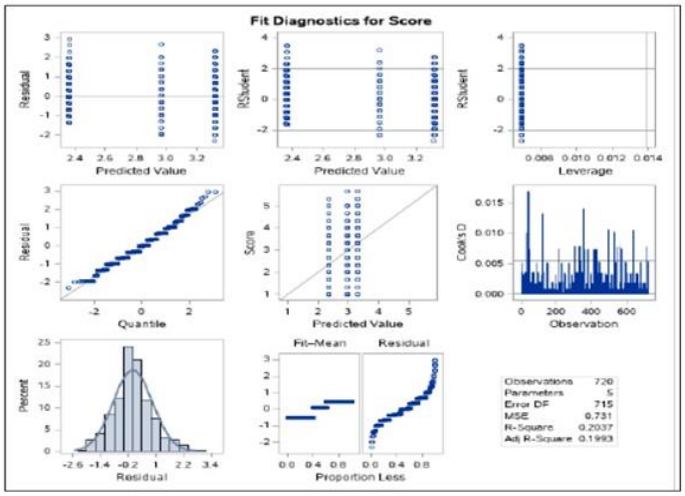

Figure 6: Fit Diagonestics of Hypothesis H3

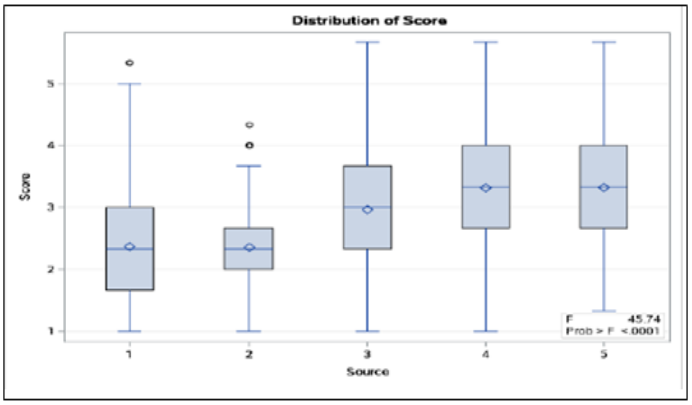

Figure 7: Box Plot of Hypothesis H3

The above ANOVA is applied to test the hypothesis. The ANOVA results as given in table 4, show that the calculated "F" value is (45.74), which is quite good and the "P" value is (0.0001), which is less than 0.05 of significance. Hence the null hypothesis H30: "There is no significant influence of business networking on the performance of the women entrepreneurs" is rejected, whereas the alternative hypothesis H3a: "There is a significant influence of business networking on the performance of the women entrepreneurs" is accepted. It is inferred that business networking is an art form, and one should be adept at it as an entrepreneur. Business

networking is all about bringing people together who can help each other's business activities and problems.

VI. FINDINGS AND DISCUSSION

This study tries to find out the key influential factors for the growth and success of women entrepreneurs and the challenges and hurdles they face during their entrepreneurship tenure. Again the study is interested to unveil the facts that starting their own business, influences the economic and financial condition of their family and country as a whole. There are many Govt. launched schemes which help them to face the challenges which generally restrict their entrepreneurial growth. The data analysis suggests that the key competencies which are responsible to make them successful and make them self-dependent are Personal Skills (1st), Economical & Financial (2nd), Business Management (3rd), Technological (4th) Interpersonal (5th) and Conceptual Competencies (6th) respectively. So it is well accepted that personal skills like Spotting Opportunities, Commitment to work, Motivation & Preservance, Self-efficiency & Self-confidence, Information seeking and Problem-Solving skills will make entrepreneurs more competent in doing their own business. The study also reveals that there is an influence of personal networking with the performance of the business owned by them and it has a significant impact on the success of entrepreneurial activities performed by women. It is inferred that business networking is an art form, and women should adopt it as an entrepreneur to survive and succeed in the long run. The networking will be beneficial to the rural women entrepreneurs in performing their enterprise-related activities like spotting business opportunities, getting moral support, enhancement of access to financial assistance, availing different Govt. schemes, acquiring technical support and understanding entrepreneurial orientation like creativity and innovativeness which will make them more proactive of success.

Concerning the fourth objective to conclude the interconnection between different Govt. Schemes and challenges faced by women entrepreneurs, it is explored there is a significant influence of the former to the latter. That indicates that if women entrepreneurs will be aware of many schemes launched to grow their small businesses both by Central and state Govt. like Annapurna Scheme for catering, Stree Shakti for (EDP), Dena Shakti (Manufacturing), Orient Mahila Vikas Yojana(Small Business) then the impact of challenges to them will reduce to a great extent. Other than these schemes Govt. have established many institutions to fulfil the needs of women business owners. The Platform for Women Entrepreneurship (WEP) is the WEP, which was launched by the NITI Aayog, and it aspiring and established women entrepreneurs in India. It's broken down into three sections and each one has different objectives like Iccha, Gyana & Karma Sakti for encouraging, educating and providing hands-on assistance to women entrepreneurs to expand their businesses. We found that if women will aware of and access all these schemes and facilities provided by different levels of Govt. automatically the effect of challenges will come down and they can overcome them.

VII. CONCLUSION

The study demonstrated that in rural areas like Kandhmala of Odisha, women enter into entrepreneurial activities by establishing their businesses due to many pull factors like exclusive accomplishments, responsibility towards family becoming self-sufficient & self-reliant and avail autonomy status. It is also noticeable from the study that a significant portion of women entrepreneurs became a success due to a combination of many competencies like self-confidence, strong willpower, determination, passion for their desired business and entrepreneurial spirit and tenacity. These competencies not only help them to become success also helps them to overcome the hard challenges during their entrepreneurship tenure. The findings of the study will enhance the personal and entrepreneurial skills of Women who have opted to take up business ownership status by providing new insight.

VIII. LIMITATIONS OF THE STUDY

The investigation here is limited to the women entrepreneurs in the Kandhmala district of Odisha but similar studies can be generalised further by doing it in other districts of Odisha and India and also by taking the other key competencies into account also. Here stratified sampling is adopted so that an overall view can be drawn from the studies but other studies can apply different sampling to pursue their study.

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Ambulance Emergency Route Optimization (AERO)

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Abstract— **This research proposes an optimized routing system for ambulance using algorithms and data sets for a particular area. This study goes into great detail about the variety of routing issues, such as picking the quickest and best route to bring a vehicle to its destination in the shortest period of time while avoiding traffic jams. This research also discusses about how road networks are seen in relation to graphs and how techniques for traversal and path discovery, such as Dijkstra's algorithm and the A* method, can be used. In order to determine which areas have a greater or lesser need for ambulances and to allocate the appropriate number of vehicles, data sets from a region will be collected. Optimizing the route so that nearest ambulance can reach the required accident location as soon as possible.**

Keywords— Route Optimization, Allocation, Routing Techniques, Dataset Mapping.

I. INTRODUCTION

Human Nature involves movement from one place to another which increases traffic on the route of the movement, the increased traffic eventually leads to traffic congestion. Traffic congestion leads to long hours of waiting time to go from one place to another. To overcome this people often look for an optimized route which can take us to our destination in less time and through shortest distance. Most need for optimization route is during emergency. In India we don't have dedicated service lane for during emergency and due to congestion it leads to delay in reaching the accident location, which puts the patient at high risk sometimes causing death. Due to this route optimization and allocation is very necessary for ambulance system.

AERO is an ambulance emergency service application and website which will assist ambulances in determining the best and an optimized route to the accident place where the caller has requested for immediate assistance. Ambulance would be distributed with the help of the previously collected data of a particular region which will help us to plot a graph database. Accordingly, if a certain zone receives more emergency calls, we can allocate more ambulances so that they can use our application's route optimization to get there in the shortest amount of time.The user must register and verify himself so that we know the user is legit. The user will be able to view Google Maps using Google API and will be able to see the time required. When an emergency call is placed, the programme will look for the closest ambulance and notify the driver, allowing him to get at the scene as quickly as possible. The user would get the driver's contact information and his most recent location, which would be shown on Google API. With the aid of route optimization, the ambulance would be able to transport the patient to the closest hospital, and the time needed would be minimised to the greatest extent feasible, which is vital for the patient.

II. RELATED WORK

The ambulance routing problem is a well-known issue and numerous researchers have offered their own solutions using various routing strategies. One of the critical missions that ambulance services strive to provide is the ability to save injured or severely ill individuals and reduce mortality even in the event of a pandemic or a grave disaster, such as a volcano eruption, flood, storm, earthquake, etc. In other words, the main objective is to determine the most optimal route for the ambulance and get patients to the hospital in minimum time. This research has investigated different factors that several studies may have considered while devising a model for the route optimization.

A. Ambulance Allocation

The allocation problem has been extensively studied during the last few decades. Locating ambulances is a challenge for emergency service providers in order to properly meet any potential future demand. Ambulances should be stationed at predetermined areas so that in an emergency it will be easy to get to the patients quickly. (Brotcorne,2003) developed a mathematical model after thoroughly examining how ambulance location and relocation models have changed over the previous 30 years. (Gendreau,2001) looked into locating idle ambulances, examined the variations in rescue coverage, and presented a dynamic model and dynamic ambulance management system. incorporating real time traffic information and GIS data to dynamically update the suggested route while the user is really driving. The number of nodes used to determine the shortest path gradually reduces as the ambulance gets closer to the scene of the accident, reducing the computing time.between multiple points.

B. Optimal Route Selection

III. METHODOLGIES

I. VARIOUS ROUTE OPTIMIZATION TECHNIQUES A road network is viewed in reference to graph

theory as positive weights graph whose nodes correspond to junctions of the road and the graph edges are road sections (paths) between the junctions. The length (distance) of the road section represents the weight of the edge. Several algorithms use these properties and consequently are capable of computing the shortest path faster than the use of general graphs.

A. Dijkstra's Algorithm

The foundation of shortest path algorithm is the Dijkstra's algorithm. Dijkstra's algorithm computes the shortest paths from a particular node which is the source to every other available node. The nodes are visited in sequence following the shortest path from the origin by the algorithm. When all the goal nodes are visited, it stops the sequence. Dijkstra's algorithm resolves problem in single source shortest path and it is not available for graphs with negative edge weights.

B. A* Search Algorithm

A* search algorithm is an algorithm which is generally useful in graph traversal and path discovery. It is a technique for plotting a viable path connecting several nodes. Heuristics are used by A* to achieve better time performance. In order to achieve target it uses lower bounds on target distance to straight the search of Dijkstra's algorithm to the goal. The node is resolved in order of their provisional distance between the origin and plus the lower bound. The effectiveness of this approach depends highly on the lower bounds. The nodes geographic coordinates determines the simplest lower bounds in road network and this results to poor performance. A* algorithm and graph were used in the development of a novel algorithm for a self-aware route planning. The algorithm was able to forecast traffic and planned route for each car.

IV. PROPOSED WORK

Route Optimization is used widely for vehicle routing, geographical mapping, and various other routing application to give an optimized route with reduced travel time and least amount of hindrance which helps a business to stay cost effective. Our approach to the problem is divided into the following steps:

A. Allocating Ambulance Site

Using the local data, we will allocate various ambulance site in our application which will act as nearby source to the given destination. Our algorithm will use these sources as a starting point. It will also be useful for a variety of information, such as available drivers and ambulances.

B. Initiating requests

The user will need to start a request through our application in an emergency. This will search for any nearby free ambulance in a certain radius and the nearest vehicle will be reserved.

C. Processing Requests

After a request is initiated, the location of the user is sent to our application. Once this request is accepted by the driver or assigned to a driver by a hospital, the user's location is directed into our Routing application as the destination and an optimized route will be displayed on the driver's hardware. Here, we would only use Google Maps API's location service to track and display the appointed ambulance location on the user side and not for routing purpose.

D. After Pick-Up

After reaching the destination, if the patient condition is critical then an optimized route to the nearest hospital would already be calculated and all it would take is to press the emergency pop-up. If the condition is not critical then the route towards registered ambulance's hospital is selected by default.

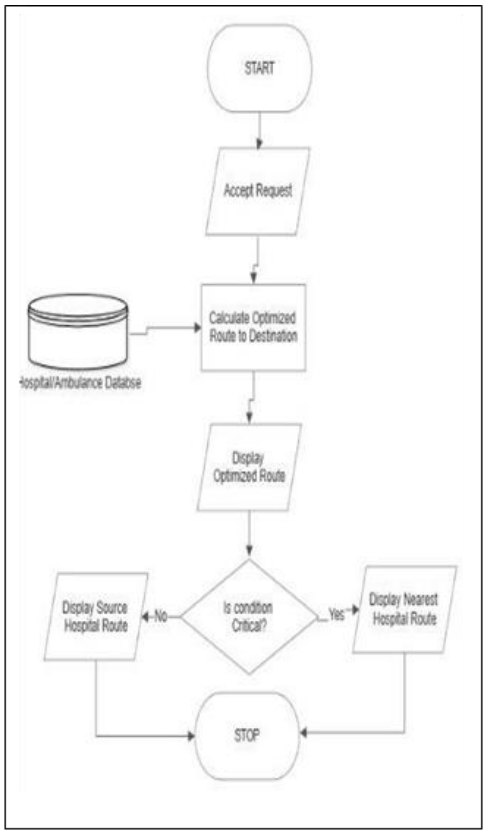

Fig 1: Step By Step Approach

V. RESULT AND DISCUSSION

The proposed methodology would likely help the ambulances reach on time and avoid any fatal situation which would probably occur if a unoptimized path was chosen. After going through various research paper and studying the techniques used for optimization will help to build a working model.

VI. CONCLUSION

The application aims to provide an optimized route for ambulances towards the requested location. Firstly, various ambulance sources will be mapped in our

application using local database. If requested, after reaching the location it will automatically provide an optimized route toward nearest hospital. For calculating the optimized route various algorithms like Dijkstra's algorithm, a* algorithm, Genetic algorithm, etc. will be used. For requesting ambulance, the application aims to provide a simple and clean UI which could be used by any age groups

VII. ACKNOWLEDGEMENT

This paper and the research behind it would not have been possible without the exceptional support of our teacher and project guide, Mrs. Neha Kapadia. This research was supported by Thakur College of Engineering and Technology. We thank our faculties from our institution who provided insight and expertise that greatly assisted the research. We would also like to show our gratitude to Mrs. Neha Kapadia for sharing her opinion and thoughts with us during the course of this research.

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Rejuvenating The Pilgrimage Sector Using Information Technology

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Abstract— **This paper aims to cover the revolution that can be achieved by bringing the scopes of computing and IT in the pilgrimage sector. Pilgrimage till now is such a niche sector where the steps of starting till the end of the devotee's journey is whole and sole in the hands of the government. The devotee has to take a lot of efforts to register himself in the registry of government then using another technologies to see the better routes and stays are pretty much for the devote to handle. IT can be used to make the steps easy making it more of a comfort side for the devotee to be in. A separate IT software can be created in order to make a whole cluster of all the necessary steps to be taken. This paper aims to bring limelight to the development in the sector of pilgrimage as it can make the devotee's journey a lot more fulfiling. Our project looks after the problem that a pilgrim may suffer which can be reduced by our program. A tourist when decides to take on a journey he/she can get the safe and fulfilling steps to be taken due to various computing and it miracles. But specially for pilgrimage there is no single point of contact for the devotee/pilgrim to be in. Our program can looks after the easy registration of the pilgrims in the registry of the pilgrims. It can guide the pilgrims for all the precautionary steps to be taken by them. Our program looks after the problem of staying of the pilgrims while pilgrimage , our software can suggest the best inns and stays of affordable prices for the pilgrims. Our program can be a kind of tourist guide which will guide pilgrims to their destiny. Various technologies are used in order to create the interactive user interface of our program. Html, css, java, bootstrap, node, express and many more frameworks and tech are used in order to achieve our software. Our program also has database facility in order to get previous travel log of a particular pilgrim. Database technologies like MongoDB is used in order to keep track of all the steps and travel destination of the logged in pilgrim. Pilgrimage in its own is a vast sector to be in as it has various problems that can be identified and resolved. Our software can mostly resolve all the problems faced by the pilgrims. Problems like having the best stays, easy registration, easy routes to be in, easy travel partner to find like rickshaw and palkis in pilgrimage like Pilgrimage, having the climate conditions forehands to the users(as climate is a huge factor when carring on for the pilgrimage like Kedarnath) and many more. This review has examined the growth and development that can be brought in the field of religious tourism. This paper in turns highligh the problem that can be faced by the pilgrims and giving the utmost solutions to it. It also gives the government a better hand to handle the pilgrim registry problems. Hence our program has a scope of bring a kind of computing revolution in the field of pilgrimage.**

Keywords— IT, pilgrimage, registry, database, html, css, javascript, government, computing, revolution.

I. INTRODUCTION

Pilgrimage is an age old tradition that has been followed throughout all times. Recent tourism is an upbringing of this age-old tradition. Pilgrimage is such a niche sector in which IT has been brought but has never been flourished. There are various software related to various problems which are faced by tourist while undertaking a tourism. Problems like knowing better routes for the destination, knowing better hotels and its cost of living, knowing the best climatic condition to be in, knowing the best way to communicate with the guide and many other are resolved for the recent tourism sector, but when it comes to the pilgrimage, this gets diminished. A software can make a pilgrim to be self centric toward all the similar problem faced as followed above. Our software makes all this problems resolving in a self centric manner. Our software can guide the pilgrim just like a human guide can during their pilgrimage. Our software can guide then the better stays, better routes, better transport facilities(even in the terrain areas like kedarnath palkis system). Information technology can be embedded in the pilgrimage sector in order to create the same satisfaction that the tourist get when he/she uses the tourism related applications. The application uses various algorithms such as linear regression, rainforest algorithm in order to get the suitable inns/hotels in the route to the pilgrimage. Various climate detection algorithms like SACZ, Ocenic SACZ etc are used in order to provide the pilgrim with the most up-to- date climatic changes. All concepts of climate change that can be used for 'detection' and 'attribution' are as same as given in(IPCC, 2001; MITCHELL et al.,2001).

II. LITERATURE SURVEY

Bisignani, G. & Peters, J. (2005) Change is in the air. In Economists, 19-21. New York: Contoso Press Bhangal, Sham; Jankowski, & Tomasz (2003). Foundation Web Design: Essential HTML Boston:- In this survey we gathered information about changes in the air the economists and many more and most importantly the foundation of the web design and their essentials. Proseware, Inc. Burns, Joe; Growney, Andree S. (2001). JavaScript Goodies. Los Angeles: Pearson Education. Cameron, S. & Probert, P. (1994) In this survey we foundthe importance of java script as it's a scripting language not forget to mention that it acts as brain in web development.Advanced Guided Vehicles, Aspects of the Oxford AGV project. World Scientific, London Cedar A.

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In this press release we found out that to reach to a place you need to have a better connectivity no matter what your location is so to provide better connectivity to the pilgrimage we referred to the advanced guided vehicles.

Cedar A, Golany B., & Tal O., (2001). Creating bus Timetables with maximum Synchronization. Transport Research Part A, 35, 913-928. Hong Kong

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Dasai, T. (2002). Current State of and issues concerning Mobile Electronic Payment and mobile e- ticketing [Online]. Available from :http://wwwecom.ip/ecom e/latest/ecomjournalno4/wg13 e04.html[Accessed December 10, 2005] in this survey we have noticed one thing that no mode of payment can replace the method of cash payment since it very easy and the payment can be finished very easily in no time but in electroic mode of payment there is a huge barrier of internet and failing og machine which is a rare case though

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III. RESEARCH METHODOLOGY

Existing System Other existing applications are available in net which just gives a solution to a specific problem just like having best place to accommodate in or best transport to take from a specific point to a specific point. Applications are based on only one or maybe two problems faced by any tourist and for any tourism spot. But a tourist guide only based on pilgrimage is not available till yet. This problem of self centered pilgrimage application is been created by us. Basically we will include all the facilities that the existing system provides the tourists but being more self centered toward the pilgrimage pilgrimage. Also it will include all the process assistance that the tourist has to go through. The Existing system earlier consisted of following operations-

- Manually Searching the hotel or inns
- Getting data from respective hotels or inns.
- Getting data from third party websites which hardly considered the necessary parameters for the transport searching tool.

1).Absence of Recommendation System

The recommendation system is a very essential tool to provide list of hotels or ways of transport to the users which is evaluated automatically by the program based on the input data provided by the user after logging in the system

1. There are various sites which provide hotel or ponies finding finding facility but there are very few who provide recommendations to their registered users.

2. This system is necessary to reduce the efforts of the user for getting an insight of which conditions he can apply for and have chance for getting an ease toward it.

3. This system analyzes and generates the list of hotels/inns that a user can apply for based on his /her financial backgrounds.

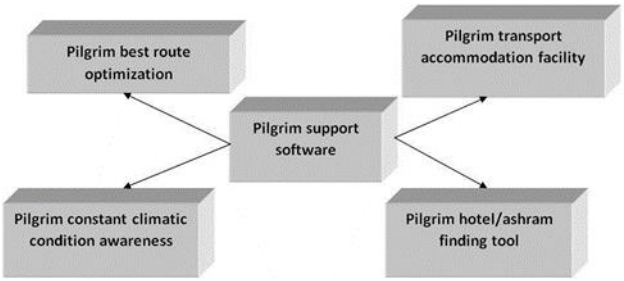

Figure 1: Attributes of the proposed system

IV. RESULTS AND DISCUSSION

To overcome the drawback of existing system we have developed new system, which is a web based application in which the tourist can simply search or explore the inns/ashrams anonymously. It also provides a special unit

which specifies various options for specially- abled provision as well. It is most reliable & time saving system for searching relevant and appropriate hotels from the comfort of your device. A.Architecture of Proposed System The components of the system are as explained below:.

Hotel Database: The database is a repository for storing the hotel details as well as user details. The user related details can be updated through logging in their account. • Inn Finder Website: The Website acts as an interface between user and database and helps to display information to the user.

• User: The user retrieves information from the database about hotel/transport data and manage their account.

• Administrator: The administrator updates the database as well as manage the users. B.Operations of Proposed System The proposed system has following operations as explained below:

1. Searching:- Searching of hotels/inns is used to find an appropriate accomodation quickly. This feature is used to give accurate search results. The user enters a keyword related to the inn and the inns satisfying that keywords are retrieved.

2. Filtering:- Filtering of hotels is used to find inns based on various properties. This feature is used to give relevant inn satisfying one or all the properties. The user enters options that they require (like….Location, Nearest walkway, etc).

3. Recommendation It helps to recommend hotels/transportation to user based on the input data provided by the user after logging in their profile. The data of what user expects in the data is saved on the database and the hotels satisfying the data are retrieved.

4. Registration ease: This window will help the tourist to even register him/herself for the respective pilgrimage plan as per the government guidelines.

V. ALGORITHMS FOR PROPOSED SYSTEM

1) Searching Algorithm:

The one thing that really annoys us when surfing around sites is searching on sites that give you irrelevant results. You can‟t help but think something has gone terribly wrong with the search script. With over 70% of users likely to just „bounce‟ off such a site after not being able to find what they were after immediately, we need to take a look into the why‟s of getting such irrelevant search results. The most basic search practice out there is to do something like:

• Break string into words.

• Compose the search query targeting known data fields like title, description, features, word by word, imploding into the query. At this point the where statement can look like „where (description like „%black%‟ or features like „%black%‟ or title like „%black%‟) and (description like „%pack‟‟)

. • Display the results and hope for the best. Its fair to say, certain words should not be used to score results, they are just too generic to be considered. Unless you are typing something like „the north face‟, „the‟ should be dismissed, in the same way as „this‟ should be removed. So, what is the alternative? Oddly enough, the most accurate search results are achieved via manual tagging and backed up by product knowledge. It goes like that:

• Assign tags to each product. You can build an aliases table for common tags and errors.

• Build the search algorithm to break down the string into parts and analyse them. Drop all common words that won‟t help and keep the „useful‟ bits only. What words you have left, treat as tags and fetch all tuples they have been applied to. Improved Querying tools that can be incorporated for search process –

• Keywords: Document creators (or trained indexers) are asked to supply a list of wordsthat describe the subject of the text, including synonyms of words that describe this subject. Keywords improve recall, particularly if the keyword list includes a search word that is not in the document text.

• Concept Search: A search that is based on multiword concepts, for example Compound term processing. This type of search is becoming popular in many eDiscovery solutions.

• Proximity Search: A phrase search matches only those documents that contain two or more words that are separated by a specified number of words; a search for "Wikipedia" WITHIN2 "free" would retrieve only those documents in which the words "Wikipedia" and "free" occur within two words of each other.

• Regular-Expression: A regular expression employs a complex but powerful querying syntax that can be used to specify retrieval conditions with precision. Fuzzy search will search for document that match the given terms and some variation around them (using for instance edit distance to threshold the multiple variation).

• Wildcard Search: A search that substitutes one or more characters in a search query for a wildcard character such as an asterisk. For example, using the asterisk in a search query "s*n" will find "sin", "son", "sun", etc. in a text

2) Sorting/Filtering Algorithm:

For Sorting/Filtering algorithms we can consider the shopping websites which provide sorting operations performed on products to show relevant results. On System websites, users can find hotels in two different ways: searching and browsing. Searching obviously means using the site search whilst browsing involves drilling down through the catalogue provided by the website. Getting sorting and filtering right improves

searching ability and allows users to find the product they want in less time, from this product listing. If users can't find the exact product they require in the minimal time, there's a good chance they'll go to another site where they can.

What is sorting and filtering? Sorting is a method of changing the order of any product listing, where by users can choose which criteria they want the hotels to be listed by. So, preconscious web users may choose to list the products in order of hotel fare, from cheapest to most expensive. Filtering is a way of reducing the number of products in a product listing. Users choose which criteria are important to them and view only relevant hotels. For example, price-conscious users may choose to view only inns having fare under 1 thousand rupees (thereby filtering out all products over 1 thousand rupees).

3) Recommendation Algorithm:

For getting accurate and relevant hotels as per users wish there is a need of Recommendation Algorithm to make the user experience much effective. The Recommendation algorithm helps to shortlist the hotels and transportation options based on individual users demand and thus provide refined results which really matter to users. This algorithm basically works on the input data provided by the users after logging in their account and completing their profile. The hotel/transport are recommended based on the details as given below:

- Fare for per night stay.
- Location
- Preferred transportation choices(likes ponies and palkies)
- Preferred hotels and transport(i.e ac or non-ac)

To achieve faster query results the ranking of accommodation fare is carried out. Like assigning ranks to hotels that fall in a certain range. For example: Let's consider the fare range being assigned position

. • Less than 5k fare > 1 place
- 5k-7k > 2 place
- 7k-10k > 3 place
- 10k-15k > 4 place
- Above 15k > 5 place

Now the hotel database values will be assigned these positions corresponding to the tourist given fare they require. Now when user selects the range in which their fare fall, the corresponding position will be assigned to the user and hence the user will be recommended with the hotels/inn that have position equal or lower corresponding to the user specified fare in the application. After filling such details they can get an estimate of which hotels they can afford for to get accomodated. This really helps to truncate down the search and provide minimal but optimal results quickly..

VI. CONCLUSION AND FUTURE SCOPE

This project assists in automating the existing manual system. This is a paperless work which can be monitored and controlled remotely. It reduces the man power required and provides accurate information. All years together gathered information can be saved and can be accessed at any time. Therefore the data stored in the repository helps in taking decision by management. So it is better to have a Web Based pilgrimage tourism guide system. Web based pilgrimage is of very useful nature as it can assist the pilgrim for any journey related issues to get resolved in his own hands. The project can make a big revolution to the way the pilgrimage is carried out from start till the commencement of its journey. The project can make the pilgrim a better understandable person to carry out the pilgrimage.

The web based pilgrimage application can be reached to all the religions though being major or minor. Database connectivity can be carried out in better way in order to get the data in all the structured manner. Situations like covid or any pandemic like situation can be a problem which can be resolved if we have te travel og of the pilgrims during their times.

In future the program can be supplied by various companies contract which have high range in that pilgrim areas. The program can be supplied by various ngos and other social service socities in order to carry out the pilgrimage for the poor dreaming people.

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A Study of Teacher's Attitude with Trainees Towards Using Cyber Resources (ICT) in Their Teaching Learning Process

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Abstract:- **Technology has dominated all spheres of life. The education is also one of the fields where we can see the impact of information technology. In this study the researcher tries to study the attitude of teacher trainee towards educational technology. To conduct the study the investigator select 600 B,Ed. Students from Raipur district, out of them 300 male and 300 female students .Through random sampling method the researcher select the sample .After analysis the researcher found that there is no significant difference between the urban male and rural male pupil teachers' attitude towards using cyber resources. Where in the 2nd hypothesis the investigator found that no significant difference between rural female and urban female pupil teachers' attitude towards using cyber resources. There was no significant difference in attitude towards using cyber resources among the pupil teachers irrespective of locale and gender. Hence training colleges should arrange, seminars & workshops for the pupil teacher so that they should be aware about the updated aspects of educational technology and use accordingly.**

Keywords:-Attitude, Cyber resources.

I. INTRODUCTION

The rapid advancement of information and communication technology (ICT) has brought a revolutionary change in the information scenario giving rise to a number of options to handle varied information sources conveniently and effortlessly as a result of which e-resources have become the most sought after modern library's reserves in satisfying varied needs of students, teachers, and researchers with minimum risk and time. Our educational system has been transformed owing to the ever-advancing technology. Teachers are the most dominating factors for contributing educational modernization. The teacher's effectiveness depends on the teacher's attitude, characteristics and classroom phenomena such as management, organization, classroom environment. If the teachers were motivated and inspired to use internet and other sources to make their teaching learning process most effective for their students then the teaching process and syllabus can easily fulfill the expected objectives. Hence this paper tries to study the attitude of B.Ed. students using cyber resources in their teaching learning process.

(Rajkumar, 2018) Did a study on "Awareness of educational technology among the B.Ed. trainees in Villupuram educational district". The investigators focused to study the level of awareness among the B.Ed. students on the basis of gender and their parental education. To collect the data from the samples (200 B.Ed. students) the investigator used survey method and a self made questionnaire. The investigator found that high level of awareness among the B.Ed. students towards educational technology. No significant difference between the male and female students, their parent's educational qualification does not affect their awareness towards educational technology.

(Chadha & Chhavi, 2018) Conducted a survey on the topic "A study of B.Ed. students' attitude towards using cyber resources". The main objectives of the study were (i) To assess the attitude of B.Ed. students towards using cyber resources. (ii) To compare the attitude of male and female students of B.Ed. students towards using cyber resources. (iii) To compare the attitude of B.Ed. students residing in rural and urban areas towards using cyber resources. The surveyor adopted normative survey method to conduct the study. The sample comprised of 120 pupil teachers, 60 males and 60 females selected randomly. The entire sample belonged to HNB Garwal University of Srinagar. To measure the attitude towards cyber resources of the B.Ed. student the researcher used Dr.S.Rajshekhar (2010) scale. Output of the study were maximum students have natural attitude to use cyber resources. Male students were found to be better than the female B.Ed. students. There was no significance difference between the B.Ed. student residing in rural area and urban areas in respect of their attitude towards using cyber resources.

II. OBJECTIVES OF THE STUDY

1. To study the significant difference in Attitude towards using cyber resources, between the rural male and urban male pupil teachers in Raipur district of Chhattisgarh.

2. To study the significant difference in Attitude towards using cyber resources, between the rural female and urban female pupil teachers in Raipur district of Chhattisgarh

Hypothesis of the study

1. There will be no significant difference in Attitude towards using cyber resources, between the rural male and urban male pupil teachers in Raipur district of Chhattisgarh.

2. There will be no significant difference in Attitude towards using cyber resources, between the rural female

and urban female pupil teachers in Raipur district of Chhattisgarh

Method of the study

Descriptive survey method has been followed by the researcher

Sample of the study

Sample of the present study consisted of 600 pupil teachers of B.Ed. college of Raipur district, Selected by random sampling technique irrespective of their cast, creed, religion and family type. The selection of samples for male and female pupil teachers of B.Ed. College of urban and rural part of Raipur district were selected by using random sampling techniques. The study was conducted on 600 pupil teachers, out of them were 300 males and 300 females of B.Ed. college of Raipur district of Chhattisgarh

Tools of the study

To collect the data the researcher used "Attitude towards Using Cyber Resources Scale" By S.RajaShekhar.

Analysis of the data

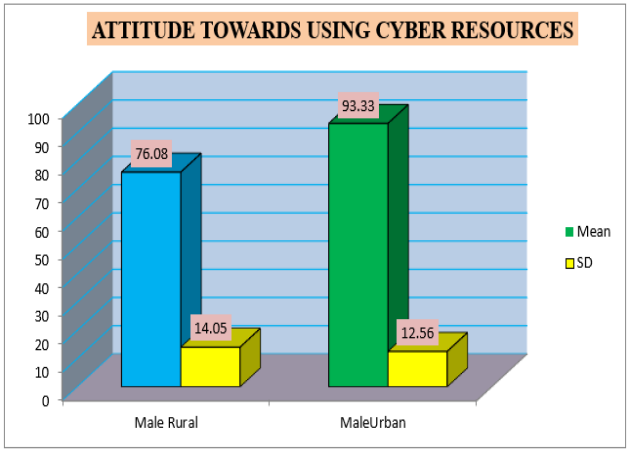
HO-There will be no significant difference in Attitude towards using cyber resources, between the rural male and urban male pupil teachers in Raipur district of Chhattisgarh

Table4.2.1 Local wise gender, M, SD, N, and 't'-test of Attitude towards using cyber resources among the urban male and rural male

Variables	Group	N	Mean Score	SD	Mean Difference	t-value	Significance
Locale wise Gender	Rural Male	150	76.08	14.05	1.49	1.50	Not Significant
Locale wise Gender	Urban Male	150	93.33	12.56			
Table value 1.96 with df 298 on 0.05 level of significance.							

The above data shows that rural male pupil teachers' mean score on Attitude towards using cyber resources is 76.08 and SD is 14.05.Where urban male pupil teachers' mean score on Attitude towards using cyber resources is 93.33 and SD is 12.56.The t-value between the urban male and rural male is observed as 1.50 at 298 degree of freedom. The level of significance is taken 0.05.Thus the calculated value of t is less than the table value 1.96. It proves that there is no significant difference found between the urban male and rural male pupil teachers' attitude towards using cyber resources. It hence is concluded that there is no significant difference between rural male and urban male pupil teachers and thus 1st hypothesis is accepted.

Bar graph shows the comparison of Attitude towards Using Cyber Resources among the urban male and rural male pupil teachers of Raipur district.

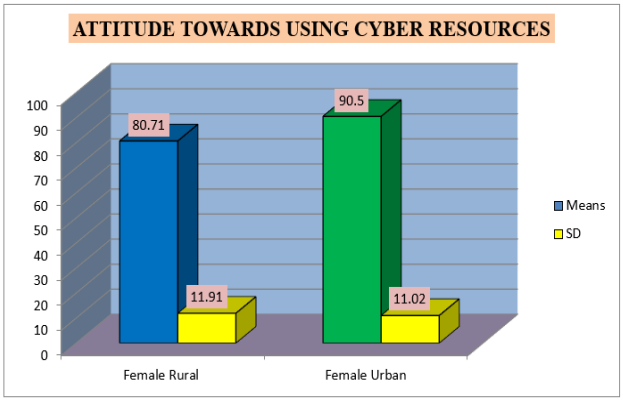


Local wise Gender, M, SD, N, and 't'-test of Attitude Towards Using Cyber Resources among the urban female and rural female

Variables	Group	N	Mean Score	SD	Mean Difference	t-value	Significance
Locale wise Gender	Rural Female	150	80.71	11.91	0.89	1.55	Not Significant
Locale wise Gender	Urban Female	150	90.5	11.02			
Table value 1.96 with df 298 on 0.05 level of significance.							

The data shows that rural female pupil teachers' mean score on Attitude towards using cyber resources is 80.71 and SD is 11.91.Where urban female pupil teachers' mean score on Attitude towards using cyber resources is 90.5 and SD is 11.02.The t-value between the urban female and rural female is observed as 1.55 at 298 degree of freedom. The level of significance is taken 0.05.Thus the calculated value of t is less than the table value 1.96. It indicates that it is not significant. It is concluded that there is no significant difference between rural female and urban female pupil teachers' attitude towards using cyber resources. Thus 2nd hypothesis is accepted

Bar graph shows the comparison of Attitude towards Using Cyber Resources among the urban female and rural female pupil teachers of Raipur district.



III. FINDINGS AND SUGGESTIONS

1. The finding of the study shows that there was no significant difference in attitude towards using cyber resources among the pupil teachers irrespective of locale and gender. Hence training colleges should arrange for seminars & workshops for the pupil teacher so that they should be aware about the updated aspects of educational technology.

2. Researcher suggests that the pupil teacher should develop their working skills and knowledge regarding cyber resources and should know how to handle and use cyber resources while teaching.

3. The training colleges of pupil teachers should make their trainees aware of the latest resources, their availability, scope, effectiveness and on the type of field for which the resources can be used, by arranging workshops on cyber resources.

4. Researcher suggests that the training college should provide updated and innovative teaching aids related to cyber resources to their trainees by which the trainee becomes well versed to those applications and develops positive attitude towards using cyber resources to achieve their teaching objectives.

5. Researcher suggests that awareness programs among the parents should be arranged by the central and state governments with the schools to increase the awareness about the importance of cyber resources.

6. Efforts should be made by the State Council of Education and Research and Training to train the teacher's of B.Ed. Colleges for making them more innovative while using cyber resources in their teaching learning process. This would enhance their teaching effectiveness while making it interesting.

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University & College Finder & Recommender Web Application System

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Abstract— **The University and College Finder & Recommender Web Application System is designed to help students make informed decisions about their higher education. The system offers personalized recommendations based on a student's academic background, financial situation, and personal preferences. With a comprehensive platform, students can easily compare and contrast different institutions, access detailed information about admission requirements, and obtain insights into campus life. The University and College Finder & Recommender Web Application System utilizes advanced algorithms to provide the most accurate recommendations to students. The system's recommendation engine takes into account multiple factors to make the best possible suggestions. The user interface is user friendly and intuitive, allowing students to navigate and find the information they need quickly and easily. In conclusion, the University and College Finder & Recommender Web Application System is a valuable tool for students searching for higher education institutions. It simplifies the complex process of choosing the right university or college, making it more accessible and convenient for students**.

Keywords—University and College Finder, Recommender Web Application System, higher education institutions, personalized recommendations, admission requirements, campus life, algorithms, user interface

I. INTRODUCTION

The University and College Finder & Recommender Web Application System is a platform designed to help students in their search for the best educational institutions and courses that meet their needs and goals. The application combines a comprehensive database of universities and colleges with advanced recommendation algorithms to provide students with personalized recommendations and a seamless user experience. The system offers a range of features, including a search engine that allows students to search for universities and colleges based on various criteria such as location, program offerings, and admission requirements. Additionally, the recommendation algorithm takes into account the student's personal preferences, academic background, and career goals to provide the most relevant and accurate recommendations. With the University and College Finder & Recommender Web Application System, students can easily find and compare the best educational options and make informed decisions about their future. The platform provides a one-stop solution for students, helping them to navigate the complex world of higher education and find the best path for their success.

II. LITERATURE REVIEW

In recent years, the higher education landscape has become increasingly complex, with a wide range of options available to students. To help students navigate this landscape and find the best educational options, a number of university and college finder and recommender web applications have been developed.

Studies have shown that students are often overwhelmed by the abundance of information available when searching for universities and colleges, and that they often struggle to make informed decisions about their education. In response, researchers have developed recommender systems to help students find the best educational options based on their personal preferences, academic background, and career goals.

Several studies have explored the use of recommender systems in the context of higher education. For example, one study found that a recommender system can significantly improve the accuracy of university and college recommendations for students. The study also found that students appreciate the convenience and personalized nature of the recommendations provided by the recommender system.

Another study explored the use of machine learning algorithms in the development of recommender systems for higher education. The study found that these algorithms can effectively predict student preferences and provide accurate recommendations. The study also found that students prefer recommendations that are based on their individual needs and preferences, rather than on generic criteria.

In conclusion, the literature suggests that university and college finder and recommender web applications can be an effective tool for students in their search for the best educational options. The use of recommender systems and machine learning algorithms can help to provide personalized and accurate recommendations, making the search process easier and more efficient.

III. METHODOLOGY

The methodology for the University and College Finder & Recommender Web Application System can be divided into several key steps, including:

Data Collection: The first step is to gather a comprehensive database of universities and colleges, along with information about their programs, admission requirements, and other relevant criteria. This information can be obtained from various sources, including academic databases, government websites, and educational organizations.

Data Cleaning: The next step is to clean and pre-process the data to ensure its quality and accuracy. This includes removing duplicates, dealing with missing or incomplete data, and standardizing the data into a consistent format.

Feature Engineering: The next step is to extract relevant features from the data and create a feature matrix. This matrix will be used as input to the recommender system.

Features may include information about the university or college, its programs, admission requirements, and other relevant criteria.

Model Development: The next step is to develop a recommender system based on the feature matrix. This can be done using a variety of algorithms, including collaborative filtering, content-based filtering, or matrix factorization. The goal is to develop a model that can accurately predict student preferences and provide relevant recommendations.

Model Evaluation: The next step is to evaluate the performance of the recommender system using a variety of metrics, such as accuracy, precision, recall, and F1 score. The model should be evaluated using a dataset of known student preferences and compared to other existing recommender systems.

Deployment: Finally, the recommender system should be deployed as a web application, accessible to students via the internet. The application should provide a user-friendly interface for students to search for universities and colleges, view recommendations, and make informed decisions about their education.

Existing System: -

Whenever we implement a new system it is developed to remove the shortcomings of an existing system. The computer has more Edge over the manual system. Getting an admission in a good College/University is a very tiring and complicated process. It may take weeks, even months to find relevant colleges which probably provide admission to students and even after wasting much time, students do not find colleges as per their requirement.

So firstly we will introduce the existing system, the existing system is based on a manual system i.e. users have to search each and every college individually for his/her admission process, which takes a lot of time to get relevant or deserving colleges list.

The Existing system earlier consisted of following operations-

• Manually Searching through search engines

• Getting data from respective college websites.

• Getting data from third party websites which hardly considered the necessary parameters for the college searching tool.

1. Absence of Recommendation System: -

The recommendation system is a very essential tool to provide list of colleges to the users which is evaluated automatically by the program based on the input data provided by the user after logging in the system

i. There are various sites which provide college finding facility but there are very few who provide recommendations to their registered users.

ii. This system is necessary to reduce the efforts of the user for getting an insight of which colleges he can apply for and have chance for getting an admit.

iii. This system analyzes and generates the list of colleges that a user can apply for based on his /her educational backgrounds or on the scores of the various entrance exams like GATE/SAT/CAT etc.

2. Data Redundancy

Take a few moments to inspect Figure 1. Notice that all of the fields now appear in a single table. Although this may seem simpler, it turns out to be a terrible idea. Look at the third and fourth rows in Figure 1. These two rows reflect the sales made to Kristin Reis. But look more closely and you‟ll notice that Kristin‟s information (First, Last, Street, City, State, Zip and Birth Date) is stored twice because she has been the customer in two different sales. If she had been the customer in 50 sales, this design would require that we store her name, address and birth-date 50 different times. Storing the same field values more than once (unnecessarily) is referred to as data redundancy. Three problems are caused by data redundancy. The first is that storing values multiple times wastes space. Under a proper design, Kristin's information is stored only once, in her record in the Customers table. The second problem is that when a field value changes, multiple occurrences need to be updated. For example, if Kristin moves, we'll need to change the values for her Street, City, State and Zip in multiple records. The third problem occurs if we forget to change the values in any of the records. The database would then have inconsistent data.

Figure 1: Data Redundancy Problem in table

i. Other Problems in Existing System

- Browser compatibility issues.
- Searching tedious.
- Do not cover all the modules that should be present for a college finding tool.

This methodology can be used to develop an effective and user-friendly university and college finder and recommender web application system. By combining a comprehensive database of educational institutions with advanced recommendation algorithms, the system can provide students with personalized and accurate recommendations, helping them to find the best educational options for their needs and goals.

IV. RESULTS AND DISCUSSION

- Proposed System

To overcome the drawback of existing system we have developed new system, which is a web based application in which the student/parent can simply search or explore the colleges anonymously. It also provides a special unit which specifies various career opportunities and course details for Masters/MBA applications. It is most reliable & time saving system for searching relevant and appropriate colleges from the comfort of your desktop.

1) A. Architecture of Proposed System

The components of the system are as explained below:

- **College Database:** The database is a repository for storing the college details as well as user details. The user related details can be updated through logging in their account.
- **College Finder Website:** The Website acts as an interface between user and database and helps to display information to the user.

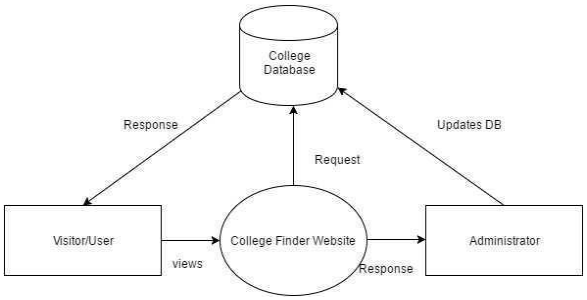

Figure 2: College Finder System Architecture

- User: The user retrieves information from the database about college data and manage their account.
- Administrator: The administrator updates the database as well as manage the users.

B. Operations of Proposed System

The proposed system has following operations as explained below:

1. Searching

Searching of colleges is used to find an appropriate college quickly. This feature is used to give accurate search results. The user enters a keyword related to the college and the colleges satisfying that keywords are retrieved.

2. Filtering

Filtering of colleges is used to find colleges based on various properties. This feature is used to give relevant college satisfying one or all the properties. The user enters options that they require (like Location, Degree offered).

3. Recommendation

It helps to recommend colleges to user based on the input data provided by the user after logging in their profile. The data of what user expects in the college is saved on the database and the colleges satisfying the data are retrieved.

4. Wish-List

It helps to add colleges to wish-list so that it is easier to review shortlisted colleges. The user has to login their profile in order to store the colleges to the wish-list.

VI. Conclusion

The University and College Finder & Recommender Web Application System is a powerful tool for students in their search for the best educational options. By combining a comprehensive database of universities and colleges with advanced recommendation algorithms, the system can provide students with personalized and accurate recommendations, helping them to make informed decisions about their education.

Studies have shown that students are often overwhelmed by the abundance of information available when searching for universities and colleges, and that they often struggle to make informed decisions. The use of recommender systems can help to simplify the process and provide students with recommendations that are tailored to their individual needs and preferences.

The methodology described in this paper provides a step-by-step guide to developing an effective and user-friendly university and college finder and recommender web application system. The system should be evaluated using a dataset of known student preferences and compared to other existing recommender systems to ensure its accuracy and effectiveness.

In conclusion, the University and College Finder & Recommender Web Application System is a valuable tool for students and educators, helping to make the process of finding and choosing the best educational options easier and more efficient. By providing personalized recommendations and a user-friendly interface, the system can help students to achieve their educational and career goals

VII ACKNOWLEDGMENT

The development of a University and College Finder & Recommender Web Application System would not be possible without the contributions of many individuals and organizations.

First and foremost, the authors would like to thank the students and educators who provided valuable input and feedback during the development process. Their insights and experiences helped to shape the final product and ensure its usefulness and effectiveness.

The authors would also like to acknowledge the contributions of academic researchers and experts in the field of recommendation systems. Their work provided the foundation for the development of the recommender algorithms used in the system.

Finally, the authors would like to express their gratitude to the educational institutions, government agencies, and other organizations that provided the data used to build the database of universities and colleges. Their contributions were essential to the success of the project.

This project was only possible through the combined efforts of these individuals and organizations, and the authors are grateful for their contribution

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Music Therapy and Attention Deficit Hyperactivity Disorder (ADHD)

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Abstract: **One form of psychotherapy is music therapy. It is described as "a methodical intervention procedure where the therapist assists the client in promoting health, using musical experiences and the relationships that arise through them as dynamic forces of change." Children with autism spectrum disorders, elderly individuals with Alzheimer's disease, and those who have suffered serious brain trauma can benefit from music therapy. Music therapy for kids with attention deficit disorder (ADHD or ADD) improves focus and attention, lessens hyperactivity, and builds social skills. Structure is provided by music. It has rhythm, structure, and structure is comforting to an ADHD brain that struggles to control itself in order to maintain a linear route. According to research, listening to enjoyable music raises dopamine levels in the brain. This brain chemical, which is This neurotransmitter, whose levels are low in ADHD brains, controls motivation, working memory, and attention. Three separate characteristics can be used to categorize music therapy approaches: the degree of organization, the focus of therapeutic attention, and whether the active or receptive mode is used. The active mode includes activities like singing, playing musical instruments, and free improvisation of songs. Use of pre-written music for relaxation or listening to recorded music chosen by the client or the therapist are two examples of receptive approaches. The degree of structure describes the amount of guidance provided by the music therapist. A higher level of structuring can involve the therapist choosing the activities in advance, whilst a lower level might involve the client and the therapist negotiating the activities during the session. Between musical genres, structural levels differ. Depending on the needs of the client and the different music therapy approaches, structuring levels can vary. The processes taking place inside the musical engagement itself or the verbal reflection of the client's problems prompted by the musical processes may be the focus of attention. The goals of music therapy include (a) eliciting alertness, relaxation, satisfaction, self-confidence, and enthusiasm; (b) fostering an environment in which the client can open up about issues, feelings, and thoughts; and (c) assisting in the discovery of unconscious attitudes or suppressed memories and feelings. One outstanding feature of music therapy is its capacity to meet a broad range of needs in individuals of all ages, including physical, mental, social, emotional, and spiritual needs, frequently addressing several needs at once.**

Keywords: ADHD, Music therapy, Brain diseases, Therapist, Improved health conditions and better approach to life.

I. INTRODUCTION

Almost all kids occasionally exhibit uncontrollable conduct. They could move quickly, create noise constantly, refuse to wait their turn, and collide with everything in their path. Other times, they could become disoriented, as if daydreaming, and fail to pay attention or finish what they start. Most usually recognized and treated in primary school, Attention Deficit Hyperactivity Disorder (ADHD) affects children and is characterized by inattention, overactivity, and impulsivity. According to population research, 5% of youngsters globally exhibit hyperactivity and poor attention spans. Children in elementary school are diagnosed with ADHD about twice as often as teenagers, and boys are diagnosed with it about twice as often as girls. Depending on the source of identification (such as a parent or teacher), perception of the degree of functional impairment, diagnostic criteria, and the threshold selected for defining a "case," ADHD symptoms in the general population exist on a continuum and are considered a "disorder" to varying degrees. Early on, children exhibit the developmentally excessive levels of impulsivity, overactivity, and inattention that characterize ADHD. However, oppositional non-compliant behaviors, tantrums, and hostility that co-occur with early indicators of ADHD in preschoolers can obscure evidence of inattention and overactivity and cloud the diagnosis. Disruptive Behavior Disorder (DBD), which includes Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), and ADHD, may be used to more broadly describe these behaviors. If not initially diagnosed at a young age, preschool-aged children with ODD often satisfy the criteria for ADHD by the end of the first grade. One of the concepts that has been bandied about a lot in recent years is "music therapy." Although there are several definitions for this topic, just a handful will be highlighted here. Professional music therapy is concealed in cultural processes, claims Stige (2012; 210). Studies have revealed the part music therapy plays in diagnostic and clinical evaluation, according to Wigram & Gold (2006).

Ansdell (2003;152-153) claims that music therapy may be viewed as the development of a continuous narrative about the use of music in the 20th century as a discipline, practice, and profession in certain circumstances and for specific purposes. A further challenge in defining music therapy, according to Bruscia (2016; 9), is that it has a

multidisciplinary nature. Music therapy is more than just a subject on its own; it is also a hybrid field that matches up with and covers the two fields (music and therapy) as well as other branches like art, health, medicine, education, psychology, human sciences, and others. Bruscia (2016; 11) asserts once more that music therapy is a discipline of art that is structured with science, focused on interpersonal and sociocultural processes, and as a science, gains life via art and is humanized by the therapist-counselor interaction. Wigram, Saperston, and West (1995) claim that music therapy is now regarded as both a science and an art. We can trace the history of music therapy to the founding of the National Music Therapy Association in the United States in 1950, according to Bruscia (2016;20) and Thompson (2009; 208). Wigram, Saperston, and West (1995) assert that the history of music therapy is both lengthy and recent. According to Merle-Fishman & Marcus (1982), Nord off & Robbins were the first researchers to examine a connection between musical behavior and disease.

According to Ak (2006; 235–243), there are essentially two approaches to employing music as a therapeutic tool: the active approach, which focuses on rhythm, sound harmony, dancing, singing, and the use of a musical instrument, and the passive approach, which focuses on listening. According to Thompson (2009; 210), the patients' engagement in music during active music therapy sessions involves both solo and group musical performances. Playing an instrument is also advantageous for the patients since it promotes the growth of attention, collaboration, and fine and gross motor control. According to James et al. (2015: 52), there are particular songs with lyrics that are associated to target abilities and musical improvisation in the research in the literature. Numerous studies and applications of music therapy have been done, and it has been shown that active treatments are employed more frequently than passive ones. (Rickson, 2006; Kim, Wigram, and Gold, 2009; Shore, 2003; Wigram, 1999; Gattino et al., 2011; MerleFishman, and Marcus, 1982; Wigram, 1999) Additionally, there is research that is conducted at music therapy facilities. 1992's Forinash In addition, there are other measures and methodologies in this field, such the Musical

Communicativeness Scale (Nordoff & Robbins: 1977, 2007) and the Music Therapy Communication and Social Interaction Scale (MTCSI; Guerrero et al., 2014). (Bell;2014:61) In 1959–1960, Nordoff and Robbins theorized their method. (Aigen: 2005) Music can facilitate verbal communication.

II. METHODOLOGY

Types of research Trials that use alternate allocation, a participant's birth date, or a case number to randomize participants are known as randomized controlled trials (RCTs) and quasi-randomized trials. Participant types There will be studies on teenagers and kids with ADHD who are under 18 years old. Adults (those above the age of 18) will not be permitted. Studies with participants aged 18 and younger and those with individuals aged 18 and older will be included if data for participants aged 18 and younger are separately supplied or can be obtained interventions' types. Any type of music therapy that complies with the criteria in Bruscia 1998 (see Background) will be evaluated in comparison to a no treatment control group or to standard care, including pharmaceutical or psychological interventions. Trials that combine music therapy with another kind of treatment will be included as long as both the experimental and control groups get the exact same intervention. Studies that don't specifically use music in a music therapy context or studies conducted by non-music therapists who use music will be disqualified. Result measurement types primary results:

1. The frequency or intensity of the primary symptoms
2. Inattention/Hyperactivity
3. Unfavorable result disruptive actions

The main findings will be derived from the child, parent, teacher, or other professional's comments on interviews or validated symptom rating instruments, such as the Conners

Teacher Rating Scale (CTRS) and Conners Parent Rating Scale (CPRS), both of which have been revised.

Secondary effects:

1. Academic and school performance
2. Results for families and society
3. The quality-of-life index
4. Disorders associated with ADHD:
   - Learning impairment
   - Disorder of oppositional Defiance
   - Behavior disorder
   - Emotional illness
   - Disorder tic
   - Affective disorders
   - Abusing drugs
   - Dysgenopathy
   - Somnipathy
5. Relationships with others
6. Any music therapy side effects that were mentioned in the trials

Official medical records, academic records, or validated symptom rating instruments like the Wechsler Individual Achievement Test (WIAT) or the Parenting Scale for Parents of Children with ADHD will be used to measure the secondary outcomes.

III. LITERATURE SURVEY

According to a review of the available data, music therapy is increasingly being used as a treatment option for Attention Deficit Hyperactivity Disorder (ADHD). Studies have looked into how well music therapy works to treat the impulsivity, hyperactivity, and inattentiveness that are hallmarks of ADHD. One study, for instance, discovered that after 10 weeks of therapy, children with ADHD showed significant improvements in their attention, hyperactivity, and impulsivity.

Another study looked at how music therapy affected people with ADHD's brain activity. According to this study, music therapy altered the activity of brain regions linked to attention, suggesting that it may aid people with ADHD who struggle with their attention and executive function.

Case studies and anecdotal data support the idea that music therapy may be advantageous for people with ADHD. Additionally, the sensory stimulation and emotional expression that music offers can also benefit those with ADHD. Music therapy can offer an organized, goal-oriented exercise that can help improve focus and attention in ADHD patients.

The literature also emphasizes the need for additional study to completely comprehend the mechanisms by which music therapy affects ADHD and to establish the best type and dosage of music therapy for people with ADHD.

The literature review concludes that music therapy has promise as a kind of treatment for people with ADHD. The evidence that is now available supports the use of music therapy as a complementary or alternative treatment for ADHD, even if additional research is required to completely understand its effects on the condition.

IV. LIMITATIONS

Music therapy for attention deficit hyperactivity disorder (ADHD) has its limits, much like any therapeutic strategy. These restrictions include, among others:

Lack of research: Although some studies have suggested that music therapy may be helpful for ADHD patients, further studies are required to completely understand the effectiveness of this treatment.

Limited accessibility: Music therapy is not available to all ADHD sufferers. This can be as a result of the expense, insurance coverage, or the scarcity of music therapists in the area.

Individual differences: Due to the wide range of reactions to therapy based on individual variations, including age, the severity of symptoms, and personal preferences, music therapy may not be beneficial for all people with ADHD. Limited duration of effects: Music therapy for ADHD may not have significant long-term effects. This could imply that in order for people with ADHD to continue to gain from music therapy, they would need to engage in it regularly. These restrictions emphasize the significance of taking into account a variety of therapeutic methods for ADHD, including medication, behavioral therapy, and other complementary therapies, to find the most effective course of action for each person. Working with a mental health expert is crucial because they can assess the unique requirements and difficulties of each person with ADHD and decide on the best course of action.

V. CURRENT TRENDS

The overarching goal of this study, which was motivated by a general dearth of research material, was to determine the degree to which the three core characteristics of ADHD behavior—inattention, hyperactivity, and impulsivity—appear both during musical engagement and after it has ended. Another focus was on the context and availability of active music production, which was motivated by evidence that suggests symptoms associated with ADHD may be minimized by an adequate teaching environment and good practice (e.g., Purves et al., 2011; Wiebe, 2007).

As a result, this study developed the following two research questions: (1) Can kids and teens with ADHD successfully participate in music education? (2) If yes, how does the presentation of ADHD vary when listening to music? The qualitative evaluations were strengthened by this quantitative data. The study's findings show that even though the affected people had symptoms associated with ADHD, they were still able to enjoy music and develop their musical abilities. ADHD was a disorder that varied depending on the pedagogical and artistic situation, not a static one. When participants were actively playing and performing music, their typical ADHD symptoms were either less noticeable or completely absent. A successful, context-sensitive, and inclusive pedagogy can incorporate students into successful individual and group music making, according to analyses.

VI. FUTURE SCOPE

For many years, patients with attention deficit hyperactivity disorder (ADHD) have benefited from the use of music therapy to better manage their symptoms and overall quality of life. It is anticipated that music therapy will gain more acceptance in the future as a supplemental treatment for ADHD and a variety of other mental health issues. Although research on the efficacy of music therapy for ADHD is still in its early stages, preliminary findings are encouraging. According to studies, music therapy can help people with ADHD focus better, feel less anxious, and have better moods. It's conceivable that music therapy will become increasingly more widely available and efficient as technology develops. For example, immersive, interactive music therapy experiences could be made using virtual

reality (VR) and augmented reality (AR) technologies. This might encourage improved therapy engagement and more therapeutic benefit in ADHD patients. Additionally, the introduction of wearable technologies, such as fitness trackers and smartwatches, may make it simpler for music therapists to monitor their patients' progress and modify their therapy sessions as necessary. Overall, music therapy for ADHD has a promising future, and it is probable that fresh discoveries and technological improvements will only serve to increase its advantages for those who suffer from this condition.

VII. CONCLUSION

To conclude, after reading this research paper, you should now have a better understanding of what music therapy is, how it functions, and how it might help you or a loved one who is dealing with a mental illness like ADHD. We hope that as soon as possible, these ailments are included to the list of those that have not yet been thoroughly investigated with music therapy so that even more individuals can benefit from its amazing effects.

VIII. ACKNOWLEDGMENT

Our HOD and project mentor, Ms. Sangeeta Vhatkar, provided great support that made it possible to complete this report and the research that went into it. This work was assisted by the Thakur College of Engineering and Technology. We are appreciative of the faculty at our university who provided information and insight that were very beneficial to the project. We also want to thank Ms. Sangeeta Vhatkar for sharing her thoughts and viewpoint with us throughout this endeavor.

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Department Information System

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Abstract -- **Department Information System is a computer-based system that is designed specifically to meet the needs of a particular department within an organization. The purpose of Department Information System is to provide a centralized platform for storing, processing, and managing data and information required for daily operations. The system will be used to store data for a department. It will store data such as staff member's information, events, and other data related to the department. The motivation behind the implementation of Department Information System is to bring significant improvements to the efficiency and effectiveness of the department, enabling it to better meet the needs of the organization.**

Keywords — Information, Information system, Information store, Data store, Database.

I. INTRODUCTION

1.1 Background

The departments in colleges need to store data related to various things. They need to store data about the teachers, the events that happen, fests, etc. The traditional way of storing this data is to manually do it using physical papers, files and folders. This becomes a problem in the modern world where more and more data is being stored. Due to this manually storing and recovering of data is time consuming in the modern business environment.

The modern business environment is characterized by an ever-increasing amount of data and information. Organizations must be able to manage this information effectively in order to remain competitive. The traditional methods of managing data, such as manual processes, are no longer sufficient in today's fast-paced and rapidly changing business environment. The traditional information management has the problems of low information recall, long query time, and poor information precision. This paper designs an information management system website on the department level.

1.2 Introduction

Department Information System is a management system for a department in a college or institute. It will be used to store information about students and faculties. It will manage all data in centralized manner and that can be accessed by anywhere and can be maintained by everyone in this project. The information system aims to fulfil the information requirements of staff and faculty of the Department, make the information source centralized and therefore easier to share, and also integrate with the other systems of the University.

Department Information Systems have become increasingly important in modern organizations, as they provide a centralized platform for storing, processing, and managing data and information required for daily operations. The purpose of Department Information System is to help departments work more efficiently and effectively by streamlining processes, improving communication and collaboration, enhancing data security, and providing real-time insights and analytics. The implementation of Department Information System has the potential to bring significant improvements to a department's performance, enabling it to better meet the needs of the organization.

The key elements of Department Information System include data management, workflow automation, communication and collaboration, reporting and analytics, data security, and integration with other systems. By improving data management, Department Information System helps to ensure that departments have access to the most up-to-date and accurate information, which is essential for making informed decisions.

1.3 Need of Department Information System

Department Information Systems are designed to meet the specific needs of a department, taking into account the unique processes and requirements of each department. The key elements of Department Information System include data management, workflow automation, communication and collaboration, reporting and analytics, data security, and integration with other systems.

(1) Data Management: Department Information System helps to ensure that departments have access to the most up-to-date and accurate information, which is essential for making informed decisions. By improving data management, Department Information System helps to reduce manual tasks and ensures that data is consistent and accurate. The system will also create backups so that the data doesn't get lost in the case if some problems occur.

(2) Workflow Automation: Department

Information System automates manual tasks, reducing the time and effort required to complete tasks and improving efficiency. This includes the automation of processes such as data entry, data validation, and data analysis. This will make it faster for the department and improve the efficiency of the work which would have been difficult in the traditional manual system.

(3) Communication and Collaboration: Department Information System provides a centralized platform for communication and collaboration, improving the speed and efficiency of information exchange. This includes features such as instant messaging, email, and document sharing.

(4) Reporting and Analytics: Department

Information System provides real-time insights into key performance indicators, enabling departments to make informed decisions based on accurate and up-to-date information. This includes features such as data visualization, dashboard creation, and data analysis.

(5) Data Security: Department Information System provides enhanced data security, helping to ensure that sensitive information is protected. This includes features such as data encryption, access controls, and data backup and recovery.

(6) Integration with Other Systems: Department Information System integrates with other systems, providing a seamless flow of information between systems. This helps to ensure that departments have access to the information they need, when they need it.

(7) Backup and recovery of data: The system will be able to backup the data. This will make it more reliable as even if data is lost in one place due to server failure or other technical errors, the department can still recover it using the other backups.

II. RELATED WORK

The literature survey on Department Information Systems shows that Department Information Systems has become an increasingly important tool for organizations to integrate and manage information from multiple sources. Many studies have been conducted to evaluate the benefits and challenges of Department Information Systems implementation, and researchers have proposed several improved models for Department

Information Systems design and implementation.

Studies have demonstrated the benefits of Department Information Systems implementation for organizations. Department Information Systems increase efficiency by automating and streamlining information management processes. Department Information Systems also improve communication and collaboration within and between departments, leading to more informed decision making.

However, the implementation of Department Information Systems also presents several challenges. The lack of standardization in Department Information Systems design and implementation results in inconsistencies and difficulties in integrating data from different sources. Department Information Systems implementation can also face resistance from employees who are reluctant to use new technology or lack the skills and knowledge to effectively use Department Information Systems. The need for specialized skills and robust technology infrastructure can also be a barrier to Department Information Systems implementation.

To address these challenges, we have proposed several improved models for Department

Information Systems design and implementation. A user-centered design approach involves users in the design process and ensures that Department Information Systems meets their needs and requirements. The adoption of best practices in Department Information Systems design and implementation, such as using industry standards, conducting thorough testing and quality assurance, and providing adequate training and support to users, can also improve Department Information Systems implementation.

The integration of artificial intelligence and machine learning algorithms can also improve Department Information Systems implementation by automating and streamlining information management processes, improving data accuracy and security, and providing insights and recommendations based on data analysis. Advanced data integration and management tools can also improve the efficiency and accuracy of Department Information Systems.

III. DESIGN

3.1 Database design

This project will be using MongoDB as its database to store the data. MongoDB is a document-oriented NoSQL database. MongoDB also allows the nesting of documents which will be useful for us to store related data such as events in fests, feedback of events. It is well-suited for modern web applications due to their scalability and flexibility in handling unstructured data. MongoDB provides features such as easy data storage, efficient querying, and indexing.

The database will store the following details:

• Login details: The data required for the users to log in the website. Every user will have a login id and a password that they need to login. The login will also store what type of user they are.

The user can be a teacher or admin.

• Users: The department information system will need to store the data about the users of this system or the staff members of the department. It will include the name, designation, username, etc.

• Fests: This will store the fests happened in the college. Each fest will have various events that have been in the particular fest. It will be stored in nested manner. The fests will also include feedback for each fest as a nested collection. The fests will store data like the events that happened, date, time and duration of the fest.

• Events: After logging in the users can view or add new events that have happened or will happen in college.

This will consist of seminars, workshops, and other events. The events collection will include feedback each event as a nested collection. The events will store data such as the date, name, purpose, participants, who took the event, etc.

• Feedback: This will store the feedback of the events and fests. The system needs to store the feedback too so that the department will be able to view the feedback and plan for future events and fests in a better way.

3.2 Pages

The system will include the following web pages:

(1) Login

This will be the first page that the user sees. They will need to login in order to use the website. Every user will have a login id and password that they need to login.

(2) Homepage

This page will appear after the user has legged in on the website. The user can go to other pages to add an event, view previously added events, view their profile data.

(3) Add event

The user will add events to the system on here. They will have to pick the type of event first. The user will have to fill various inputs about the event. The inputs will be data, time, name, taken by whom, etc.

(4) View events

The user can view the events that were previously added to the system. The events will store data such as the date, name, purpose, who took the event, etc. They can edit the events by clicking on edit button and then save the edits.

(5) Profile

The user will be able to see their information that is stored on the website. They can change the data if it is incorrect or ask the administrator to change it.

IV. METHODOLOGY

The methodology for the Department Information System project will utilize a database to store and manage information, and will be developed using MongoDB, Node.js, and a user interface.

MongoDB, a NoSQL database, will be used as the primary database for the project. NoSQL databases, such as MongoDB, are well-suited for modern web applications due to their scalability and flexibility in handling unstructured data. MongoDB provides features such as easy data storage, efficient querying, and indexing, making it a great choice for a web-based Department Information System.

Node.js will be used as the back-end technology for the Department Information System. Node.js is a popular platform for building fast, scalable, and efficient web applications. It provides a server-side environment for executing JavaScript code, which makes it well-suited for building web applications that interact with databases.

The user interface will be developed using HTML, CSS, and JavaScript. The UI will provide an intuitive and user-friendly interface for users to interact with the Department Information System. The UI will be designed with a modern and responsive layout, making it accessible on a variety of devices, such as desktop computers, laptops, and mobile devices.

The development of the Department Information System will follow an agile software development methodology, which emphasizes collaboration, iterative development, and continuous improvement. The Agile methodology will allow the development team to respond quickly to changes and provide regular updates to stakeholders throughout the development process.

At last the use of MongoDB, Node.js, and a user interface in the Department Information System project will provide a scalable, flexible, and efficient platform for information management. The project methodology, combined with the use of modern technologies, will ensure that the Department Information System is well-designed, user-friendly, and optimized for efficient information management.

1. Requirements Gathering: This stage will involve gathering requirements from Management and users to determine the specific needs and requirements for the Department Information System. This will help to define the scope of the project, and ensure that the Department Information System is developed to meet the needs of the users.

2. System Design: During this stage, the system design will be developed and refined based on the requirements gathered in the previous stage. The system design will outline the overall architecture of the Department Information System, including the components, modules, and relationships between them.

3. Implementation: In this stage, the actual development of the Department Information System will take place. This will involve the implementation of the system design and the development of the database, back-end, and user interface.

4. Testing: After the implementation is completed, the Department Information System will be thoroughly tested to ensure that it meets the requirements and is functional. This will involve both functional testing and performance testing to ensure that the Department Information System is optimized for performance and reliability.

5. Deployment: The final stage of the proposed work will involve deploying the Department Information System to the production environment. This will involve configuring the production environment, migrating the

data to the production database, and providing training and support to users.

The proposed work for the Department Information System project will involve the use of agile software development methodologies to ensure that the Department Information System is delivered on time, within budget, and to the required quality. The project will be continuously reviewed and improved throughout the development process, ensuring that the Department Information System is optimized for efficient information management.

V. RESULT AND DISCUSSION

The proposed Department Information System has the potential to be a valuable tool for organizations in the future. Its user-friendly interface, reliable performance, and scalability make it suitable for use in organizations of different sizes and types. The future integration of the Department Information System with other systems and the enhancement of its security will only make it more valuable to organizations.

The integration of the Department Information System with mobile devices, advanced analytics, and enhanced security will provide organizations with greater flexibility and efficiency in managing their information. The use of analytics will also provide organizations with valuable insights into their data, allowing them to make more informed decisions and improve their operations.

Overall, the Department Information System has the potential to significantly improve information management within organizations, providing a valuable tool for storing, accessing, and retrieving information. By continuously evaluating and improving the Department Information System, organizations can realize the full benefits of an effective information management system.

VI. CONCLUSION

The Department Information System is an important tool for managing information within organizations. A well-designed Department Information System can improve organizational efficiency, accuracy, and productivity. The proposed Department Information System project aims to address the challenges of information management by providing a user-friendly, reliable, and scalable information management solution.

VII. FUTURE WORK

In the future, the Department Information System will continue to evolve to better meet the needs of organizations. This includes enhancing its user interface and functionality, improving performance, increasing scalability, and ensuring security. Additionally, can will be integrated with mobile devices, enabling users to access the Department Information System from anywhere at any time. Integration with advanced analytics and machine learning will provide greater insights into information management, helping organizations make informed decisions. Finally, further research and development will be conducted to continuously improve the Department Information System and make it an essential tool for organizations.

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Mobile Software for Guiding Tourists in Uttarakhand

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Abstract - **This paper reviews the enthralling category in the world of mobile software – Tourist Guidance System. When stuck at a tourist spot, one would assumingly be unfamiliar with the place and naturally, would need some sort of assist to know more about the surrounding. In a situation as such, an aid available at the tip of one's fingers would be of great benefit. The proposed mobile software is just the aid an individual might need. In this guidance system, the authors have implemented a framework of google that will allow the users to have a familiar and friendly experience with the User Interface of the application. Features and functionalities are invoked in the form of widgets. These widgets serve as the interactive UI in the application. Some additional features of the proposed software include vital information and list of things to be looked out for before visiting Uttarakhand, a state with extreme temperatures and intensely variable geography, so the tourists can be well prepared. Along with that is the information of all nearest services based on the location that the tourist can turn to in the hour of emergency. Furthermore, the authors state the advantages of using this software as compared to** the existing systems and how the gaps are bridged.

Keyword: Tourist guidance system, mobile software, google framework, user interface, widgets.

I. INTRODUCTION

Hands-free devices also known as mobile phones has made a critical excursion in the province of tourism. These devices have shown different intricate qualities that allows the tourist to look for assistance in an isolated environment. Since tourism seems to have a substantial influence in augmenting a nation's economy and societal employment, the creation of mobile guidance software is essential. Nowadays, the most fundamental issues appear to have been resolved, and the sophistication of smartphones and tablets assistants has risen, leading to the establishments of research and commercial brand names (e.g., Mobile Travel Buddy, Mobile Travel Guide). However, numerous limitations of mobile computing must be thoroughly examined by tourist-related service

providers: limited energy capacity, constrained computing power, quantity of memory and storage space; smaller screen layout, inadequate color and font number support, compact and stressful to even use keyboard; low network bandwidth and exorbitant cost of wireless connections. Most existing conventional applications and research methodologies throughout the discipline of mobile tourism fall into three broad categories, which may include:

- Tourist or exhibition help guide with pre-installed software packages, i.e., content that is rigidly defined and cannot be customized based on user preferences.
- Digital phones always like to connect mobile browsers and web portals to search for tourist information.
- Wireless handheld guides are devices that access context-aware services via wireless or mobile network or GPS connections.

In this study, we proposed a model for a mobile application on a travel guide in the Indian government for Uttarakhand. This model will assist the government in developing digital tourism policies. Mobile devices (smartphones) are used for model implementation because nearly 90% of society uses them to find tourism-related information. As a result, we focused on regulation and the challenges of developing mobile-based application currently centered on three platforms: Mobile web, Android, and IOS.

The method used in conducting this research is the method of creating a smartphone application. There are several development methods designed specifically for mobile development, including MASAM, SleSS, and Mobile-D. MASAM is a development method based on the agile framework, but the work steps and implementation are very similar to Mobile-D. This method was discovered in 2008 with the work process, namely preparation, embodiment, development, and commercialization, and it is suitable for development in small businesses. SLeSS is a SCRUM development method that has five work steps: definition, measurement, analysis, improvement, and control.

SLeSS was discovered in 2011, and its application was specifically for embedded software development, whereas Mobile D is a pioneering method in the field of mobile application development processes. The Mobile D method can be done in groups of up to ten individuals, and the time required for computation is relatively short, taking less than ten weeks. Mobile-D first appeared in 2004; it is a development method that prioritizes speed in both development and change processes, with five stages, namely: explore, initialize, production, stabilize, system test, and fix.

The following is how the paper is organized. Section 2 discusses previous surveys in the field of mobile tourist guides, while Section 3 introduces our evaluation framework, which includes a classification of mobile tourist services as well as a definition of certain services' design dimensions. Section 4 discusses the findings and implications for future research before concluding the paper with a summary in Section 5.

II. RELATED WORK

The focus study that was conducted on a variety of websites and applications created to provide information to tourists is presented in this section as its result. It might

be possible to find a range of flaws in these websites and applications through critical examination that would make consumers dissatisfied. A lack of user-friendliness, a failure to receive detailed information anonymously due to the fact that many applications require users to register with their personal email addresses or Facebook identities in order to receive more information, and a lack of security owing to the fact that personally identifiable information, such as tour plans, places visited with times and dates associated with those visits, etc., is stored on the servers of the service provider, are among the biggest shortcomings encountered. Lack of targeting was another significant problem noticed, as there was no segmentation of tourists and numerous websites included various points of interest, including shopping outlets, entertainment venues, and other tourist destinations, on a single page or listing.

According to the research done by Dr. Deepak Kaushal, Anuj, Dr. Kamal Pant and Dr. Mandakini Sharma [3], customers are significantly influenced by mobile applications when deciding on their travel location. Data was gathered from clients as well as tour operators in order to achieve this goal. The study's findings indicate that customers' choices about their trip destinations are significantly influenced by mobile applications. This comprises the crucial elements of perceived trust and utility, as well as the mediation of attitudes toward mobile applications, which help travel and tourism-related businesses improve their offerings for better outcomes. Any company that works in the tourism sector, if it manages its mobile application well, may benefit from a competitive edge over its rivals.

C. Grün, H. Werthner, B. Pröll, W. Retschitzegger and W. Schwinger [4] proposed an extensive framework based on a comprehensive evaluation framework that goes beyond previous ones by offering a classification of services as well as three design dimensions for how those services might be tailored for the end user. The emphasis has shifted away from technical concerns and mobile limits in mobile applications and toward the total value of the services. The evaluation methodology assists suppliers of mobile tourist guides in gaining a comprehensive perspective of their

services and developing methods for differentiating their services from others. It can be used as the foundation for consumer field research on how people react to various types of services in terms of service delivery, service commencement, and service modification.

Chawda, Yogendra Singh [8], present the creation of a tourist guide system based on Android. The system is built on a three-tiered design. The system allows users to search for information about tourist attractions such as hotels, restaurants, museums, and live entertainment. The system combines a smartphone and the Internet to facilitate the user's journey. A new Semantic Web framework for information sharing and reuse is presented. The Semantic Web enforces information expressed in web resources by applying agent technologies. This opens it up to collaboration between humans and computers, possibly in conjunction with intelligent network services such as search agents.

III. CHALLENGES

In this section, we identify the challenges that must be overcome in order to run the prototype for creating mobile applications related to travellers' users in Uttarakhand. These challenges can be demonstrated by a few applications available on the Android Play Store and the IOS Appstore that provide information about tourism in Uttarakhand. Most applications only provide tourism information and do not go into detail about the B2B (business to business) procedures.

A. Difference between Mobile Platforms

The first factor that makes mobile development a topic is the variation between mobile platforms. Numerous users and communities utilise several platforms, including mobile web, Android, and iOS.

B. Internet Access

Although Uttarakhand has recently gained access of internet connectivity in the major places, lack of broadband connection has been a problem that has so far taken on a life of its own. The existing disparity in internet connection between major regions of Uttarakhand continues to be concentrated mostly in areas with the potential to attract tourists.

C. Unorganised travel guide

There are numerous tourist attractions in Uttarakhand that visitors can visit, although this is restricted by limited infrastructure and availability to travel guides. Tourists find it challenging to visit Uttarakhand's tourist attractions because the majority of travel guides are written by people from outside the region. Making a guideline and a blueprint that the Government of India can adopt for Uttarakhand to enhance tourist attractions is therefore important.

IV. METHODOLOGY

A. Problem Statement

Tourists visiting Uttarakhand face challenges in finding comprehensive and reliable information about tourist destinations, activities, and services in the region. As a result, they often miss out on key experiences and miss

opportunities to fully enjoy their visit. There is a need for a comprehensive, easy-to-use mobile app that provides tourists with accurate and up-to-date information about the region, including recommendations for things to do and see, places to stay, and local services.

This problem definition sets the stage for the development of a tourism app that addresses the needs and challenges of tourists visiting Uttarakhand. The app should be designed to provide tourists with the information they need to make the most of their visit, including recommendations for tourist destinations, activities, and services in the region.

B. Mobile-D development

Due to the specific demands and technical constraints of the mobile environment, developing mobile applications is currently a very difficult task, such as

• Terminal devices' restricted efficiency and rapid evolution,

• Various standards, protocols and network technologies,

• Must be able to run on a variety of platforms,

• `Particular requirements of mobile terminal user and,

• Strict time to market requirements.

To overcome the challenges of mobile application development, we are adopting the Mobile-D agile development approach. The Mobile-D approach is designed for a team of less than ten developers working in a co-located office space to deliver a highly integrated mobile application in a short period of time (i.e., less than 10 weeks). Mobile-D was created in collaboration with three companies that create mobile software products and services. The approach has passed the CMMI level 2 certification assessment.

Figure 1 (Mobile-D flowchart)

The Mobile-D approach divides a development project into five iterations. Set-up, core, core2, stabilize, and wrap- up are the phases. Each phase consists of three distinct-

phases. There are three types of development days: planning days, working days, and release days. An Integration Day is also required if multiple teams are working on different components of the same product at the same time.

C. Research and analysis:

● By conducting surveys and interviews we can understand the profiles of a typical tourist visiting Uttarakhand, including their age, interests.

● We can also analyze existing tourism apps and websites that cater to tourists visiting Uttarakhand, and identify their strengths and weaknesses.

● Conducting research to understand the key tourist destinations, activities and services that are most in demand in Uttarakhand.

● Conducting user testing sessions to gather feedback on the app's design and features, and to validate the research finding.

This research and analysis will provide a comprehensive understanding of the market and target audience for a tourism app focused on Uttarakhand which is a beautiful yet difficult terrain. By taking these steps, the app can be designed to meet the needs of the target audience and to provide a positive experience for tourists visiting Uttarakhand.

D. Conceptual design

Uttarakhand is difficult terrain and it shouldn't be treated like normal tourist spots. After the heart-wrenching "cloudburst" of 2013 there is still fear among people regarding visiting Uttarakhand especially Kedarnath which is a very important pilgrimage among Hindus. Despite the government's continuous efforts to improve the infrastructure there is still some work that needs to be done in order to make things better. This app can promote tourism in Uttarakhand. The basic approach is simple.

Figure 2 (E-tourism Design)

Interviews, Library studies, and field observations will be used as data collection methods. The study of the library is useful to look for references from previous research. In addition, this research also uses KNN algorithm in its implementation. The KNN algorithm is used to classify objects based on the training data that are closest to the object. The data fed forms clusters of its own. The working principle of K-Nearest Neighbor (KNN) is to find the closest distance between the data to be evaluated with its closest neighbor in the training data.

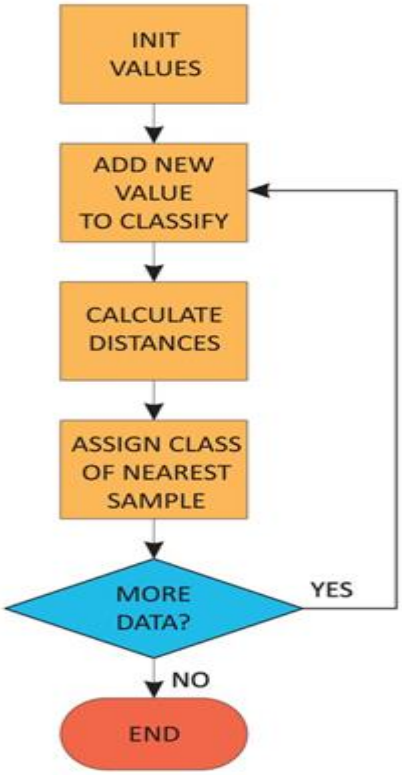

Figure 3 (KNN flowchart)

Flutter is a cross platform framework for creating a high-performance framework. Flutter was chosen as Google's application-level framework since it just relies on OEM widgets on the device instead of just consuming web views. Flutter applications run on Fuchsia in addition to Android and iOS. The hot reload feature in Flutter is known as stateful hot reload, and it is an important factor in shortening the development cycle. Dart is used to write every application in Flutter. Dart is a programming language created and maintained by Google.

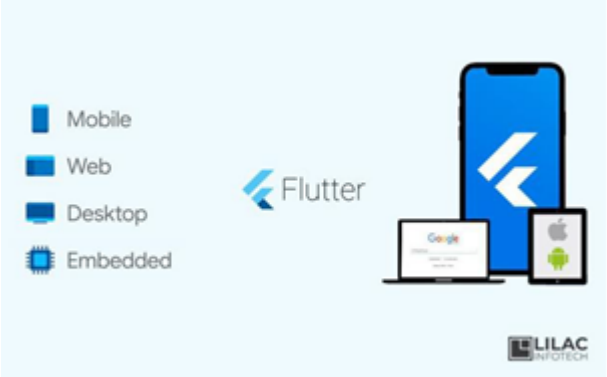

Figure 4 (Google-Flutter)

V. CONCLUSION

The state's enormous geographical, natural, and distinctive ecology, surrounded by gorgeous forests and rivers, provides significant opportunities for tourists to experience Uttarakhand. There are various roadblocks in the way of the state's tourist development that the government and locals must overcome.

The suggestion we make via a system based on mobile applications for tour operators in the Government of India for Uttarakhand. The government will use this approach to help with digital tourism policymaking. Utilizing the development method process, we leverage the steps of creating mobile applications in the proposed methodology (Mobile-D). We also create systems that minimize communication overhead and preserve battery life. A portion of the user's query can be handled locally using the data-caching technique, lowering the cost of wireless network traffic.

The google framework i.e., Google-Flutter, aids mobile tour guide service providers in gaining a comprehensive understanding of their offerings and in formulating plans to set them apart from competitors' offerings. Additionally, the google framework can serve as the foundation for field studies on customers' responses to various service delivery, commencement, and customization scenarios.

K- closest neighbor is a straightforward yet very accurate method that has worked well in a number of situations. The way the nearest neighbor algorithm categorizes newly discovered unlabeled data is by looking at the classes of its closest neighbors.

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Fitness Guidence Software

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Abstract—**An abstract for a fitness guidance software would summarize the key features and benefits of the software. Here's an example:" Our fitness guidance software provides personalized workout plans and nutrition recommendations based on an individual's fitness goals, body type, and health information. The software includes interactive tutorials, progress tracking, and the ability to connect with certified personal trainers. The user-friendly interface makes it easy to stay on track and meet fitness goals. Whether you're a beginner or a seasoned athlete, this software offers expert guidance to help you achieve your best self." Here's another example of an abstract for a fitness guidance software:" Our cutting-edge fitness guidance software is designed to help people of all fitness levels reach their health and wellness goals. With its advanced algorithms, the software creates custom exercise programs and meal plans based on a user's physical attributes, health conditions, and personal preferences. The software also offers real-time tracking and progress analysis, as well as motivational support through built-in reminders and community features. Whether you're looking to lose weight, build muscle, or simply maintain a healthy lifestyle, our fitness guidance software provides the tools and support you need to achieve your goals." "Our innovative fitness guidance software provides a comprehensive and personalized approach to health and wellness. The software combines artificial intelligence and human expertise to create customized exercise plans and nutrition recommendations. With its user- friendly interface, users can track their progress, set goals, and receive real-time feedback and motivation. The software also offers a wide range of workouts and meal options to fit any lifestyle, from beginner to advanced fitness levels. With our fitness guidance software, you'll have everything you need to achieve your health and wellness goals, all in one convenient place**

I. INTRODUCTION –

"Fitness and wellness are crucial components of a healthy and balanced lifestyle, but finding the right guidance and support can be a challenge. That's why we've created our fitness guidance software, a comprehensive platform that comes in. This innovative platform provides personalized exercise plans, nutrition recommendations, and progress tracking, all based on each user's unique goals and needs. The software combines advanced algorithms with human expertise to create custom programs that are effective and easy to follow. With its user-friendly interface and built-in motivation tools, our fitness guidance software makes it easier than ever to achieve your fitness and wellness goals. In this project, we'll examine the key features and benefits of our software, and how it helps users achieve their best selves."

recommendations, and progress tracking. Our software combines artificial intelligence and human expertise to create custom programs that are tailored to each user's fitness goals, body type, and health conditions. Whether you're a beginner or an experienced fitness enthusiast, our software provides everything you need to achieve your best self. In this project, we'll explore the features, benefits, and impact of our fitness guidance software, and why it's the ideal solution for anyone looking to improve their health and wellness."

"Staying fit and healthy can be a struggle, especially with busy schedules and conflicting advice from different sources. That's where our fitness guidance software

II. EXISTING SYSTEM—

Based on a user's fitness goals, body type, and health information, the software creates custom exercise programs and provides step-by-step instructions and tutorials. The software offers guidance on meal planning and nutrition, based on a user's calorie needs and dietary preferences. Users can track their progress, set goals, and view their workout history, helping them stay motivated and on track. Some fitness guidance software allows users to connect with certified personal trainers for additional support and guidance. Many fitness guidance software systems are mobile-friendly, allowing users to access their programs and track progress from their smartphones or tablets.

III. LITERATURE REVIEW—

Conduct a review of existing research on fitness and wellness, as well as on the use of technology for health and wellness. This will help you understand the current state of the field and identify gaps in the existing literature. Provide an overview of the topic, including a background on the importance of fitness and wellness, and the challenges people face when trying to achieve their goals. Discuss the role of technology in the fitness industry, and the increasing

popularity of fitness guidance software. Discuss existing studies on the use of technology for health and wellness, including the impact of fitness apps and wearable devices on behavior change. Highlight the limitations of previous research and the need for further investigation. Discuss the potential benefits of using fitness guidance software, including increased motivation, improved physical activity, and better dietary habits. Also, consider the challenges that users may face, such as lack of adherence, technical issues, and privacy concerns. Review studies that have examined the impact of fitness guidance software on various health outcomes, such as body composition, fitness levels, and health markers. Consider the limitations of these studies and the need for further research. Discuss the user experience of fitness guidance software, including satisfaction, engagement, and user behavior. Review studies that have investigated the factors that influence user adoption and adherence to fitness guidance software. Identify areas for future research, including the development of more advanced

and personalized fitness guidance software, and the investigation of the impact of these systems on specific populations and health outcomes.

IV. RESEARCH METHODOLOGY —

Choose a research design that is appropriate for your study. For example, you could conduct a randomized controlled trial, a longitudinal study, or a qualitative study. Consider the strengths and limitations of each design and choose the one that is most appropriate for your research question. Define the inclusion and exclusion criteria for your study. Decide how you will recruit participants and how you will obtain their consent. Consider the representativeness of your sample and the generalizability of your findings. Decide on the methods you will use to collect data, such as surveys, interviews, or self-reported data from the fitness guidance software. Consider the reliability and validity of your measures and the feasibility of your methods. Decide on the methods you will use to analyze your data. For example, you could use descriptive statistics, regression analysis, or thematic analysis. Consider the suitability of your methods for your research question and the type of data you have collected. Consider the ethical implications of your study. For example, you may need to obtain ethical approval, protect the privacy and confidentiality of your participants, and ensure that your methods do not cause harm to your participants. If your study involves an intervention using the fitness guidance software, you will need to consider the design and delivery of the intervention. For example, you may need to decide on the frequency and duration of the intervention, the mode of delivery (e.g. online, app-based), and the level of support provided to participants. Choose appropriate outcome measures for your study that align with your research question and the goals of the intervention. For example, you could measure changes in physical activity levels, body composition, or health markers. Consider the reliability and validity of your measures and the feasibility of collecting the data. Conduct a power analysis to determine the sample size required for your study to have sufficient statistical power to detect meaningful differences. This will help ensure that your study is adequately powered to answer your research question. Consider strategies to ensure the quality of your data, such as using validated measures, training your data collectors, and checking your data for outliers and missing values. Consider the limitations of your study and the potential sources of bias in your data when interpreting your results. Consider alternative explanations for your findings and the implications of your results for practice and future research. Document your methods and procedures in detail to ensure that your study is replicable and transparent. Consider sharing your data and code to facilitate replication and further investigation. network analysis. Finally, the results should be evaluated and interpreted in order to gain a better understanding of the disease and identify potential strategies for its treatment.

V. RESULTS —

Report the basic demographic characteristics of your sample, such as age, gender, and baseline levels of physical activity. Report the results of the outcome measures you used, such as changes in physical activity levels, body composition, or health markers. Provide descriptive statistics such as means and standard deviations, and inferential statistics such as t-tests or ANOVA. Report the effects of the intervention, if applicable, including any differences between the intervention group and the control group in terms of changes in the outcome measures. Report any exploratory analyses that you conducted, such as subgroup analyses or regression models. Report on changes in quality of life, if this was one of the outcomes measures used. Report on the level of adherence to the intervention, if this was measured. Report on the user experience of the fitness guidance software, if this was assessed. Report on the level of user engagement with the fitness guidance software, such as the number of sessions completed, time spent using the software, and completion rate. Report on the acceptability of the fitness guidance software, such as satisfaction ratings, ratings of ease of use, and the proportion of users who would recommend the software to others. Report on the cost-effectiveness of the fitness guidance software, if this was measured. This could include the cost per user, the cost per session, or the cost per unit change in the outcome measure. Report on any factors that mediate or moderate the effects of the fitness guidance software, such as user motivation, social support, or perceived barriers to physical activity. Report on the sustainability of the effects of the fitness guidance software over time, including whether users continued to use the software after the intervention and whether changes in the outcome measures were maintained. Report on the health outcomes associated with using the fitness guidance software, such as changes in blood pressure, cholesterol levels, or glucose levels.

VI.CONCLUSION —

Summarize the key results of the study, including the effects of the intervention, the level of user engagement and satisfaction, and any adverse events. Discuss the implications of the results for the use of fitness guidance software in practice, including recommendations for future use and areas for improvement. Acknowledge the limitations of the study, including any potential sources of bias, confounding, or confounding variables. Discuss the implications of the limitations for the generalizability of the results. Identify avenues for future research on fitness guidance software, including areas where further investigation is needed and potential avenues for improvement. End with a concluding statement that summarizes the main points of the study and highlights the significance of the results.

VII. ACKNOWLEDGEMENT —

Acknowledge any funding sources that supported the study, such as grants, scholarships, or sponsors. Recognize the members of the research team, including co-investigators, research assistants, and data analysts. Thank the participants in the study, including any volunteers or study subjects, for their time and effort. Acknowledge any institutional support received during the study, such as access to facilities, equipment, or databases. Recognize any mentors, advisors, or

supervisors who provided guidance and support during the study. Thank any colleagues who provided feedback, support, or collaboration during the study

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WeFine

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Abstract—**Life is becoming too busy to get medical appointments in person and to maintain a proper health care. The main idea of this work is to provide ease and comfort to patients while taking appointment from doctors and it also resolves the problems that the patients has to face while making an appointment. Online Doctor appointment is a smart web application, this provides a registration and login for both doctors and patients.**

Doctors can register by giving his necessary details like timings, fee, category, etc. After successful registration, the doctor can log in by giving username and password. The doctor can view the booking request by patients and if he accepts the patient requests the status will be shown as booking confirmed to the patient. He can also view the feedback given by the patient. The patients must be registered and log in to book a doctor basing the category and the type of problem patient is facing and the location.

The search results will show the list of doctors matching patients required criteria and he can select one and send a request the request will be forwarded to admin and admin forward to doctor and if he is available he will send the confirmation request back to admin the admin update the booking request and says confirmed to the patient. the patient can view the status in the status tab and also he will get the mail saying the booking is Confirmed.

Keywords: Appointment, online web application, hospital, scheduling, track, healthcare

I. INTRODUCTION

A doctor appointment booking system is a software or online platform that allows patients to schedule appointments with medical practitioners, such as doctors. The system typically allows users to search for available appointment times, select a preferred provider, and book the appointment online. This can streamline the scheduling process for both patients and healthcare providers, reducing the need for phone calls or in-person visits to book appointments. Some doctor appointment booking systems also provide features such as appointment reminders, online payment options, and medical history tracking.

The goal of a doctor appointment system is to improve patient experience: The system provides a convenient way for patients to book appointments, receive appointment reminders, and manage their schedules. This improves the overall patient experience and reduces the time spent waiting in line or on the phone to schedule appointments.

Increase efficiency: By automating the appointment booking process, the system helps healthcare providers manage their schedules more efficiently and reduces the risk of errors or missed appointments. Enhance communication: The system allows for easy communication between patients and healthcare providers, such as sending appointment reminders or sending test results. Streamline data management: The system provides a centralized database for storing patient information, appointment records, and other relevant data, making it easier for healthcare providers to access and manage patient information.

Save time and reduce costs: By reducing manual tasks and reducing the risk of errors, the system saves time and reduces costs for healthcare providers and their staff.

In short, a doctor appointment system aims to provide a better, more efficient, and more convenient experience for patients and healthcare providers.

II. LITERATURE SURVEY

A literature review on doctor appointment booking systems would encompass an examination of the existing academic and professional research related to the development, implementation, and impact of these systems. The review would likely cover topics such as:

1.Historical development of doctor appointment booking systems, including early paper-based systems and the transition to digital systems.

2.The benefits and challenges of doctor appointment booking systems for healthcare providers and patients, including issues related to accessibility, user experience, and privacy.

3.The impact of doctor appointment booking systems on healthcare outcomes, such as

reducing wait times and improving patient satisfaction.

4.An examination of different doctor appointment booking system models, including standalone systems, integrated systems, and those that use artificial intelligence or machine learning technologies.

5.A comparison of doctor appointment booking systems in different geographic regions, including the implementation of these systems in developing countries and the challenges they face.

6.The impact of doctor appointment booking systems on healthcare organizations, including

the role of these systems in reducing costs, improving efficiency, and increasing revenue.

7.An examination of future trends in doctor appointment booking systems, including the integration of telemedicine and the use of blockchain technology.

The literature review would aim to provide a comprehensive overview of the current state of doctor appointment booking systems, as well as an evaluation of their effectiveness and potential for future growth and improvement.

Application Referred:

1mg:

1mg is a healthcare technology company that provides an online platform for patients in India

to access information on medicines and health

products, book lab tests and diagnostic services, and consult with doctors through teleconsultation. The platform offers features such as medicine information, including generic alternatives and

pricing, appointment booking for diagnostic

services, and an online doctor consultation service. It aims to simplify healthcare and make it more accessible and affordable for patients. 1mg also provides a range of health-related products,

including over-the-counter medicines, wellness

products, and health devices.

Practo:

Practo is a healthcare technology company that provides a platform for patients to search, book, and consult with doctors and other healthcare professionals. The platform offers features such

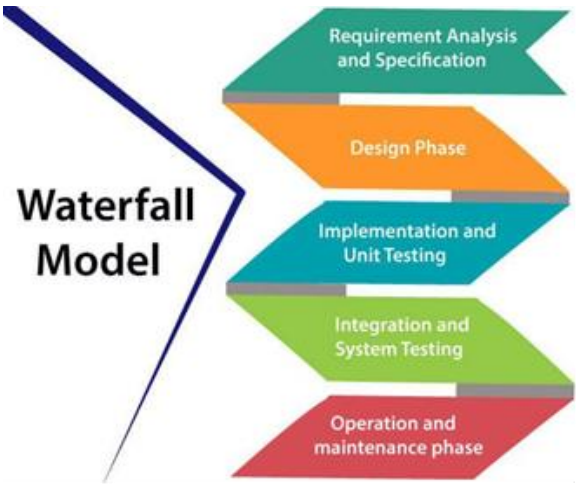
as doctor search, appointment booking, electronic

medical records, and teleconsultation services. It operates in several countries and aims to simplify healthcare and make it more accessible to patients

III. METHODOLOGY

The methodology implemented for problem solving is based on waterfall model. Scope of Further Development Online system is always a changeable system. It develops day by day, getting better and better to easier for peoples. This could be a revolutionary application that may help bonding between doctor and patient. We believe we can make this system more advanced in future. Advance features. and User interface will be updated in future. Our system is

already user friendly but we will try to make this system more user friendly in future. The methodology for developing a doctor appointment booking system would typically involve several steps, including:



1.Requirements gathering:

The first step would be to gather information about the requirements and needs of the stakeholders, including patients, healthcare providers, and administrative staff. This information can be gathered through surveys, focus groups, or one-on-one interviews.

2.System design:

Based on the requirements gathered, the next step would be to design the system, including its functional and non-functional requirements, such as user interface design, database design, and security requirements.

3.Prototyping:

A working prototype of the system can then be developed, allowing stakeholders to test and evaluate the system and provide feedback.

4.Development:

The next step would be to develop the final version of the system, incorporating any feedback received during the prototyping phase.

5.Testing:

The system should then be thoroughly tested to ensure that it meets the requirements and works as expected. This can include functional testing, performance testing, and security testing.

6.Deployment:

Once the system has been thoroughly tested, it can be deployed and made available for use by the stakeholders.

7.Maintenance:

The system should be monitored and maintained to ensure its continued performance and security, and to address any issues or bugs that arise.

The methodology for developing a doctor appointment booking system would typically involve collaboration between healthcare experts, software developers, and other stakeholders to ensure that the system meets the needs of all parties and is effective and user-friendly.

IV. CONCLUSION

With the help of IT , it is possible to transform health care and improve patient safety by better leveraging information technology to improve the efficiency, accuracy and effectiveness of healthcare system. Healthcare administrators and planners should take a long term view because the benefits will not be immediately tangible.

A doctor appointment system is an essential tool for modern healthcare providers. By providing patients with an easy and convenient way to book appointments and manage their schedules, and by streamlining appointment management for healthcare providers, the system helps improve the overall patient experience, increase efficiency, and reduce costs.

The proposed system outlined above is just one example of what a doctor appointment system could look like, and can be customized and tailored to meet the specific needs of healthcare providers. With the use of technology and

innovative design, doctor appointment systems are making it easier for patients to access healthcare services and are a valuable investment for healthcare providers.

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A Systematic Study on Cybersecurity Technologies Issues and Its Challenges

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Abstract— ***With the development of technology, usage of the internet and digital/social media is rising quickly. Sites like Twitter, Facebook, WhatsApp, Instagram, and Messenger are examples of social networks, YouTube, and Snapchat have made it possible for people to interact effectively and regularly. Utilizing the internet has both benefits and drawbacks. Online gambling, harassment, pornography, and cyberbullying all have become more common as a result of Internet users' lack of self-defense knowledge and skills. Because of the present digital change, cybersecurity is a common subject in both our professional and personal life. Cyberbullying and cyberterrorism, in which terrorist organizations utilize social media platforms to recruit new members, other negative features of social media that have been linked to them. It is necessary to provide instructional and educational resources on cybersecurity to students who may end up being targets of exploitation. The primary contribution This article puts an emphasis mostly on difficulties that contemporary technology, ethical issues, and recent developments in cyber security pose.***

Keywords: Cyber Security, Cyber Attacks, social media, Cybersecurity Awareness, cyberbullying

I. INTRODUCTION

Internet usage has increased by a staggering 1,355% between 2000 and 2022. Currently, 5 billion people, or 63% of the world's population, use the internet. The Online world is among the most important innovations of the twenty-first century that has had a big influence on our lives. [1]. Internet has influenced how users connect, play video games, study, buy, meet new people, watch films, and make purchases for groceries. bill payment, etc. by removing all obstacles [2]. A new paradigm of communication and engagement has been established by the development of social media. In order to communicate among our neighbors, friends, coworkers, and others, it has evolved into a necessary component of the professional lives Additionally, it was mentioned how the widespread usage of social media sites like Facebook and Twitter had substantially changed how individuals utilized the internet for both personal and professional reasons. Despite the fact that social media platforms have privacy controls, unscrupulous users nevertheless manage to acquire sensitive personal data. Therefore, since social media security has a direct impact on our life. Our world is becoming more networked, with digital data supporting crucial services and infrastructures. Concern exists around threats to the privacy, accuracy, and availability of digital information nation states, businesses, and end users alike. Everyone recognize that in today's digital environment, our personal information is more vulnerable than ever. Our entire civilization is interconnected the location where information is stored on computers and other electronic devices, including government infrastructure and internet banking. Intellectual property, financial data, personal information, and other sorts of confidential material that might be compromised by unauthorized access or disclosure should be protected., may bepresent in one or more of those data components.Cybercrime will be one of the biggest challenges that humanities will face in the next twenty years [3]. To solve the problem awareness should be there basedon Cyber security which is shown in the following figure 1.

Figure 1: Cyber security awareness

II. BACKGROUND AND RELATED WORK

2.1Internet: In addition to its typical application, the internet can be classed into the following three "E" categories [4].

- Education: This refers to in-class work, homework, and assignments.
- Edutainment: Applications that encourage problem solving through games, riddles, and other forms of amusement.
- Entertainment: Video games, social networking, and other entertainment-related activities.

Figure 2 illustrates few more other internet-related applications.

Figure 2: Usage of Internet

2.2 Cyber Security:

Addressing the idea of cyber security is crucial. defined as safeguarding a user's assets from potential attacks online. The concept of cybercrime appeared to somehow be linked to digital platforms' lack of protection in the mid-nineties. Cybersecurity issues went beyond technical ones and contributed to a number of social issues [5]. In general, three aspects of information systems that require protection are referred to as "cyber security":

- **Confidentiality-** Privacy of communications and information is referred to as confidentiality. example, imply limiting access to classified material to those who are permitted in the government. It could refer to the preservation of confidential information in the business world.
- **Integrity** - The guarantee that data or computer systems have not been altered or destroyed. Loss of data integrity could manifest as instructions to the system that cause financial, material, or human losses in the case of vital infrastructures.
- **Availability-** A guarantee that data or services will be available when needed. Interfering with availability includes things like denial-of-service attacks, which overload system servers and crash websites.

2.3 Cyber Approaches [6]:

2.3.1 Authentication and authorization and password protection: One of the most important important ways to protect personal details is to utilize a user name and password. This may be the first step in a cyber safety plan.

2.3.2 Authentication of data: Before downloading, alldocuments must be validated, meaning they must havecome from a reputable and trusted source and haven't been changed. Antivirus software installed on the devices often authenticates these papers. Therefore, having strong antivirus software is equally crucial for shielding the gadgets from malware.

2.3.3 Virus scanners: The strategy usually examines each folder or document on the computer for hazardous bugs or other code. Malicious code is indeed a general phrase encompassing items like bugs, parasites, and Adware that fall under the category called malware.

2.3.4 Firewalls: Is indeed a piece of hardware or software that protects against internet dangers like intruders, infections, and spyware. This installed barrier is now in charge of monitoring any communications coming inside and going out of the system, stopping individuals who don't follow the established safeguards, also checking each communication because it arrives in quits the web. Due to this, barriers become essential towards finding vulnerabilities.

2.3.5

2.3.6 Antivirus software: A piece of software code known as an antivirus application seeks out and gets ridof harmful software programmes like viruses and worms. In order to check for reported cases as immediately as they are discovered, the most of security software packages offer a software update option which allows the system to obtain malware characteristics. Virus protection software is a crucialnecessity for any computer.

III. EVOLVING CYBER SECURITY TRENDS

The following list includes several factors can significantly affect cyber threats [6].

3.1 Web servers: Web apps are still susceptible to attacks that aim to collect data or spread malicious software. Utilizing genuine network services that are infiltrated, scammers distribute such spyware. The media regularly reports on attacks that steal data, but they also represent a major hazard. The protection of web servers and online applications must now take center stage. These fraudsters explicitlyuse web servers as their preferred platform for data theft. Use a safer browser at all times, especially whilemaking important purchases, to prevent being a victimof these frauds [7].

3.2 Cloud technology and its capabilities: Nowadays, most commercial enterprises, moderate, and huge progressively adopting cloud solutions. To put it another way, the earth is moving gradually more towards the clouds. The most recent development poses a serious threat to cyber security since transmissions may bypass standard port for screening. In order to safeguard against the loss of sensitive information, global framework for web programs and cloud hosting will be required to advance along with the diversity of internet apps. Safety concerns have been raised and although cloud services corporations are implementing own respective procedures. The cloudoffers a lot of alternatives, but it's vital to keep in mind that as it grows, security issues also materialize.

3.3APTs and focused cyberattacks: Advanced Persistent Threat is a new level of anti-cybercrime software (APT). Web filtering and intrusion prevention systems (IPS) have been crucial in detecting these targeted efforts for a long period of time (mostly after the initial compromise). Allow us guys recognize attacks as they happen and become more adventurous and shadier in their methods, attackers must link with other security services. So, in order to prevent the introduction of new

hazards, must strengthen our security mechanisms [8].

3.4 Mobile Networks: Individuals have access to international communication in the modern day. However, security is a significant worry for such wireless services. the application of firewalls and other protection mechanisms is less impenetrable in modern times as more people use gadgets like tablets, phones, PCs, and other comparable ones that also need extra security measures beyond those present in the programmes being used. The security concerns with It are necessary to continually keep these cellular services under view. Network operators are also very vulnerable to such cyberattacks, thus the need for extraordinary attention inside the occurrence of whatever safety difficulties.

3.5 Internet protocol version 6: A IPv6 protocol will replace the function of a IPv4 protocol, that was the main underlying infrastructure for modern networks. Moving IPv4 capabilities won't be enough to safeguard IPv6 on its own. Security policy still has to take into account a few very basic protocol changes evenwhen In regard to the number of IP addresses that are allocated, IPv6 entirely replaces IPv4. In in order to reduce the risks that are usually a good idea to convert

3.6 on IPv6 as early when it is feasible because of cyberattacks. [9].

3.7Encryption of the code: Data should always be encrypted via cryptography in to keep attackers or snoopers access getting things. During an encryption method, every message or information is encrypted and decrypted. Switching to IPv6 as early when it is feasible always seems to be recommended because of theft., resulting in an unintelligible cypher text. Typically, a key for encryption is used, which defines the best way to encrypt this information. Somewhere at least interesting, cryptography safeguards the authenticity and confidentiality of information. basic level. Butwhen encryption is used more often, cyber security risks increase. Data being transported across networks is protected using encryption [10].

IV. LITERATURE REVIEW

In 2016 S S Tirumala et al. presented “a poll on Online media use and student awareness of cyberattacks” This study offered information on existing cybersecurity knowledge and emphasized the need to raise students' understanding of cybersecurity using wireless intercoms and other means.

In 2021 Farzana Quayyum et al. proposed “Children's Digital Knowledge: A Comprehensive Literature Analysis”. This study focuses on cybersecurity risks, awareness, approaches and solutions among children.

In 2017 Jitendra Jain et al. Presented “A Recent Analysis of Cybersecurity Security's Fundamentals”. Numerous security concerns related to information security also are included in the study of cybercrime as well as its elements.

In 2016 APRA presented “Cyber Security Survey Results”. This paper presented and observed the frequency of important cyber security events, the variety of threats, and the prevalence of high-risk cyber security discoveries. They recommended that everyone who is regulated develop an ongoing planto deal with the many types of growing cyber risk.

In 2017 Farhad Alam et al. "Utilization data mining strategies towards preventing information security" is indeed a proposal. Researchers discussed about several approaches to data mining that really are significantly linked to internet protection. They demonstrated how incredibly useful data mining- based interruption location tools are for locating security holes.

V. CYBERSECURITY ISSUES FOR SOCIAL MEDIA

The quick expansion of social media has a lot of benefits, but it has generated serious security risks. Furthermore, attackers can utilize it as a glaring weakness. The following lists some related concerns [11].

- **Information Security:** Customers might breach consumers' confidentiality if individuals post personal stuff on social media. It may even cause the loss if confidential information or encourage terrorists to utilize it for bad intentions. As fact, when a customer decides to make personal data available by nature, anyone can access that.

- **Data Mining:** Everybody leaves a digital trail, mostly online. When someone creates a new account on social media and adds details like their name, date of birth, location, and personal habits, all of these traits are utilized and shared with third- parties for targeted advertisements without theuser's knowledge. Security concerns may arise since a third party might learn the user's location in real time [12].

- **Virus and Malware Attacks:** How Adverts that really are offensive frequently allow spyware and viruses can gain access to a computer. Whenever a criminal gained access to a network, they either steal sensitive information or completely damage the computer system. Personal, professional, financial, and other types of data are frequently lost as a result.

- **Issues involving the use of third-Party software:** With able to reach confidential info includes contacts, pictures, or location information, the majority of apps today ask customers' approval during setup. Several of these idle applications might unintentionally attack the customer's device or the other connected phone using infections.

- **Legal Concerns:** Potential consequences associated with online social media include using publishing negative information about either person, organization, or nation. Legal proceedings can often be undertaken when certain incendiary comments were

written and circulated either by individual or collective.

VI. RISKS ASSOCIATED WITH SOCIAL MEDIA

As more individuals engage with social media, the threats are also expanding.

- **Cyber Fraud:** Cyber Fraud: Since countless individuals divulge personal information when subscribe for one or even more social media platforms, such content is vulnerable to Because criminals have the ability to reset passwords, solicit loans, as well as other unscrupulous activities, cybercrime is indeed a concern.

- **Romance Scams:** Whenever a scam artist acts as connected to a victim, develops a relationship with someone, and afterwards utilizes it to attempt to obtain personal details and money through people, this is a clever strategy.

- **Whistle-blowers:** Individuals typically behave unpredictably or vent their frustration with superiors or colleagues via social networking sites. Somebody may intentionally disclose personal information, which would be extremely harmful again for brand's reputation.

- **Cyberstalking:** Such phrase refers to cyberbullying. Cyberbullies irritate its victims on media platforms by posting crude or disrespectful comments. They manipulate survivor photographs and publish them on media platforms while complaining that the person's life is becoming terrible due to gossip.

- **Cyberbullying:** This term describes bullying that occurs online. It may happen on chat, gaming, and social networking sites. It attempts to frighten, humiliate, or irritate the intended victim [13].

- **Cyber Terrorism:** The use of media platforms in favor of crime activities has recently increased. It can support, encourage, participate in, and disseminate terrorism propaganda such as calls to violence, recruiting, radicalizing training, and plotting terrorist acts [14].

VII. PREVENT FROM CYBER ATTACKS

To Prevent from Cyber Attacks following are the solution given in figure 3 and listed the same.

- Use capitalized and lower characters, numbers, and slightly different for produce interactive credentials. It shouldn't be documented somewhere; it is only to be retained in mind.
- When uploading or sharing content on social networking sites, people should use caution and avoid revealing private information such as personal identity number, birth date, personal details, and photos from the families.
- Make utilization of the confidentiality and safety features on social networking websites, including the two-factor authentication method and access controls. Use only the downloading features of auto-lock.

Figure 3: How to Prevent from Cyber Attacks

- Avoid using pirated software, turn on the firewall, and make sure the programme is patched up to date.
- Ensure that regular scans and antivirus updatesare carried out.
- Use caution when browsing the internet to avoid visiting dubious websites; never click on website referral links; instead, put the URL directly into the browser.
- Must accept only friend requests from individuals know, and anyone who posts objectionable content will be blocked orunfriended.
-

VIII. CASE STUDY: ATTACK BY THE ENEMY ON PUNE'S COSMO BANK[15]

Attack by the enemy on Pune's Cosmos Bank The following case study examines a malicious assault on the Cosmos Bank in Pune between August 11 and August 13, 2018, which is one of the better instances of a malware attack. The internal architecture of the bank and the ATMs were both affected in this instance. Multiple malicious central code assaults were used in the crime to switch between the central and core banking systems of the bank. In essence, the code responded to clients' transaction requests by generating false payment transfer requests. 450 fake non-EVM debit cards from several countries were used to authorize sizeable cash withdrawals from ATMs after sending phone standing-in requests, altering the account balances of the targeted customers, and engaging in other illicit acts. Attackers injected malicious software into The fund's Automated teller machine shifting mechanism, which forbids confirmation of any payments made by customers using POS/ATM devices. PJAEE, 17 (6) (2020) 4664 A transaction request (TRQ)
once a withdrawing transaction occurs, is sent to a consumer banking accounting information system to verify and authenticate your credentials. If indeed the identification is approved, a transmission actually slower is transmitted to the user to verify them. In this instance, malicious code was utilized to transmit phone transactions reply messages in response to each transaction request at the ATM/POS [13]. As a result, The shifting mechanism of the account was managed to manipulate by hackers, prohibiting any payment demands and money confirmation from becoming

delivered to the central banking system. As a result of this attack on Cosmos Bank, layers of banking system defense were breached and 84 crores of rupees were syphoned off in two waves of large transactions. The banking infrastructure and background monitoring system of the Cosmos bank had been extensively studied by hackers; it was discovered after additional investigation. For unexplained reasons, it's possible that the bank executives disregarded every signal the system generated. It was important to not overlook the auditing of reports generated by banks [14].

Table 1- Frauds involving Banking sectors: RBI Announcement, as reference 2019 [16].

Year	**2018-2019**		**2019-20**		**Apr-Jun 2020**	
Banks	**No. of Frauds**	**Amount Involved**	**No. of Frauds**	**Amount Involved**	**No. of Frauds**	**Amount Involved**
Public Sector Banks	3,568	63,283	4,413	1,48,400	745	19,958
Private sector Banks	2,286	6,742	3,066	34,211	664	8,009
Foreign Banks	762	955	1,026	972	127	328
Financial Institutions	28	553	15	2,048	3	546
Small Finance Banks	115	8	147	11	16	2
Payment Banks	39	2	38	2	3	0
Local area Banks	1	0.02	2	0.43	0	0
Total	**6,799**	**71,543**	**8,707**	**1,85,644**	**1,558**	**28,843**

IX. BASED ON CASE STUDY: OUTCOMES

- Phishing, identity theft, and malware are major criminal acts in the Indian banking industry.
- Small errors and a lack of knowledge about cyber security procedures might lead to even major crimes. Any suspicious activity should be treated cautiously, and before taking any action, the relevant authorities should be notified. PJAEE, 17 (6) (2020) 4665.
- System must undergo regular audits to check for security flaws.
- Public sector banks ought to devote greater attention to improving security through associated with early and devote more funds to data protection and security framework improvement.
- Along with tracking ATM/POS machines transactions, the changing system communication with the main banking system should be regularly observed. There should be a stable system packet sent and received between and as an acknowledgment notification.

X. CUSTOMER AWARENESS CAMPAIGN

The emphasized safety precautions are below part of a customer awareness campaign that all bank employees must adhere to [17].

- Use secure and distinctive passwords when logging onto network shares removing any unused shares.
- For any offshore outsourcing, use a Private Network (VPN) instead of revealing distant workstations (RDP).
- Working folders shouldn't include shared applications in exe format. When necessary, only download from a secure source with IT Security's consent.
- Tracking RDP access and turning it off when not in use.
- Maintaining constant browser updates and blocking add pop-ups.
- Promptly confirming the legitimacy of the visited surfing site and prompt notification of the bank's IT security in the event of any suspicion.
- Always save relevant websites in your bookmarks to prevent connecting to Phishing web pages,
- posting of private information on any unidentified websites is prohibited.
- Examining each message, the organization sends out. When receiving messages from unknown communicators, need not read them. Instead, notify them towards the fund's scamming section. Ensuring that OS patches and security applications are applied at regular intervals.
- When it's not in use, the webcam must be hidden.
- Regular data backups to a safe place.
- On every site that hasn't been vetted or safeguarded

by IT Safety, sensitive information should not be communicated.

XI. CONCLUSION

As the world becomes more interconnected and more crucial transactions are performed via networks, computer security is a large issue that is growing more crucial. With each New Year that goes by, cybercrime continues to take various turns, compromising information security. The newest and most innovative technology, as well as the freshest cyber tools are

dangers and emerge every day, new platforms and intelligence is needed to safeguard infrastructure, which poses a challenge to enterprises. To ensure Spite of the fact that there is no optimal solution, individuals must make each effort to minimize cyberattacks if they desire a secure and protected environment in cyberspace.

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Security Enhancement for Data Transmission In 5G

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Abstract- **Ensuring that 5G devices are secure from cyber-attacks and that sensitive data is protected is a major challenge for the industry. This requires the development of new security protocols and the implementation of robust encryption algorithms. The parameters of such existing algorithms are Key size – 128, Rounds – 32, Hardware Throughput – 22.9 kbps, and Software Throughput – 342 kbps. Because of the adaptability of the algorithm used in various applications and environments, data and key length can be chosen with various sizes. This adaptability is an outcome of the simplicity of the design and this straightforwardness of Simon is moreover beneficial, they are exceptionally simple to implement, and efficient implementation can be had for minimal work this is a contrast to the algorithms such as Advanced Encryption Standard (AES). This project is to optimize the SIMON algorithm to increase the throughput of the data**.

Keywords Light weight cryptography, 5G Technology, Simon Algorithm.

I. INTRODUCTION

Wireless communication has reshaped our society. The development of mobile communication as specified and provided by the second, third, and fourth generation of mobile communication systems (respectively referred to as 2G, 3G, and long-term evolution (LTE)) has transformed us. Most people today own a mobile phone, keeping it close by, and conducting not only phone calls, and Internet browsing, but also several other very convenient services, which may include money transfers, mobile tickets, paying for parking, video conferencing, and 3D television etc. [1]

Today, researchers and Network engineers are focusing on the next generation of mobile communication, the so-called 5G system. This next-generation mobile network is currently being specified by the third-generation partnership project (3GPP). Mobile carriers have started building 5G networks in some cities and there are already a few mobile phones offering 5G connectivity. The 5G system will be the enabling platform for achieving the original goals set up in IMT-2020 [1], which contains several use cases spanning from voice and fast connectivity to new use cases, such as smart city, smart home, industrial automation, self-driving vehicles, and mission-critical applications. The impending deployment of the fifth generation (5G) cellular network has created a lot of enthusiasm in both industry and the scholarly world especially because of its commitment to empowering new applications. 5G is not only envisioned as a replacement for home broadband Internet but also is supposed to influence the tactical combat zone and emergency management by improving situational awareness. All these potential novel and critical applications of 5G can be attributed to its following enhancements over 4G LTE:

1. Improvements in the physical-layer technologies enabling the support of large numbers of devices with substantially improved bandwidth.
2. Robust security posture due to the introduction of security measures in the upper-layer of the 5G protocol stack. The 5G standard, however, has opened the door to a wide array of new security challenges stemming from:

i. New security policies that are not formally verified against adversarial assumptions
ii. Retaining security mechanisms from 4G LTE and its predecessors. [2]

II. BACKGROUND

Lightweight cryptography has a trade-off between security and its lightness. Recently, several educational communities are doing a significant quantity of work regarding lightweight cryptography to implement conventional cryptography standards efficiently, to design and analyze new lightweight algorithms and protocols. The widespread utilization of small computing devices such as sensors nodes, radiofrequency identification (RFID) tags, industrial controllers and smart cards indicates there have been massive changes in people's lives.

A. Importance of the Project

This project is important as, 5G is in the near future and it will connect all the devices to the internet. The flaw in 5G network will lead to immense of cyber-attack at very ease. Because the company that are manufacturing internet-based devices like smart watches and automatic cars are not focusing much of its security. PC's and servers have enough power and speed to be able to appropriately use heavy algorithms such as AES and SHA-256, etc. On the other hand, devices such as RFID chips and devices with constraints need algorithms that they will be able to run properly with enough speed and security. It will be useful in deciding how lightweight algorithms can be used and modified for 8 resource constrained devices. It will also provide a detailed analysis of performance metrics such as speed and data size.

B. Objectives and Scope of the Project

The main objectives of this project are:

• To provide a secure end-to-end data transmission in 5G using lightweight algorithms.
• To enhance confidentiality using lightweight algorithms in 5G devices.

• To enhance confidentiality by strengthening/modifying encryption algorithm.
• Performance evaluation using a lightweight algorithm on resource constrained device.

III. 5G ARCHITECTURE

A mobile communication network consists of two parts: the radio access network (RAN) and the core network. A RAN connects individual devices through radio connections with their core networks, while the core networks provide services to the users. Compared to the Evolved Packet System (EPS) architecture in 4G LTE, the pivotal evolution of 5G architecture is the wide adoption of cloud and virtualization technologies to support diverse and flexible services. Mobile network architectures that existed before were designed mainly to meet the requirements for voice and broadband services, which have proven to be insufficiently flexible in 5G with diverse nodes, interfaces, and services. This becomes one driving force behind leading to the softwarized architecture of 5G. With SDN and NFV technologies being able to support and manage the underlying physical infrastructure, it becomes possible to virtualize the network functions and move them to the cloud and perform the central control, processing, and management there. Compared to legacy cellular networks where an enormous of proprietary nodes and dedicated hardware appliances are deployed, the software zed architecture can reduce the equipment and deployment cost and improve the flexibility and availability to the management and evolution. Furthermore, network slicing makes it possible to design isolated virtual networks dedicated to different services as needed, e.g., vehicular network service, over a single physical architecture, thus satisfying the different requirements of diversified services. Figure 1 shows the 5G architecture reference model from 3GPP specification [3], where the components in the architecture are called network functions (NFs), which used to be different physical elements.

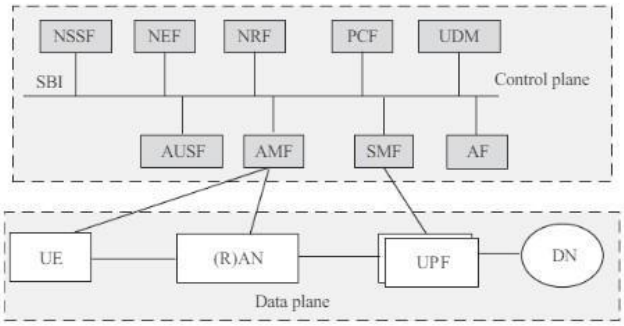

Figure 1. 5G Architecture

In 5G, these network functions are virtualized and software-based to be services, and thus can be well integrated to the cloud architecture. User equipment (UE) denotes a user and RAN is the radio access network. DN is the data network and the other components are the network functions residing in the core networks. Among them, user plane function (UPF) is a function working in the data plane, while others are in the control plane. Network functions are connected by reference points or service-based interfaces. Below we give some details to the access network and the core network.

Cloud/centralized radio access network (C-RAN) can be used in 5G for the radio access network, by utilizing the cloud and virtualization technologies to virtualize and centralize some functions of the base stations to the cloud, and thus reducing the cost on the deployment and management of the largely increased and densified base stations. The RAN then consists of distributed sites and a cloud centre. The RAN real-time functions, mainly at the physical layer and lower MAC layer, e.g., access network scheduling, interference coordination, modulation and coding, are still performed at the sites with dedicated hardware support; while some RAN non-real-time functions in the upper layers with low latency requirements, like inter cell handover, cell selection/reselection, user-plane encryption, could be moved to the cloud, where the resources can be shared and information exchanged [4].

IV. LITERATURE SURVEY

TABLE 1. LITERATURE SURVEY

Sr. No.	Paper Title	Authors Name	Technologies /algorithm	Related Outcome/Research Gap
1	An overview of cryptographic primitives for possible use in 5G and beyond	Jing Yang Thomas Johansson	AES-256 SNOW 3G SNOW-V ZUC-256	Discussed the confidentiality/integrity algorithms that are currently included or could potentially be included in the 5G. AES-256 and SNOW-V are probably going to be one of the choice.
2	A Review Paper on 5G Wireless Networks	Khushneet Kour Kausar Ali	5G	5G network architecture has been definite along with enormous MIMO technology, network function virtualization (NFV) cloud, and device-to-device communication.

3	Role of 5G Networks: Issues, Challenges and Applications	Arun Kumar Tripathi Akash Rajak Ajay Shrivastava	5G	A better assessment of 5G can be done by considering other performance metrics such as energy efficiency, spectral efficiency, latency, user fairness, implementation complexity, etc.
4	Study on Security and Privacy in 5G-Enabled Applications	Qin Qiu Shenglan Liu Sijia Xu Shengquan Yu	5G	Security risks that are found - (i) privacy leakage in the eMBB scenario and (ii) DDoS attacks in the uRLLC scenario.
5	5G Security Threat Assessment in Real Networks	Seongmin Park Daeun Kim Youngkwon Park Hyungjin Cho Dowon Kim Sungmoon Kwon	SNOW3G AES ZUC	Identified various security threats that may arise in the 5G NSA network and their solutions to enhance security.

4.1 Problem Statement

To experiment, modify and analyze lightweight cryptographic algorithms for data security and compare them based on total encryption/decryption time, memory consumption, size of input data, and power consumption using lightweight devices. The algorithm performance will be tested on a well-powered PC as well to see and optimize
it for resource limited devices.

V. ANALYSIS OF SIMON ALGORITHM

The SIMON block cipher with an n-bit word (and hence a 2n-bit block) is denoted by SIMON 2n, where n is required to be 16, 24, 32, 48, or 64. SIMON 2n with an m-word (mn-bit) key is referred as SIMON 2n/mn. For example, SIMON 64/128 refers to the version of SIMON acting on 64-bit plaintext blocks and using a 128-bit key. Each instance of SIMON uses the familiar Feistel rule of motion. The algorithm is engineered to be extremely small in hardware and easy to serialize at various levels, but care was taken so as not to sacrifice software performance.

ROUND FUNCTIONS

SIMON 2n encryption and decryption make use of the following operations on n-bit words: • bitwise XOR, ⊕, • bitwise AND, &, and • left circular shift, S j, by j bits. For k ∈ GF(2)n , the key-dependent SIMON 2n round function is the two-stage Feistel map Rk: GF(2)n × GF(2)n → GF(2)n × GF(2)n defined by Rk(x, y) = (y ⊕ f(x) ⊕ k, x), where f(x) = (Sx & S 8x) ⊕ S 2x and k is the round key. The inverse of the round function, used for decryption, is R −1 k (x, y) = (y, x ⊕ f(y) ⊕ k). The S key schedules take a key and from it generate a sequence of T key words k0, kT−1, where T is the number of rounds. The encryption map, then,

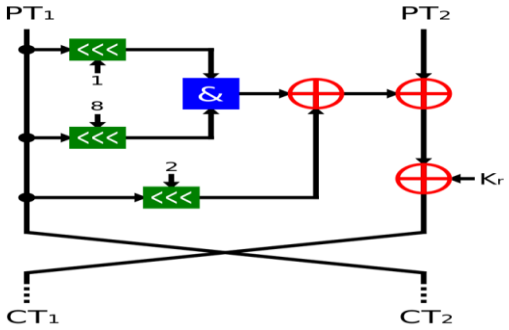

Figure 2. Feistel stepping of the Simon round function.

is the composition RkT−1 ◦ · · · ◦ Rk1 ◦ Rk0 , read from right to left. Figure 3.1 shows the effect of the round function Rki on the two words of sub cipher (xi+1, xi) at i step of this process. [5]

VI. PROPOSED SYSTEM

The proposed algorithm is a symmetric key block cipher. It constitutes 128-bit key. In any symmetric key algorithm, the encryption process is made up of several encryption rounds Sonic mathematical functions define each round to create confusion and diffusion. Increasing number of rounds will ensure better security but will increase the consumption of the device

A typical algorithm usually consists of on average 10 to 20 rounds so that the encryption process is strong enough, but the proposed algorithm restricted to only five rounds. The algorithm uses the Feistel network. It creates sufficient confusion and diffusion of data so that attacks can be confronted.

The algorithm consist of two parts:

A. Key scheduling

B. Encryption process

Key is the most fundamental component in the process of encryption and decryption. The entire security of the data is reliant on the key. the secrecy of the data will be test if an attacker happens to know the key. Therefore the

revelation of the key should be as difficult as possible. The Feistel network used here consists of five rounds each requiring five unique keys for the encryption/decryption purpose .On figure 4 the key scheduling block odd illustrated.
The proposed algorithm requires a64. Bit key. A64 bit of data can be encrypted or decrypted using the key. In order to guard against exhaustive search attack the length of the first key must be large enough to that it becomes difficult for the enemy to perform key searching attack .A cipher key takes input in 64-bit. The cipher key is input to the key expansion architecture. The block creates five unique key after going through much confusion and diffusion. The modification that is made from the existing algorithm is shown in dashed border. Inside the border there are four blocks called non-linear bit shuffling replacing conventional matrix operation. The non-linear bit shuffling of efficient in creating more confusion and diffusion then the other non-linear operation. The non-linear bit- shuffling is efficient in creating more confusion an

VII. RESULT AND DISCUSSOION

7.1 Performance analysis

After testing the data i.e. text files, audio files and video files of increasing key length we have obtain the below results in the form of graphs.

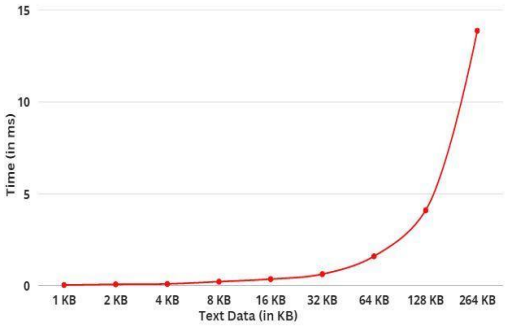

Figure 3.Encryption time vs. text data

The above Figure 3 is the graph of encryption time vs. text data and from Figure 3 it was observed that after 32kb of input data there is an exponential rise in time.

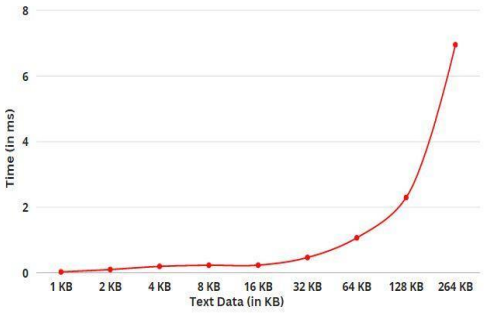

Figure 4.Decryption time vs. text data

The above Figure 4 is the graph of decryption time vs text data and from Figure 4 the pattern observed is similar to that of the graph of encryption time vs. text data (Figure 3).

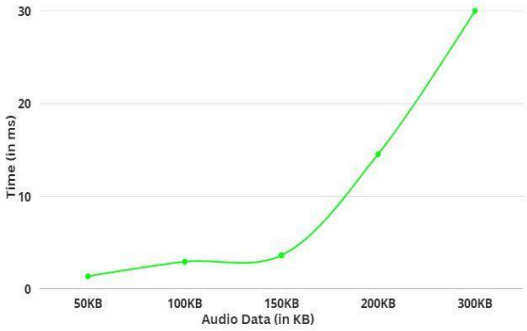

Figure 5 Encryption time vs audio data

The above Figure 5 is the graph of encryption time vs. audio data and from Figure 5 it was observed that after 150kb of input data there was a steep rise in encryption time.

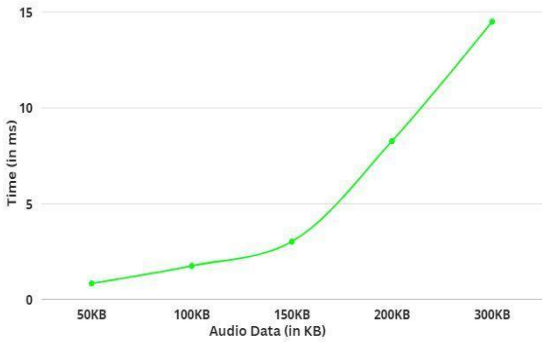

Figure 6 Decryption time vs. audio data

The above Figure 6 shows the graph of decryption time vs. audio data and from Figure 6 the pattern observed is similar to that of the Encryption time vs. audio data (Figure 5).

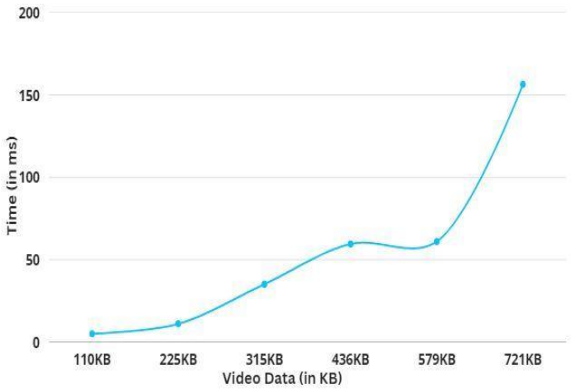

Figure 7 Encryption time vs. video data

The above Figure 7 represents the graph of encryption time vs. video data and from Figure 7 it was observed that after 579kb of input data there was a steep rise in the encryption time.

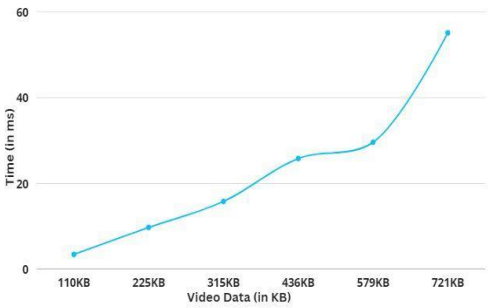

Figure 8 Decryption time vs. video data

The above Figure 8 represents the graph of decryption time vs. video data and from Figure 8 we observed similar pattern that of the encryption time vs. video data (Figure 7).

VIII. CONCLUSION

From the above observations it was discovered that as the size of the file increases encryption and decryption time increases exponentially. Also, it was found that there is a similar pattern between encryption and decryption of the same type of input data.

IX. FUTURE SCOPE

New and improved algorithms could be developed which are better in security levels and take less time for execution, have useless memory, and decrease power consumption. These would be beneficial for next-generation devices like the upcoming 5G devices. Similarly, the existing algorithm can be modified by changing the number of rounds and key size to make it more efficient.

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A Study And Review On Quantum Cryptography

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Abstract— **Quantum cryptography is a new innovation that uses quantum physics to protect network communications between two individuals. The inviolability of quantum mechanics laws underpins the security of these transmissions. Quantum cryptography, by extension, simply employs quantum mechanics principles to encrypt and transmit data in an un-hackable manner. Quantum computers are a new and fascinating branch of computer science. Quantum computer technology depends on quantum physics laws and has high processing power due to the ability to be in multiple states at the same time and perform all possible permutations. When quantum computers are developed, it will be very easy to solve many problems, including the accurate solution of very complicated processes. This research paper will give a brief history of quantum computers, an emergence to quantum computers, a characterization of how they work , a summary of their attributes and functionality, and various potential scopes of quantum computers.**

Keywords— Quantum cryptography, Virtual Private Network, QKD Protocol, Shor's Algorithm

I. INTRODUCTION

A. *Histoty of Quantum Cryptography*

Steven Wiesner created quantum cryptography in the early 1970s with his studies [1] "Conjugate Coding", which took more than ten years to complete. Quantum cryptography is based on some fundamental principles of quantum mechanics: the Heisenberg Uncertainty principle and the photon polarization principle. Based on the Heisenberg Uncertainty Principle, measuring the quantum state of any system without distributing that system is impossible [2,3,4]. Due to the no-cloning theorem, which was first presented by Wootters and Zurek, an eavesdropper cannot copy unknown qubits, i.e. unknown quantum states, according to the principle of photon polarization. Because of the no-cloning theorem, which was first presented by Wootters and Zurek in 1982[5], an eavesdropper cannot copy unknown qubits, i.e. unknown quantum states. Quantum computer technology is based on quantum physics laws and has high processing power due to the ability to be in multiple states at the same time and perform all possible permutations. When quantum computers are developed, it will be very easy to solve many problems, including the accurate solution of very complex chemical processes.

B. *Moore's Law*

In the past few decades, we have experienced the spectacular and, at times, inconceivable advancement of PCs. Since the invention of Silicon transistors, PC control has grown at an astounding rate, while PC estimate has shrunk at a comparable rate. To be sure, this reality has manifested itself as a law, Moore's law, fig. 1, which states that the number of transistors on a chip pairs every eighteen months. The physical hypothesis of items separated from their surroundings. Because it is extremely difficult to isolate expansive items, quantum theory is essentially a hypothesis of the tiny universe of particles and their constituents.

As one of its primary standards are the double wave-like as well as molecule-like behavior of both matter and radiation, along with the expectation of probabilities in circumstances where conventional predicts certainty.

For numerous reasons, traditional material science gives a reasonable guess to quantum physical science, particularly in conditions with a large number of particles. Max Planck, a physicist, presented his quantum hypothesis to the German Physical Society in 1900.

He discovered the answer to his question by assuming that vitality existed in discrete units, similar to how matter does, rather than as a continuous electromagnetic wave, as was previously assumed, and was thus quantifiable.

The presence of these units became the primary premise of quantum theory.

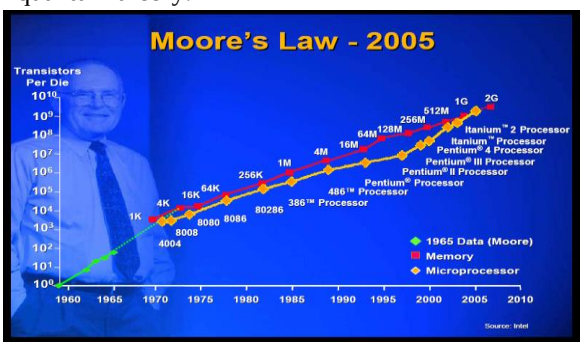


Fig. 1 Moore's Law[5]

Quantum Hypothesis Development

- Planck proposed in 1900 that vitality was composed of discrete units, or quanta.

- Albert Einstein predicted in 1905 that not only vitality, but also radiation, could be quantified in a similar way.
- In 1924, Louis de Broglie presented that there is no significant difference in the appearance and behaviour of vitality and matter; on the nuclear and subatomic levels, both can function as if they were made of particles or waves.

C. Quantum Computing

Quantum computing is a field of study that focuses on developing computer technology and describes the nature and behavior of energy and matter at the atomic and subatomic levels. It is based on the concept of quantum theory. The shortcomings of classical cryptography methods, which can be classified as "public-key systems," "private-key systems," and "one-time pad systems," inspired the development of quantum cryptography. In traditional cryptography, communicating parties must share a secret sequence of random numbers, known as the key, which is exchanged physically, putting security gaps open [6].

If the development of quantum computers is feasible, then from Abacus to modern-day Supercomputers, there will be a leap in computing capacity with a performance gain in the billion fold scopes and beyond. Alen Turning invented a programmable computer in 1936 to demonstrate that some mathematical problems could not be solved. Their argument was based on the idea that computers with sufficient resources are capable of realizing any appropriate algorithms. A quantum computer algorithm is a probabilistic transition for today's programmers that include imagining.

We can compare it to the first time we used a new technology, such as Object Oriented Programming or multithreading.

The computer that we use today fundamentally operates on two states: 0 or 1. A qubit (also known as a quantum bit) is a single unit of quantum information in quantum computing.

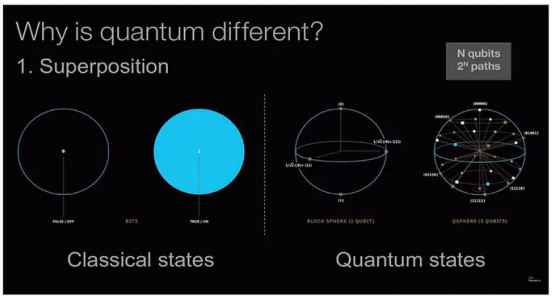


Fig.2. Superposition of Quantum [7]

Superposition is the property that states that a qubit can have both zeros and ones at the same time. According to the quantum system, a qubit does not have to be 0 or 1, but it can be in any ratio of 0 or 1. The quantum system allows you to be in several states at the same time.

D. Why quantum is different?

Entanglement is an extremely strong bonding between quantum particles. The correlation between quantum particles is extremely high, and even if they are separated by a great distance, their particles will be associated with one another. Quantum entanglement occurs when two particles or a group of particles behave in such a manner that their quantum superposition and properties cannot be characterized individually.

The distance between the two particles is irrelevant; they might be sitting perfectly next each other separated by billions of km. These particles appear to be linked in such a way that when one molecule is observed, it describes the state of the other.

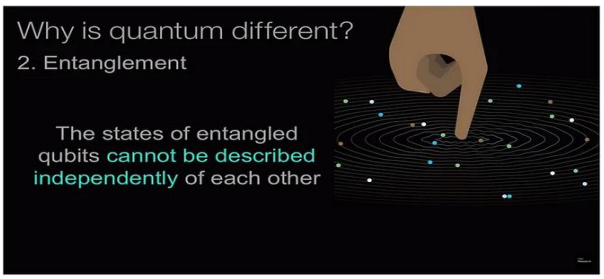


Fig. 3 Quantum Entanglement

E. Working of Quantum Computing

The quantum computer's operation is based on quantum physics, where the terms superposition, qubit, and entanglement are used to provide a better understanding of how it works.

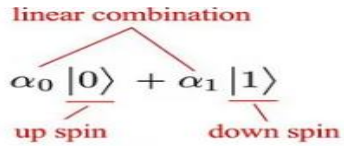
Now, consider the following hypothetical example to better understand how a quantum computer works to solve a problem: When working with a traditional computer, if one need to find a way out from one side of the tunnel to another opening end, they must choose one direction and begin following it until they reach the destination, which may be a dead end, at which point they must turn around and begin following another direction until they find the way out.

Now, for another approach, call two people and instruct one to stand at the tunnel entrance and the other at its exit. Now, in each direction, release a different colored gas; the individual standing at the exit point will determine the color of the gas particles that are initially noticed at the exit. As a result, the path determined by the individual standing at the exit point will be the best and shortest path through into the maze. A quantum computer functions similarly to the example above.

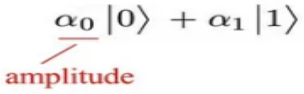
a. Qubits

A qubit is a physical quantum information carrier. It can encode an exponential amount of information with superposition, which can scale a solution better than classical computing. When measure a particle's spin, it is either in the "up" or "down" state. However, in the quantum world, the spin is in a state of

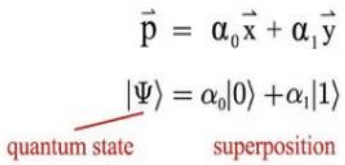
superposition. The mathematical description of a spin indicates whether it will be "up" or "down" when measured. Such uncertainty exists in reality until measure it. As a result, when one say a particle's spin is in a superposition of states, which merely mean it is in a linear combination of up spin and down spin.



The coefficient α is termed as the amplitude. It is associated with the likelihood of being "up" or "down" when measured.



The basis vectors are simply the up and down spin states (being 0 "up" or 1 "down"). The idea is similar to the x and y basis vectors in Newton's law of motion.



The superposition is shown in matrix form in The Dirac notation $|\psi\rangle$.

$$|\Psi\rangle = \alpha_0|0\rangle + \alpha_1|1\rangle = \begin{bmatrix} \alpha_0 \\ \alpha_1 \end{bmatrix}$$

superposition

The orthogonal basis vectors $|0\rangle$ and $|1\rangle$ are encoded as follows:

$$|0\rangle = \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \quad |1\rangle = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

0: not spin up

1: spin down

It also has a dual form written as:

$$\langle 0| = \begin{bmatrix} 1 & 0 \end{bmatrix}, \quad \langle 1| = \begin{bmatrix} 0 & 1 \end{bmatrix}$$

F. Quantum computing And Algorithm

Quantum cryptography tries to provide information security by utilizing the fundamental features of quantum mechanics. Charles Bennett and Gills Brassard created the first key distribution mechanism in 1984.

It is designated as BB84. This is the first discovered quantum distribution scheme. The distribution of single particles or photons is the foundation of the quantum system, and the polarization of a photon encodes the value of a classical bit.

The Heisenberg uncertainty principle and the principle of photon polarization are two major foundations of twentieth-century quantum mechanics on which quantum cryptography is based.

According to the Heisenberg principle, certain physical qualities are linked in such a way that measuring one prevents the observer from knowing the value of the other at the same time. When measuring the polarization of a photon, for example, the direction of measurement impacts all subsequence measurements.

This means that a photon's or light particle's polarization can only be determined at the time of measurement. This idea is critical in preventing eavesdropping attempts in a quantum cryptography-based cryptosystem.

The photon polarization principle, on the other hand, describes how light photons can be polarized in a certain direction. Furthermore, an eavesdropper cannot duplicate unknown qubits, or unknown quantum states, because of the no-cloning theorem [7].

Quantum cryptography allows two communications parties to agree on a bit string without having to meet face to face, and those two parties can be confident that the agreed bit string is solely shared between them.

BB84 enables two parties, often "Alice" and "Bob," to create a secret common key sequence using polarized photons.

Each of these photons is in one of the four states depicted by the symbols —, |, /, \.

The first two photon states are emitted by a rectilinearly oriented polarizer, while the remaining two states are emitted by a diagonally oriented polarizer.

For example: +(0)= — , +(1)= | , x(0)=/, x(1)= \

If Alice sends random sequence of photons: ++xx++xxx++xx the binary number represented with these states is 1110010110010. Following figure shows a working of quantum cryptography.

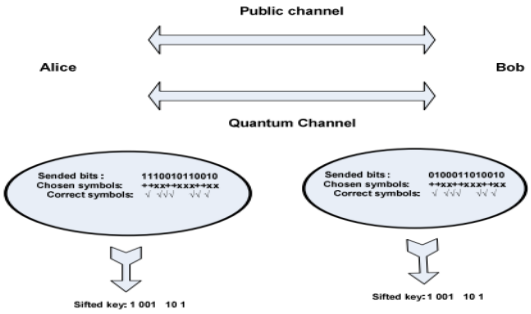


Fig. 4 Working of Quantum Cryptography [6]

II. DARPA QUANTUM CRYPTOGRAPHY NETWORK

The DARPA Quantum Network (2002-2007) was the first quantum key distribution (QKD) network in the world. The DARPA Quantum Network was entirely compatible with normal Internet technology and could be used to establish Virtual Private Networks (VPN), enable IPsec or other authentication, or for any other purpose. The cryptographic virtual private network is the DARPA security model.

Following figure shows that traditional Virtual Private Networks use public-key and symmetric cryptography to achieve confidentiality and authentication/integrity.

The public key mechanism facilitates key exchange or agreement as well as endpoint authentication.

Symmetric mechanisms (such as 3DES and AES) ensure traffic confidentiality and integrity.

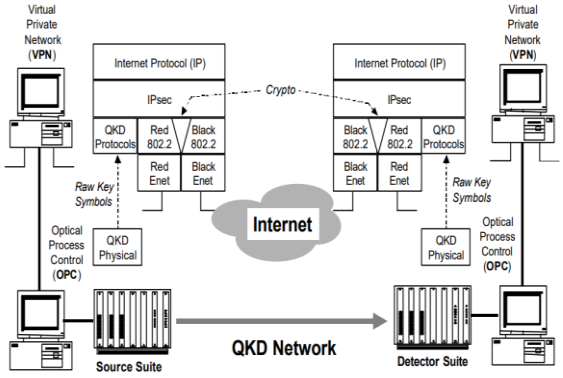


Fig. 5 A virtual Private Network (VPN) based on Quantum Key Distribution [8]

III. QKD Protocols

Basic steps required for to implement QKD Protocol Stack [9] is shown in below figure.

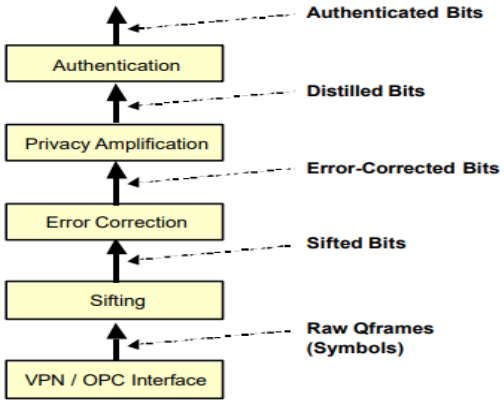


Fig 6 The QKD Protocol Stack [9]

Sifting is the process by which Alice and Bob filter out all of the prevalent "failed qubits" in a series of pulses. Sifting allows Alice and Bob to remove errors from their "raw" secret bit streams.

Error detection and correction allows Alice and Bob to identify all "error bits" within their shared, sifted bits and correct them. They have the similar sequence of error-corrected bits. The error detection procedure enables Alice and Bob to estimate the current Quantum Bit Error Rate (QBER) on their quantum channel, which can then be utilized as input for privacy amplification.

The method by which Alice and Bob lower Eve's knowledge of their shared bits to an acceptable degree is known as privacy augmentation.

Authentication protects Alice and Bob from "man in the middle attacks," which allow Alice to confirm that she is interacting with Bob (rather than Eve) and vice versa [10, 11].

IV. Shor's Algorithm

Shor's computation, discovered in 1994 by Peter Shor, is the standard scenario for a quantum calculation and one of the most crucial. The calculation used quantum figuring to solve the problem of determining the two prime variables of a whole number [12, 13]. This is a huge concern because most security systems rely on RSA encryption, which is based on a number being the result of two large prime integers. Shor's computation can factor a large number in polynomial time, but a standard PC has no known effective calculation for factoring large integers. If a person had a quantum computer with enough qubits, they could use Shor's calculation to hack into online banks, read other people's mails, and access vast amounts of other sensitive information.

V. Capabilities, Standards, and Resemblance with Current Systems

Quantum computers [14, 15] allow for quite vast concurrency: quantum parallelism is a property of quantum computers that allows them to solve a function f(x) for several possible values of x at the same time, whereas current techniques can only provide one solution at a time.

The computer provides a highly rapid environment for many computations: there are various difficulties such as mathematical equations, chemical formulas of chemistry, and physics concepts that the classical computer cannot evaluate, but the quantum computer solves them extremely quickly.

The quantum particles have such strong bonds that they remain connected even when separated by a vast distance, resulting in an excellent transmission.

Scientists and researchers are now expecting to use quantum simulation to create entirely new molecules for medicine. Researchers are also exploring for ways to use quantum mechanics to better understand how chemical changes function. Table 1 shows that Summary table for Quantum and classical cryptography. On a memory device, a traditional computer stores all information as either 1 or 0. (Binary system) [17]. Classic computers use this logic to solve specific problems with additional resources. Quantum Computers are the next level of computers that use quantum theory principles to solve problems. A qubit is a fundamental unit of the quantum computer.

A qubit can be 0 or 1 or a mixture or overlay in either st ate, whereas a binary bit can only be 0 or 1. Quantum algorithms are built on principles that are fundamentally distinct from standard algorithms. Quantum computers and bit developments have focused on quantum technology, such as quantum recreations, correspondence, calculation, climate, and sensors [17].

Table 1 a. Summary table for Quantum and classical cryptography [16]

Features	**Quantum Cryptography**	**Classical Cryptography**
Basis	Quantum mechanics	Mathematical computation
Development	Infantile & not tested fully	Deployed and tested
Existing Infrastructure	Sophisticated	Widely used
Digital Signature	Not present	Present

Bit rate	1 Mbits/avg. [10]	Depend on computing power
Cost	Crypto chip	Almost zero
Register storage(n bit) at any moment	One n-bit string	2^n n-bit string
Communication Range	10 miles	Millions

Scientists and researchers anticipate that quantum simulation will be used to build whole new molecules for medicine. Researchers are also looking into using quantum mechanics to better understand how chemical changes work.

Table 2 b. Classical computing vs Quantum computing [17]

Classical Computing	Quantum Computing
Calculates using transistors that can represent 0 or 1.	Calculates with qubits, which can represent both 0 and 1.
The number of transistors has a 1:1 relationship with power.	Power grows exponentially in direct proportion to the number of qubits.
Computers can operate with a low error rate at room temperature.	Computers have a high error rate and must be kept extremely cold.
The majority of everyday processing is best handled by traditional computers.	Ideal for tasks such as optimization, data analysis, and simulation.

Table 2b shows comparison between the classical and quantum computing areas in different parameters.

VI. Future Scope

Following a long period of laborious struggle with no promise of success, quantum processing is suddenly humming with warmer intensity and action.
Almost two years ago, IBM made a quantum PC available to the public: the 5-quantum-bit (qubit) asset known as the IBM Q encounter. That appeared to be more of a toy for experts than a means for doing any real math.

Transmon cryogenic 5-qubit gadgets, for example, have marked the end of the era of conventional Quantum PCs.
Experts worldwide are currently concentrating on establishing large-scale production of multi-qubit gadgets in order to enable the development of costly scale Quantum PCs with billions of qubits, which will be required to address real concerns.

Furthermore, quantum computers require additional effort to detect and correct errors because all qubit technologies available today are exceedingly fragile and prone to error.
Researchers in China and others have started to look into the feasibility of developing quantum systems using equivalent standards to quantum figuring.

Inside the long haul, the establishment of these systems would set the stage for a quantum web, a more secure correspondence framework in which data is stored and sent using cutting-edge cryptography. However, such a system won't be truly recognized until quantum PCs become multifunctional, which Science fiction supporters believe will happen before 2050. Researchers are eager to use Quantum PCs to analyze organisms in order to create new antibodies, which the Quantum computer could then use to improve to reduce undesired interactions.
Some scholars believe that Quantum PCs are critical for achieving achievement protection and medical standards for social insurance.

VII. Conclusion

In comparison to current conventional systems, quantum computing is a very advanced technology. Quantum computing processing is extremely fast, and it is also extremely powerful. As we can see, everything is connected to the computer, and every aspect of our work is dependent on computers, so quantum computing as an innovation in the field of computing will shape the future and learning thing for society, where various problems and difficulties will be easily solved in very little time.

However, the deployment of the quantum computer is challenging; for example, it is difficult to manage quantum particles, the quantum computer produces a lot of heat, therefore it requires a cool atmosphere, they are extremely costly.

The quantum computer is not designed for tasks such as word documents or email communication.

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Blockchain Application in the Energy Industry

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Abstract— **Along with its energy industry, the Indian economy is on the verge of a revolution in energy transmission. A more adaptable, intelligent transmission system dependent on cutting-edge technologies is already beginning to replace the conventional transmission system. The increase of electrical sources is beginning to put pressure on the Indian grid infrastructure. India will need a dependable EV charging infrastructure above all else. Blockchain technology has the potential to help India overcome its charging infrastructure development dilemma as well as the issue of the short electric range of these EVs. Blockchain even promises to give a viable answer for users' transaction privacy. With its distributed ledger technology, all transactions may be pooled together and allocated a specific unique code, preserving privacy. As the renewable sector expands at a rapid 17.33% CAGR. Transmission and distribution losses, as well as decreased power purchase agreement (PPA) prices for prosumers, drive blockchain technology forward. Indian enterprises should seize the chance with both hands and make the most of best practices combined with innovation. India has the potential to be a driving force in the digitally driven future of renewable energy distribution and transmission.**

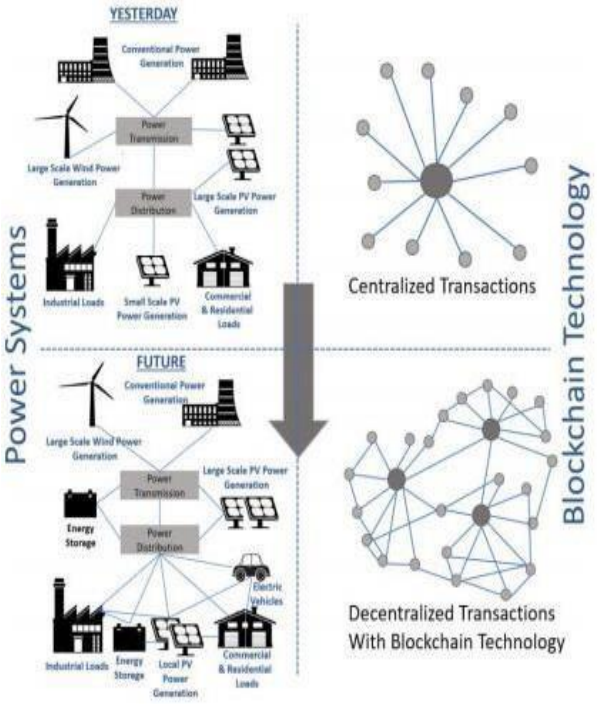
Keywords—Energy Blockchain, Peer-to-Peer Trading, Renewable energy trading, Energy Infrastructure

I. INTRODUCTION

Blockchain is a revolutionary technology that has emerged in this digital era and is based on cryptography. This technology enables transaction management in real time. Based on the term, Blockchain, construct a data block that is linked to the preceding block in the chain. Blockchain transactions cannot be changed since each block has a unique number and a hash function that is connected to the preceding block. This eliminates the need for a central administrator because the transaction is recorded on a distributed ledger and validated by network peers. In general, there is a conventional energy market in India, where users may purchase power from approved businesses. Peer-to-Peer trading is a new type of energy trading system.

The energy is subsequently stored in a digital electricity plant (VPP), which allows for asset management and tracking. Before each day of buying and selling begins, the gadget uses an average of predictions to estimate how much energy will be produced during the day. The energy consumers have a role in a smart grid since each energy

(4.) There is no incentive system in place to encourage the adoption of energy transfer using blockchain Both the consumer and the provider are involved. Excess renewable energy generation might be exchanged with the utility and other customers in need of power resources for mutual benefit.



II. LITERATURE REVIEW

Because of the increase in renewable energy sources, energy trade is transitioning from centralized to dispersed. The extra renewable energy generated can be transferred for mutual benefit to other users with power deficits via application. People have widely adopted Blockchain, a digital distributed public ledger technology. The government has also demonstrated their vision for smart grids, new models, and technologies that can produce solutions to efficiently manage energy and allow for an optimal flow of power. Individuals can only buy power in a traditional grid, however in smart grid technologies, individuals can be both power suppliers and consumers.

Challenges of Blockchain enabled Energy Trading:

(1.) In comparison to transaction costs, efficiency is low and it is impossible to achieve system requirements due to other technical shortcomings of the technology.

(2.) Because blockchain technology is complicated to understand, some people may decide not to use it at first. (3.) The pricing strategy for a deal is flexible.technology. How to safeguard the privacy of the data is the issue that needs to be resolved.

(5.) It is challenging to guarantee the lowest cost when there are so many variables that affect the system.

(6.) Strict, unclear rules or framework

(7.) Another difficulty now is the excessive powerusage & lack of interoperability.

III. METHODOLOGY

Based on the energy exchange mechanism now in place in Brooklyn, USA, a blockchain model was created. The construction of subtleties like infrastructure, procedure,

and phone apps model was made after a thorough analysis of the literature in the sectors of blockchain and energy transfer. A decentralized blockchain system feasibility assessment is then conducted. Numerous businesses, such Power Ledger, Ener Chain, Me SOL Share, etc., are now working to establish an energy blockchain. This paper is based on a careful analysis of numerous blockchain-based apps used by various businesses throughout the world. There are now some gaps inthe blockchain technology that limit its potential applications. Based on an analysis of these gaps under specific criteria using various research reports and expert publications, corrective methods are being offered to close these gaps.

IV. ANALYSIS

A. Applications of Blockchain

1) Wholesale distribution of electricity

Businesses looking to integrate blockchain technology into the wholesale power distribution sector are aware of the importance of tying end consumers to the grid. With the useof blockchain technology, consumers may purchase and sell energy instantly from the grid rather than from retailers. Grid+ is a blockchain energy firm that specializes in distributing wholesale power. The company has identifiedretailers as the primary driver of inefficiencies in the consumer energy sector. Very little or none of the grid infrastructure is owned by retailers. By adding a blockchain- based platform to existing retailers, it is possible to cut client costs by about 40%.

1) Peer-to-peer energy trading:

According to a Wood analysis, more than 50% of blockchain-based power projects engage in P2P trading. In this system, a person with excess power can trade with someone who needs power. No other agency is involved in this.

Enterprise versions of Ethereum are used by many businesses. For instance, the energy web foundation base builds up their platform using Ethereum, Truffle developer tools, and Gnosis multi-signature wallets. People who generate their own energy may be able to trade it with their friends and neighbors.

Power Ledger, a corporation with its headquarters in Australia, has linked groups together to form "micro grids." A micro grid is a collection of connected but dispersed energy sources. Additionally, in parts of the expanding world where electricity grids can.

However, blockchain can still enable more players to sell electricity even if it cannot completely replace the grid. For instance, Vattenfall, the largest utility in the Nordic region, is conducting trials in which it uses a private blockchain network to record energy transactions in which department stores or possibly individual homes can sell energy produced by distributed batteries or solar panels; in the past, such transactions may have been prohibitively expensive and time-consuming to process.

2) Electricity data management:

Customers may benefit from better performance and control over their energy assets thanks to blockchain. An immutable ledger also provides safe and up-to-date information on energy usage statistics. Market prices, marginal prices, compliance with power regulations, and fuel prices are only a few examples of the several sorts of energy records. Records are routinely purposefully manipulated, simultaneously altered, and omitted.

Businesses and governments may be hampered by the costs associated with intentional desecration and unintentional administrative errors. Like how open blockchains' simplicity reduces the likelihood of financial or record-related misuse.

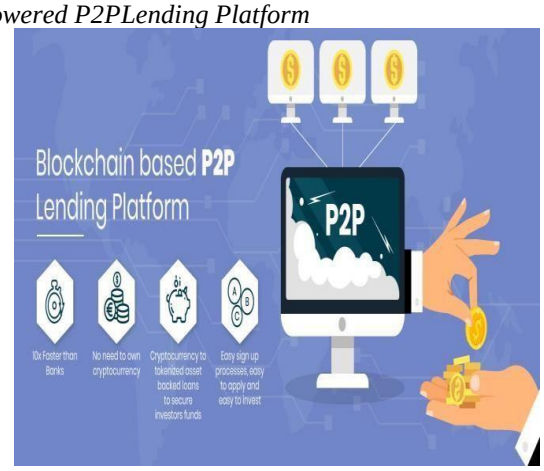
3) Trading in commodities:

Another area that might be disrupted by blockchain innovation is the exchange of gas and energy. Organizations have invested millions in the construction of customized trading platforms tailored to the unique needs of the energy business.

To maintain, modernize, and protect these frameworks, significant costs are necessary. Comparing current limiting frameworks to blockchain innovation for product exchange would be less expensive and more effective. The blockchain would allow for the modification of permanence, security, and instantaneity, eliminating the limited adaptability of extremely large-scale restricted frameworks.

International businesses involved in energy blockchain includes: GRID+, ONDIFLO, Radiant Earth [2].

B. Analyzing the Components of a Blockchain-powered P2PLending Platform



1) Peer-to-Peer Lending:

In this type of financial system, borrowers work directly with lenders to get unsecured loans. This system's weakness is that it depends on outside parties, which drives up transaction costs and transaction times.

2) Decentralized P2P Lending:

Decentralized P2P crediting either eliminates the need for outsiders or assumes cheap operational expenses for marginalized organizations. Additionally, the decentralized stance supports crediting schemes and implements themquickly. It makes it possible for a P2P advancing structure to function as a unified platform for people and organizations to successfully acquire and advance credits at competitive rates without the need for a middleman.

It offers accessibility from anywhere at any time in addition to quicker credit checks and KYC/AML (Know YourCustomer and Anti Money Laundering) standards. Additionally, any device with an active internet connection can access this new decentralized system

from anywhere.

3) Creating a public blockchain-based P2P lendingplatform:

Generally P2P lending platform is not a type of any financial construction and in most case all the banking regulation does not affect this system. In this system loans arenot secured and there is a risk on lender side in case the borrower default in repayment of the money.

4) Market Risks:

The system's primary flaw is that lenders earn if borrowers return their loans, while borrowers receive funds quickly.

A Public P2P Lending Platform Overview

For this platform, a model prototype was created. This prototype concept combines Ethereum, third-party connectors, and technology like smart contracts to speed up the entire process rather than centralized blockchain technology. In these platforms, it was possible to set up loan repayment using ERC20 currency.

5) A typical loan application process:

On the decentralized P2P platform, processing a loan application takes roughly 3–4 minutes (internet site). A blockchain-based entirely loan smart statement with a completely unique identification for the person who has requested the amount is created at some point during the process. The borrower must include their PII (personally identifiable information) to ensure compliance with neighborhood rules and KYC procedures. The resulting grade improves the KYC process by considering social media accounts, professional groupings, and verifiable website statistics. After the data has been successfully verified and scored, the platform offers or publishes the loan request for lenders. The lenders engaging in a reverse auction provide the loan to qualified debtors at competitively low interest rates.

6) Smart contracts-powered automated lending processes: When the borrower downloads the funds after accepting one ofthe offers, a smart contract based on blockchain technology islaunched. With this technique, funds were automaticallycollected, sent to the designated account, and a paymentreminder was sent. Platform automatically imposes penalties onthe borrower in the event of default. As soon as the paymentdue date approaches, it continues to alert the borrower. Higherinterest rates are incurred because of late payments, and theyare applied to subsequent installments.

7) Reducing the last market risk of lending:

The platform uses a Smart Compensation Fund Contract plan to reduce the last major P2P lending risk, which is default borrower. The Smart Compensation Fund is charged a nominal fee following each loan application process. Because there are more loan programs, the sum accumulates fractionally. It makes the Smart Compensation Fund act as asurety for lenders, lowering or maybe delaying the last significant threat to the system. This pricing structure is used to cover operational costs, raise revenue, and transform tokens into highly valuable digital currency.

There are numerous businesses that operate in the blockchain technology industry. One of them is oodles, a provider of P2P trading, syndicate loans, mutual funds, and other services. Users using their program can analyze business problems and make appropriate decisions [3].

8) Applying blockchain technology to electric power systems:

Our electric power systems are becoming increasingly sophisticated in modern times. Blockchain can be utilized to handle this complexity successfully. In 2017, a number of firms collectively received almost $300 million USD for the purpose of advancing blockchain technology in the energy sector. Blockchain can be used to monitor the creation of renewable energy. Blockchain technology is being developed for use in EV charging payments, among other things.

Due to coverage issues and the necessity for reliable returns, energy utilities are unable to swiftly react to the change, thus prosumers must put up their smart systems to help the grid match demand with risky renewable electricity supply. To ensure the electricity system runs well, utilities, customers, and outside businesses should work together to harness the massive amounts of real-time operational data.

The second most alluring business for investors is blockchain. Organizations like the Tokyo Electric PowerCompany in Japan and E. ON in Germany are launching theirown companies or collaborating with young startups.Businesses that own power plants and trade their electricity inthe wholesale market exist. They believe that blockchaintechnology can increase market efficiency. Big corporationsall around the world are collaborating with startups or startingtheir own projects because they think blockchain may help the transmission and distribution sector as well as the market. Companies collaborate with nonprofits in a different category. For instance, the largest oil firms in the world, likeShell and Statoil, collaborate with the charity organizationRocky Mountain to fund the Energy Web Foundation.

Building an energy application on a blockchain platform is a major objective.

It would be vital to keep an eye on the involvement of regulatory organizations in the commercial use of blockchain-based P2P power transmission because the power industry in India is extensively regulated with several rules and regulations.

9) Grid transactions:

Many energy trading systems that are less radical than a totally decentralized peer-to-peer network are considerably more likely to succeed commercially and receive support from established utilities and regulatory authorities. These"grid transactions" refer to the buying and selling of energy within the framework of an electric driven energy device, where the energy grid is still fundamental even though its design and features have undergone significant changes.

Enel is spearheading the Ener chain undertaking to use blockchain to enhance existing wholesale electricity markets.

Large energy plant owners in these markets sell significant volumes of power to utilities and retailers, who subsequently advertise the energy to end consumers. Now, those marketplaces necessitate a centralized company using proprietary software to mediate each energy transaction, which is both time-consuming and expensive. But transactions may be checked quickly and inexpensively if these markets indexed and cleared transactions on a blockchain

network. Similar to this, all market participants would have access to transparent transaction data, enabling more effective buying and selling. Because a blockchain community can handle a large number of smaller transactions that could overwhelm a centralized system, such wholesale marketplaces may eventually desire to expand their pool of players.

In response to charges that always duplicate the demands ofthe grid, businesses and even families could participate by reselling their excess distributed technology on the market.

Nevertheless, there is no such market that accounts for rapid variations in consumer demand among neighborhoods or limitations on neighborhood distribution capability on the more nearby scales handled by the distribution grid. Until far, utilities have spent heavily on expensive infrastructureupgrades, such as new electric substations, when the existing distribution grid cannot keep up with shifting community needs. Yet as the cost of allotted energy resources, such as solar panels, batteries, and fuel cells, declines, it would be more practical to use such resources, whether they were on a customer's property or at the distribution grid.

This might be something that brand-new "distribution markets" seek to enable. Many jurisdictions are experimenting with these markets, from south Australia to New York City. Customers could buy or sell power at time- varying prices based mostly on their location in such markets. Consumers can hire smart software vendors to operate on their behalf and optimize their energy production and consumption based on market signals. Customers should pool their resources if they joined up with third party aggregators, giving the grid the services of a so-called virtual energy plant, which would help the overall device maintain supply and demand in stability despite an influx of intermittent renewable energy at the grid.

Additionally, transactions should be automatically triggered by smart contracts built into the blockchain ledger when specific conditions are met. For instance, customers may offer to charge their batteries with extra grid power while the immediate payment for doing so exceeds a pre- programmed threshold, facilitating green trading. Yet, a blockchain infrastructure may still be improved upon in many ways to detect distribution marketplaces. A utility (or a few other firms entrusted with managing any such market) will need to install a variety of sensors on the distribution grid, establish the limits encountered at each point within the neighborhood, and conduct extensive computations to generate actual-time costs for the marketplace.

Indeed, the focus of Australia's experimental decentralized power alternative project is on solving those urgent technological challenges initially. Sponsors of the project are still unsure of whether the platform will eventually record transactions on a blockchain or not.

10) Energy financing:

Blockchain has increased the pool of investors, which makes it simpler to raise money for renewable energy projects. Even for traditional investors, if a tiny portion of the overall cost can be sourced through this mechanism, it may be appealing. As technology continues to progress, the cost of wind and solar projects has substantially decreased, making them more appealing to all types of investors.

Sustainability attribution:

The use of blockchain to store and exchange sustainability-related properties is one of the most prevalent on-the-spot applications to electric power. Examples of such characteristics are a unit of energy's renewable status and the amount of emissions produced during production. Today, systems for tracking these qualities are complicated, centralized, and vulnerable to fraud and error. Moreover, the compartmentalization of systems limits the smooth exchange of characteristics across geographical boundaries.

Accurate, transparent, and frictionless monitoring and trading of such traits should be possible in a decentralized blockchain community, which might encourage the use of sustainable energy sources and lower carbon emissions. For instance, the starting point software for the energy web uses a blockchain to track power generation down to the kilowatt- hour and to disclose details like the carbon emissions connected with energy production. This would make it possible for owners and consumers of low-carbon energy to calculate carbon offset credits more accurately and provide a mechanism to swap credits for carbon emissions decreased to balance out emissions made somewhere else.

Many utilities and businesses, including Microsoft, Singapore Energy, and Engie, are participating in experimental projects that employ starting place in recognition of this capability. Although current jurisdictions and regulations have failed to monitor and register emissions, via this, governments may become more suited to modify carbon emissions.

In the future, the government may employ designated ledgers for recording and trading carbon emissions from the production, transportation, and use of electricity. Russian Carbon Fund is a business unit of IBM that specializes in developing blockchain networks to track carbon footprints.

11) Electric vehicles:

Due to EVs' growing popularity, the distinction between the transportation and electrical power industries is becoming increasingly hazy. Although there are barriers to customer acceptance, such vehicles.

Particularly, a deficiency of public charging infrastructure may discourage prospective customers. The attraction andadoption of EVs should be increased through blockchain networks that enable private owners of charging infrastructure to easily sell charging services to EV owners.

Companies are having trouble lowering the cost of constructing and maintaining charging stations in the present environment. By using electricity that is not being used in homes or businesses, blockchain-based technology has the potential to lower transaction costs when used to charge electric vehicles. The main obstacle to the adoption of EVs can be removed if this becomes a reality. The blockchain network can also support unusual types of payment transactions.

EVs may also be utilized to be charged or discharged depending on demand, turning cars into moving batteries.

12) Other applications:

A company called Finland is striving to make it easier for power users to control a variety of internet-

connected gadgets. This firm wants to notify clients about their equipment' power use and record it, saving them money. For instance, the UK's electricity regulator Office of Gas and Electricity Markets (Ofgem) plans to register members' power meters as digital entities on a blockchain network to make switching energy suppliers more quickly (now it takes three weeks).

In the area of blockchain technology, several actions have been done to enhance the security of electrical power infrastructure. For instance, Siemens and U.S. government organizations, including the Departments of Energy and Defense, are collaborating on a pilot project to safeguard critical energy sector infrastructure and guard against unwantedintrusions using blockchain-based cryptographic algorithms. Because privacy is a fundamental human right that shouldn't be shared on such a platform, the European Union general data privacy law of 2018 demands for the deletion of some private information. The rate at which blockchain technology is commercialized might be accelerated by a set of standards assuring interoperability between various blockchain architectures. Currently, several nations are developing a brand-new pilot program called as a "sandbox," where entrepreneurs may test their ideas without harming the current electric grid, making it easier to collect money, scale up implementation, and support businesses [4].

C. Need for energy blockchain in India

1) Overview of Energy Sector in India:

India comes in sixth on the global energy consumption index. The primary cause of this is an increase in electricity consumption brought on by increased urbanization. The demand is thought to have grown by 3.6% annually over the past 30 years. As of December 2012, the installed capacity of power generating was 210951.72 MW, according to information posted on the power ministry's website. The entire demand in India is predicted to exceed 950,000 MW by 2030. On the other hand, there is still no electricity in two-thirds of the rural region. The main energy sources in India are thermal (coal, gas, and oil) — 67%, hydro — 13.5%, and nuclear
— 2.1%.

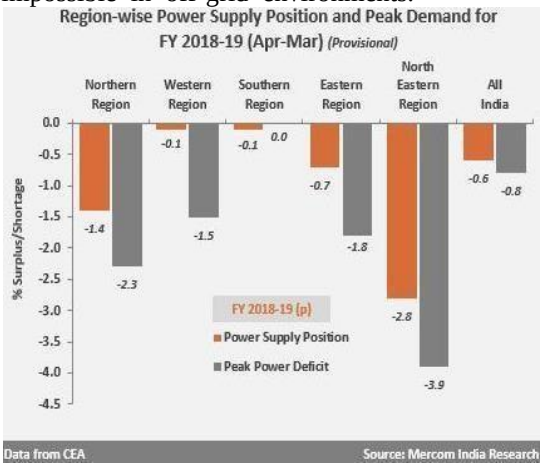
2) Thrust on Solar Power Generation:

India's carbon emissions are rising over the established ceiling norm. India is the third-largest emitter of greenhouse gases on a worldwide scale. A research claims that if India continues to use contemporary methods for producing power, the environment there might suffer greatly.

Given the circumstances in India, PM Modi has declared that by 2022, there should be 175 GW of installed renewable energy in India, of which more than 100 GW would come from solar energy. The Indian government, with the assistance of the state governments, provides subsidies for solar panel installation of up to 70%. The government is also promoting solar power parks around the nation.

From 2014 to 2017, the solar generating capacity expanded by a factor of four. It is 12.50 GW as of 2017. Moreover, the average price has dropped by about 15%, making it more affordable than thermal power.

3) Current Solar Power Distribution Landscape in India and Challenges: Solar energy must now be channeled towards centralized systems for distribution. There might not be an off-grid method to save on transmission costs, which results in waste. Additional infrastructure setups and administrative costs result from this. Solar farms must be able to resell electricity to the public grid in order to remain profitable, which is impossible in off-grid environments.



Also, this restricts the availability of electricity in remote areas without access to the power grid.

4) Blockchain can facilitate the distribution of off-grid, decentralized, sustainable solar energy Framework:

Solar power offers a lot of promise in a nation like India, where people in rural homes are still at a disadvantage when it comes to electricity. Solar energy is widely accessible and gives every family the chance to produce its own electricity. This opens the door for the creation of self-sustaining energy technology that depends far less on a centralized system [5].

Small businesses in a neighborhood may get together and buy/sell solar energy for a fee using a blockchain-enabled decentralized P2P micro energy grid structure without having to send electricity to a bigger grid. The conventional energy micro grid may link photovoltaic systems installed on different types of homes' rooftops. With the help of a main blockchain connected to the grid, the transactions may be controlled and recorded.

Owners of captive solar plants in a hamlet can band togetherto gain from the creation of a solar micro-grid based on blockchain.

I) Solar plant owners can create a cryptocurrency for the trade of energy after creating a consortium.

ii) Get funds in the form of equity and share distribution; utilize the proceeds to build infrastructure throughout rural India.

iii) Prices may be set using a method like the one used for setting gold prices, and they can be changed based on supply and demand in real time.

iv) Only investors who satisfy specific requirements are eligible to receive digital tokens in place of dividend payments[5].

ii) Business issues in energy supply:

The energy industry is currently operating in a highly competitive environment where both private and public entities are struggling to generate the projected revenue. As a result, it is very likely that businesses will try to raise the tariff rate, which will ultimately be paid by consumers, in an effort to cut their losses or boost their profits.

6) Increasing customer expectations for efficient energy provision:

India is a developing country, and customers there are currently more demanding of their needs and even

willing to pay for them, but they also require efficient energy provision, which is essential in all industries, including manufacturing, construction, and the automobile industry.

7) Providing electricity to remote areas where it is not feasible todo so using conventional methods:

Despite the government's efforts through programs like Sau Bhagya and the Pradhan Mantri Sahaj Bijlee Yojana, it is stillnot feasible to provide grid electricity to many villages and remote regions.

No gain for the consumer consuming less units:

Presently, if the customer is getting the benefit to install a captive solar plant on his roof and may use the electricity. If not, it wouldn't make economic to sell the electricity to the grid for

$3 per unit. If blockchain is supported, it may be possible to sell the power produced, which would shorten the solar plant's payback period.

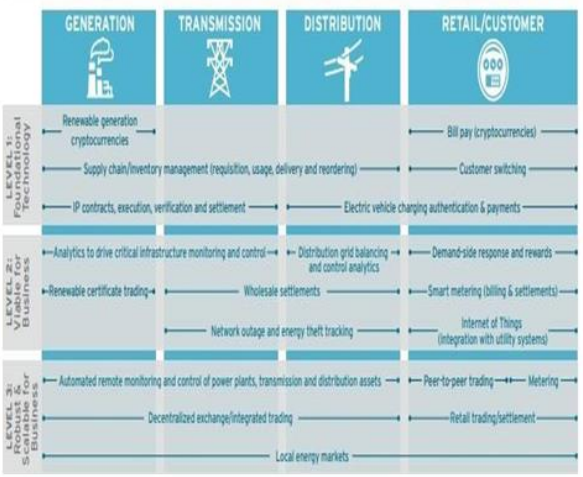
6) Current Transmission & Distribution Losses: To minimize DISCOM losses via transmission and distribution, the government developed the UDAY program, however that effort also fell short of expectations. The current T & D losses are 20%, which is double the global average.

D. Blockchain-based Solar Energy Sources' objectives.

1. Encourage the use of renewable energy sources: Now, energy cannot be transmitted to many villages in India. By establishing a captive blockchain-based micro grid in these places, it would be possible to simultaneously supply their energy demandsand lessen their reliance on conventional energy sources.

2. Disintermediation: All third parties, governmental agencies, DISCOMs, etc. would be eliminated. There is no requirement for an agency to keep track of meter readings, bill computations, or bill distribution to clients. For instance, the prosumer and consumer can create a unique contract that binds them both without the need for a middleman. The user would be able to view their actual energy usage and associated costs.

3. Low Cost: The elimination of middlemen and more equitable energy pricing as a result of increased marketopenness led to lower transaction costs.



4. Widening the scope of the energy market: Prosumers should be liberated from the central government and allowed to sell energy however they see fit. The ability to change suppliers and have adjustable rates would foster competition in the market and benefit users.

5. Exercises are permanently recorded: No extra efforts to record the interactions between various aspects are anticipated. Every hub movement on the blockchain is permanently and sequentially recorded for future use.

V. FINDINGS AND RECOMMENDATIONS

4. 1) Distributed ledger technology (DLT) offers solutions to some of the issues that P2P platforms face with regard to traceability and volume economics. The Digital Ledger Technology (DLT) is a system that allows for the simultaneous storage of the same data across different locations and the ability to update that data whenever a new entry is made by a stakeholder. There is no requirement for centralized data storage with this technique. Outside of the system, electricity is neither produced nor destroyed.

5. Thus, it is essential to retain a record of every transaction. The lifetime volume of power exchanged on the platform may be easily audited thanks to DLT.

Architecture Technology

6. For the architecture of P2P technology, Atlantic Power Exchange (APX) has used a remarkably original strategy. With this method, the technological stack is divided into domains to create a layering structure. They may quickly discover the groups that are pertinent to each domain using this method.

7. 2.1 Energy Area

8. Power is generated in this area and distributed to prosumers or consumers. The place where clever meters are used to monitor power use and improve system performance.

2.1 Control and communication domain

Digitized energy data transfer takes place inside the control and communication domain. This platform's layout acts as a domain export signal. With this feature, demand surges may be met with a coordinated mass reaction that can resolve many blackout incidents, especially those involving activities connected to frequency decreases. In this field, telecoms providers and communication devices both work.

2.2 Token domain

3. The token area is where the conversion of energy information into a token (tokenization), as well as the token exchange, takes place. Now, the transaction between suppositions and buyers (Nodes) is being managed and completed. This foundation handles the transfer of funds from the buyer to the consumer and interacts with the control and correspondence areas to complete the transfers [6].
4. Be specific and don't overcommit. Utilities should focuson evaluating and selecting a small number of blockchain-based solutions that answer their present business concerns andare cost-effective.
5. Start slowly and fail quickly. Utilities will gain an unrivalled perspective on new and upcoming improvements in the field by experimenting with blockchain through pilot projects.
6. Use caution with regards to administration. Given the very regulated utility environment, we anticipate that utilities will endure a brief to medium period of transitory administrative adjustments globally until a decent set of standards emerges that is both useful and acceptable to allutility organizations.
7. Establish relationships or alliances. Utilities must proactively work with specialized innovators, consulting organizations, and leading universities and businesses to continuously research blockchain solutions and make sure they stay on top of things.

8. Solutions that use models incorporating service providers It appears that a truly decentralized, distributed trading stage built on the Blockchain would be challenging to integrate into the existing legal system. To take use of the benefits of blockchain technology and to bundle the associated legal and administrative risks, an aid model can be used. Wuppertal Public Utilities, a German corporation, was the first in the world to put this concept into practice in 2017. They launched a blockchain-based service that allows customers to legally purchase electricity from local green power producers.

Blockchain frameworks require an expensive new foundation, specialized ICT equipment, programming, and many other things that raise investment costs and might outweigh the system's benefits. The cost of linking an existing smart meter with distributed ledgers to the infrastructure grid may also increase since smart meters are currently not technically compatible.

Facts may now be exchanged across blockchain systems at a reasonable cost, but data validation and verification need expensive hardware and energy. Verifying the stake or confirming the power estimates might also eventually make this situation better overall. Blockchain frameworks will need to deal with established procedures in the realm of network communications, such as telemetry, which isn't just often created but also fundamentally a lot less expensive innovation arrangement. Setting genuine data aside in "sidechains" and using the blockchain as a regulated layer rather than a capacity layer are promising solutions presented to handle this examination [7].

Blockchain developments can assist or speed up such locations, hence facilitating well with contemporary administrative needs. But, administrative processes may need to be updated to allow for more DLT reception. For instance, in many P2P power purchasing and selling endeavors, customer to consumer energy changing is not permitted due to the general lines float administrative frameworks. To represent agreements between prosumers and purchasers, new agreement types may be necessary, especially if counterparties use the open matrix. In particular, a different structure would call for additional, perhaps more flexible power taxes, which may be right now actively directed. The general guideline is that present administrative practices should be merged with neighboring or local energy markets.

The best view for regulators of blockchain application in the energy sector Use of blockchain in the energy sector:

- It is crucial that authorities comprehend the importance and applications of blockchain technology and devise strategies for managing the associated risks.
- The top priority, which might be expensive, is to employ personnel with the proper skills and qualifications.
- In order for regulators to push the market and bring about knowledge and innovations inside it, they must collaborate with established businesses and startups.
- Adequate framework and license requirements for energy producers
- Establish a situation where each consumer has many providers. Furthermore, provide suppliers the chance to participate in the peer-to-peer or peer-to-local energy trading market.
- Laws ought to be crafted to promote real-time pricing, which encourages more market participants. Help market players through sand-boxes: test, fail, repeat,succeed [8]
- Permissioned and privacy mechanisms:

Blockchains may be classified as either public or private. Every miner can contribute to public categories, however only those with accesscan utilize the site for private categories. As a result, permissioned chain usage should be done in application with established authorities or organizations responsible for management.

- Energy policy and regulatory layer: In every nation, decision- makers create a fundamental framework. Similar to this, the policy pertaining to the energy industry encompasses all aspectsof the sector, including technical, financial, and safety aspects. The task of creating all legal documents is delegated to policymakers with consideration for the needs of the nation or state. The implementation of the legislative texts follows a predetermined process after their creation or update.
- Business layer Investors: Trading firms, T&D system operators, investors, banks, etc. are some examples of market participants in a typical power market. Yet, in the most recent situation, a few new actors have entered this sector, such as prosumers and forward-thinking service provider organizations. There are also secondary stakeholders, such as service and product providers, who support the power network and supply goods and services to other stakeholders.
- Control and optimization layer: SCADA (Supervisory Control and Data Acquisition) systems have been employed in the power sector for at least the previous 20 years. The operation of intelligent energy systems is controlled and monitored using SCADA and other peer sophisticated technologies so that decision-making algorithms may be employed.

VI. CONCLUSIONS

The energy trading sector now needs more flexibility and improved efficiency, which Blockchain may provide. Energy trade on blockchains is progressively growing and has a high success rate. Blockchain technology is mostly used in the energy trading industry for the storing of transaction data, for privacy purposes, and as a quick and dependable method of moving energy from prosumer to consumer. To motivate users, a better incentive mechanism is introduced into the system. Also, the pressure on DISCOMs would be lessened by eliminating distributors on a smaller domestic scale, and pricing would be decided domestically between prosumer and customer.

Regulatory systems continue to be the key issue for all undertakings in this area. Despite being modest or pilot ventures, the current projects have achieved a lot of success. Evaluation of the investors' and customers' willingness to pay is also required. Moreover, the usage of edge computing will speed up transactions and deter harmful behavior, fostering a feeling of confidence among customers and other relevant stakeholders.

That would improve the performance of the RWE server, which manages several transactions simultaneously. To encourage sustainability in the energy industry and optimize the use of renewable energy sources, peer-to-peer energy trading is essential. More collaborations and connections with international blockchain-related businesses are required in order to build and maintain the blockchain infrastructure. Due to this, investors would see a modest but steady growth in the Indian market.

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Secured Electronic Health Record Db Sharing System with Access Integrity Auditing

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Abstract—**Electronic health record (EHR) is a system that collects patients' digital health information and shares it with other healthcare providers in the cloud. Since EHR contains a large amount of significant and sensitive information about patients, it is required that the system ensures response correctness and storage integrity. Meanwhile, with the rise of IoT, more low-performance terminals are deployed for receiving and uploading patient data to the server, which increases the computational and communication burden of the EHR systems. The verifiable database (VDB), where a user outsources his large database to a cloud server and makes queries once he needs certain data, is proposed as an efficient updatable cloud storage model for resource-constrained users. To improve efficiency, most existing VDB schemes utilize proof reuse and proof updating technique to prove correctness of the query results. However, it ignores the "real-time" of proof generation, which results in an overhead that the user has to perform extra process (e.g. auditing schemes) to check storage integrity. In this paper, we propose a publicly verifiable shared updatable EHR database scheme that supports privacy-preserving and batch integrity checking with minimum user communication cost. We modify the existing functional commitment (FC) scheme for the VDB design and construct a concrete FC under the computational *l* -BDHE assumption. In addition, the use of an efficient verifier-local revocation group signature scheme makes our scheme support dynamic group member operations, and gives nice features, such as traceability and non-frame ability.**

Index Terms—Verifiable database, cloud storage, functional commitment, privacy-preserving auditing, user revocation

I. INTRODUCTION

WITH the explosive increase of global information, the cloud service industry has been developing unprecedentedly. Many cloud service providers are rushing to launch cloud service platforms and products, such as Amazon, GOOGLE, Alibaba, Microsoft, and Huawei, etc. People start to outsource their large data storage tasks to cloud service providers (CSPs). It makes them no longer con-strained by limited local storage and computing resources. As a concrete and high-quality application example of cloud storage, the cloud-based electronic health record (EHR), which is a system that collects the patients' digital health information, is being vigorously promoted by many organizations, such as the Office of the National Coordinator for Health Information Technology (ONC) [6] in the United States and Canada Health Infoway [7]. The patient EHRs are written on the workstation or mobile device, and can be accessed and modified later. The patient EHRs up-loaded to the cloud can be shared among different medical institutions to help patients get better treatment, help scientific researchers to carry out disease analysis and re-search, and help public health departments predict, detect and potentially prevent the outbreak of epidemic diseases, etc. Since the cloud service provider (CSP) is an independent management entity, users actually give up the ultimate control over their EHRs. This brings security challenges for outsourcing tasks. For example, the cloud servers may re-turn incorrect results for various reasons, such as malfunctioning cloud equipments and a hacker's attack. The incorrect returned values can have serious consequences for every part of the medical system. Therefore, the primary problem faced by the EHR system is on how to verify that the server responses correctly each time. Benabbas *et al.* [9]. proposed the verifiable database (VDB) as a secure and efficient updatable cloud storage model for resource-limited users. In a VDB scheme, a client can outsource the storage of a collection of data items to an entrusted server. Later, the client can query the server for an item (a message) at position *i*, the server returns the stored message at this position along with a proof that it is the correct answer. However, the security of only verifying the server response correctness is far from enough for the EHR system, and it is not clear whether data that is not frequently accessed is still stored correctly. If these data are destroyed and not discovered in time, it can cause huge losses in the event of an emergency.

Many audit schemes [23] - [28] exist to check the data storage integrity. A simple idea to realize the server response correctness and the data storage integrity of EHR system is to use the VDB scheme and an audit scheme respectively. But there will be a lot of authentication tags generated and transmitted for verification. At present, with the development of the Internet of things, emerging wear-able devices are also deployed for receiving and uploading users' EHR information. For example, a smartwatch can upload information about a user's heartbeat and breathing, and an insertable cardiac monitor called Reveal LINQ [21] provides long-term heart monitoring. Similarly, mobile terminals with limited performance used in such applications. The main computation and communication of these low-performing terminals occurs when the user first up-loads the database and updates the data each time. In the traditional data integrity checking scheme, the user generates an authentication tag for each data block and uploades it to the cloud server together with the data in the above two stages. This 1-to-1 tag generation method results in the fact that low performance terminals have to reserve more storage space for temporary storage tags and spend more transport resources for transport tags.

Some audit schemes provide methods to reduce the number of tags. The scheme [23] proposed a method to re-duce the number of tags by expanding the size of each data block, but it still cannot realize the

aggregation of tags of each data block. Jiang et al. 's scheme [14] proposed to use vector commitment scheme to construct the audit scheme. Although the reduction of tags has been achieved, their scheme fails to achieve the expected security due to the neglect of the real-time performance of proof generation. There is still no good way to minimize the communication for low performance users.

The biggest feature of the EHR system is that patients' health information is shared in a group, including clinic, healthcare, hospital, medicine center, insurance and so on. Anyone in the group can upload, download, and modify the database. In most cases, the members in such group are not fixed. And a group manager (GM) is appointed to control members' join or quit. The scheme [28] provided an efficient audit scheme for group members to share cloud data, but only GM can upload the database. Jiang et al. [14] scheme involved the dynamic problem of group members, but their scheme can only realize the revocation and the case of users joining group is not considered. They used the group signature scheme with verifier-local revocation (VLR) [2] proposed by Boneh et al. to make group members revocable. However, their VLR group signature scheme does not have backward unlinkability (BU), which means that even if a member is revoked at a certain time, the signature before that time remains anonymous. It poses a threat to user identity privacy.

Also, security and privacy of medical data storage and access must be enforced by legal legislations [8]. Therefore, a powerful tool for EHR systems is needed to fulfill the le-gal requirements in protecting the security and privacy of the medical data.

1.1 Our Contribution

Our research focuses on the security and efficiency of large database storage, such as EHR. According to the characteristics of EHR system, two aspects of security deserve our attention, namely, the server response correctness and the data storage integrity. In order to deal with above problems, we use a new tool called functional commitment (FC) and design a publicly verifiable updatable database scheme based on functional commitment supporting privacy-preserving integrity auditing and dynamic group operation. Our contributions can be summarized as follows:

1. We modify the existing functional commitment [15] scheme in order to use the function binding of functional commitment to design an auditable VDB scheme. Two algorithms for updating are added based on the original scheme in [15]. And a modified concrete FC with updates under the computational assumption is constructed. Our construction has fewer parameters and is more efficient than the original scheme in [15]. -BDHE l
2. We point out security problems with scheme [14] and propose a publicly verifiable updatable VDB scheme based on the functional commitment and group signature without incurring too much computational overhead and storage cost. Moreover, our scheme is applicable for large-scale data storage with minimum user communication cost. Our pro-posed scheme not only preserves all the properties of the original VDB scheme, but also implements efficient privacy-preserving integrity auditing, non-frame ability and traceability. The scheme preserves data privacy from the auditor by using a random masking technique and the sparse vector is used for sampling auditing. Our scheme supports dynamic group member operations which include join and revocation. In addition, our VDB supports batch auditing and it supports multi-cloud server, multi-user and multi-storage vector scenarios.
3. Security analysis and experimental comparison with existing schemes are provided and it shows that our VDB is secure and efficient.

II. RELATED WORK

Electronic health record is a system that collects the patients' digital health information. It can reduce the medical errors, save EHR storage costs, and share medical information, etc. The transition from paper to electronic medical records has made the use of medical data more flexible and more usable. Research on data security of electronic health record system includes searchable encryption, privacy preserving, access control, and data storage integrity, etc. Many studies have been presented [16] – [19], and our work focuses on the security of the storage of large database, such as electronic health records.

As a secure and efficient dynamic cloud storage model for resource-limited users, Benabbas*et al*. [9] proposed the verifiable database (VDB). Every time a user accesses the database, the cloud server generates and returns a proof to convince the user of the response correctness. Besides, the process of query and the verification of query results should be irrelevant to the size of the database. They pre-sented the first practical VDB under a well-studied as-sumption. Their scheme only supports private verifiability, that is, results can only be checked by the database owner. Most existing publicly verifiable computation schemes do not consider the confidentiality of the final result while keeping public verifiability. Sun *et al.* [22] addressed this problem by proposing a confidentiality preserving publicly verifiable computation scheme. Their proposal achieves public verification for outsourcing Boolean function evaluation while keep final result secret to any third-party verifier. Catalano and Fiore [10] put forward the vector commitment (VC). In a vector commitment scheme, a vector can be committed to generate a commitment value. After that, the commitment value can be opened at the vector's particular positions. The updatability of the VC can be used to construct the VDB scheme. Chen *et al*. [11] found the vulnerability in [10] and put forward two types of at-tacks on the protocol which are forward automatic update (FAU) attack and backward substitution update (BSU) at-tack. To resist against both attacks, they presented a new VDB framework from the VC. Then, Chen *et al*. [12] formal-ized the concept of verifiable database with incremental updates (Inc-VDB). By using hierarchical commitment, Miao *et al*. [13] added more operations to the VDB scheme.

To check the integrity of cloud storage data, the concept of the cloud storage auditing [23] – [28] came into being. A public integrity auditing scheme is that data

integrity can be efficiently audited by any third-party auditor (TPA). Sachem and Waters [23] first put forward the notions of Compact Proofs of Irretrievability (CPR). They use the BLS signatures to build their first secure scheme in the random oracle model. And their second scheme uses the pseudorandom functions (PRFs). However, if a TPA conducts multiple queries on the same data during the auditing, it may expose the user's data to the TPA. In order to address this problem, the concept of the privacy-preserving audit-in has been proposed. Li *et al*. [24] provided a new certif-icateless public auditing scheme with integrated privacy protection for the Wireless Body Sensor Networks. In some scenarios, users may frequently update the database stored in the server, and the static auditing model cannot satisfy them. In order to make the auditing scheme dynamic, Soo-khak*et al*. [25] proposed Divide and Conquer Table to sup-port dynamic data. In order to reduce the computational burden of client, Shen *et al*. [26] constructed a light-weight cloud storage auditing scheme by introducing a Third-Party Medium (TPM). In this scheme, the TPM helps cli-ents to generate data signatures and verify the integrity of cloud data. Sometimes the cloud data that needs to be checked against its intergity may be shared in a group. Shen *et al*. [27] focused on enabling the cloud data sharing in a group member and in an anonymous manner. Using key agreement and the group signature, the scheme real-izes the traceability of group members.

The commitment scheme is a basic cryptographic primitive, which is an important component in many schemes. Many works focused on how to make the committer have flexible opening. That means one can reveal different par-tial information about the message during the opening stage. Catalano and Fiore [10] proposed the vector commitment. The VC scheme satisfies the property of position binding, which means the value of any position in a vector cannot be opened by an adversary to two different values. In addition, the values of commitment and opening in the VC should be irrelevant to the size of the vector (called concise). Kate, Zaverucha and Goldberg [5] proposed the polynomial commitment (PC) where committer commits to a polynomial and opens the commitment value to a calculation of this polynomial for a specific input. Libert, Ra-manna and Yung [15] were inspired by the VC [10] and the PC [5] to come up with the functional commitment. Like the VC scheme, the FC scheme allows a vector to be com-mitted to generating a commitment value. After that, the commitment value is opened as a specified linear function in a FC. They provided a concrete FC scheme for linear combinations under subgroup decision assumption. Their scheme satisfies two properties, called perfectly hiding and computational binding. However, in order to design the scheme under well-studied assumptions, their construction uses composite order bilinear groups, which has a number of parameters and is less efficient. And the scheme does not focus on the update algorithm.

Similar to ordinary digital signature, group signature means anyone can verify the correctness of a group signature. The difference is that after verifying the group signature, the verifier can only confirm that the message is signed and issued by a member in a group, but it does not know who signed and issued it, which protects the anonymity of the signer. When a dispute arises, there is a trusted group manager (GM) who can identify the member who actually signs the message. It is called traceability. One of the most important problem in using group signature scheme in practice is group member revocation. Boneh*et al*. [2] introduced the verifier-local revocation group signature scheme. In their scheme, the method of revocation is to send the information about the revoked members to the signature verifier. When the verifier checks the signature, he/she checks whether or not the signer of the signature has been revoked. However, their VLR group signature scheme does not have backward unlink ability. Another important property of group signatures is non-frame ability, which is to make sure no one, including group manager, can sign a message on behalf of other group members. Then, an efficient verifier-local signature scheme with these properties is constructed in [1]

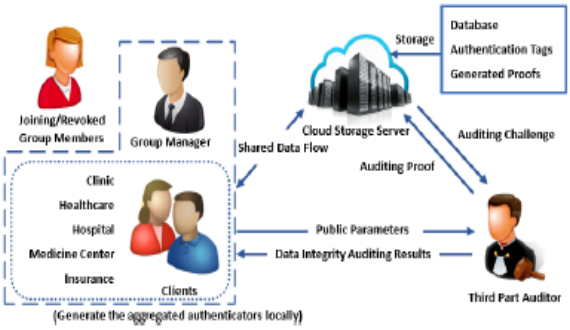

Fig. 1. The cloud storage model of our VDB scheme, which includes three entities, the cloud storage server, the clients and a Third Part Auditor (TPA).

III. PROBLEM FORMULATION

We first introduce our cloud storage model. Then, point out the security problems of the existing VDB schemes [10] –[14].

3.1 Cloud Storage Model

As shown in Fig. 1, there are three entities, which are the cloud storage server, clients and a Third-Party Auditor (TPA) in our cloud storage model. The cloud storage server provides remote data storage services for the client. TPA, which can be anyone in the system, checks the data storage integrity of client outsourced database. The clients, including patients, clinic, hospital, medicine center, insurance, etc., are able to outsource large databases to the server. Un-like most auditing schemes, the client generates the aggregated authentication tags locally and sends them to the cloud. Then, the user could query and update the database and check the data storage integrity. The TPA could check the data storage integrity of the frequently updated data-base using public key in an efficient way.

In our dynamic group member scenario, any group user can upload own database to the cloud and share them with other group members. And a trusted group manager is responsible for joining or revoking on a client.

3.2 Security Problems

Jiang *et al*. [14] who were inspired by the VDB scheme, constructed their integrity checking scheme. In the VDB

scheme, in order to generate a proof for each query, the server needs to involve all of the current stored data. The data contained in this proof will also be verified in the verification phase along with the data queried. However, their scheme uses the techniques of proof reuse and proof up-dating to improve the system efficiency. In the above techniques, the cloud does not have to re-calculate proof every time, and updating the proof requires only a small amount of computation. It greatly reduces the overhead and improves the efficiency and response rates of the system. However due to the fact that their model did not consider a notion of "real-time" proof, the use of these techniques makes their audit scheme and other VDB schemes incapable of checking storage integrity. In this case, only the queried data is involved in the verification process. This leads to verification only on the data being queried, while storage integrity of other cloud data is not checked. If the cloud data which is not queried is damaged, it will not be detected in time. When the damaged data is needed, there will be varying degrees of loss.

TABLE I
EFFICIENCY COMPARISON BETWEEN RE-COMPUTE PROOF AND UPDATE PROOF. t IS THE NUMBER OF PROOFS WHICH ARE STORED BY THE SERVER. M IS A MULTIPLICATION IN G_1 (OR G_2) AND E IS AN EXPONENTIATION IN G_1.

Technique	Re-compute proof	Update proof
Computa-tion	$(n-1)E+(n-2)M$	$1E+(t-1)M$

3.3 Design Ideas

To enable VDB schemes to gain the ability to checking data storage integrity, an additional auditing scheme is needed. However, the use of existing auditing schemes will lead to new computational overhead and communication costs; meanwhile the VDB scheme will lose its ad-vantages. This challenge inspired us to design a VDB scheme that achieves desired security goals without too much new calculation cost.

We add an audit stage for the VDB scheme. The goal is that the server must respond with the real-time stored data during the audit process. Our solution is that in each audit task, the auditor queries for many data blocks. Specifically, the auditor generates a random coefficient for each data block, and all the coefficients generated for multiple data blocks constitute a challenge vector. Whenever the cloud server receives a challenge vector from the auditor, the randomness of the challenge vector forces it must use the real-time stored data to perform a linear operation with it. Then, the server needs to produce an aggregated proof for the linear operation. Finally, the linear combination value is re-turned to the auditor for verification along with its proof However it is not easy to implement aggregate verification that maintains linear operations in the existing VDB.

A simple idea is to use the proof generated and stored for each data block in the VDB to generate the proof for aggregated verification during the audit stage. In this way, the auditable VDB scheme can take into account the low communication cost of users and no increase of server storage. However, since in the existing VDB, the trapdoor value of each data block i is the associated value . The different trapdoors result in the proofs of different data blocks cannot be aggregated to produce a proof that owns a unified trapdoor. Constrained by the construction techniques of the current VC scheme, these schemes cannot simply aggregate the proofs to achieve the integrity auditing of the data storage. We will use a modified FC scheme to solve this problem. For the design of VDB scheme, the original FC in [15] needs to be updatable. And the constructed scheme should be more efficient. i g

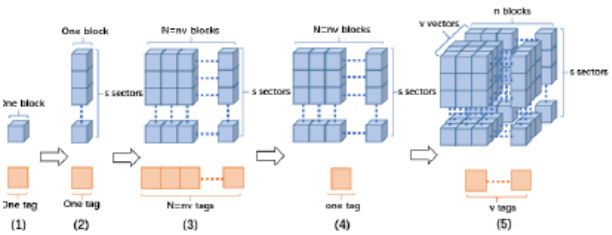

Fig. 3. The instruction for aggregating authentication tags for data blocks.

One of the original intentions is to provide low communication cost audit protocol for inefficient equipment. Fig. 3 shows how we aggregate the authentication tags. As shown in Fig.3 (1), in a general audit scheme, one data block has one authentication tag. As shown in Fig.3 (2), the protocol [23] proposed a method to expand the size of each data block. They enlarged each data block into *s* sectors, with each sector having the same size as one block in Fig.3 (1). This approach reduces the amount of data blocks to a certain extent, thereby reducing the number of tags. How-ever, as shown in Fig.3 (3), *N* data blocks in protocol [23] still have *N* tags. To be clear, data blocks are the basic unit of query for auditors. Simply using this approach to reduce the number of tags is not an ideal approach. For computational efficiency, with the expansion of a single data block, the computation amount of each response will increase greatly. For security, as the number of data blocks de-creases, the auditor can easily calculate the real data by solving the system of linear equations through multiple queries. As shown in Fig.3 (4), by using the FC scheme, the data is stored as an *N*-dimensional vector. Our VDB can further aggregate the tags of all *N* data blocks into one tag based on the scheme [23]'s method without reducing the number of blocks. When the amount of data is large, the length *n* of vector should be chosen with a tradeoff between computation and communication as shown in Fig. 3 (5). Data blocks can be stored as a *v n* matrix, still generating a tag for each vector. At the same time, the challenge data blocks will be selected from the entire matrix.

3.4 Design Goals

1. Security to guarantee that the adversary cannot convince a verifier to accept an invalid output for any database and PPT adversary in both storage stage and auditing stage.
2. Correctness to ensure that, for any database, the value and proof generated by the honest server can be always verified successfully by the verifier in both storage stage and auditing stage.
3. Privacy-preserving auditing: 1) Data privacy. It guarantees that the third-party auditor cannot derive the content of the real data from the cloud server's response in audit stage. 2) Identity privacy. In group members

share stored data scenario, it guarantees that the TPA cannot identify the specific group users who upload or update the data when auditing the integrity of group shared data, even if the group members change.

4. Traceability: to trace the last user who updates the shared data, when the updated data is generated by an honest execution of the relevant algorithm.

5. Non-frame ability: to make sure no one, including group manager, can update shared data on behalf of other group members.

6. Batch auditing to improve the efficiency of auditing, the auditing scheme supports performing auditing operations after the advanced combination of multiple auditing tasks. The batch auditing scheme supports multi-cloud server, multi-user and multi-storage vector scenarios.

IV. ANALYSIS OF THE PROPOSED VDB

4.1 Security

Our VDB scheme can securely and efficiently query and update database stored in the cloud and publicly audit data storage integrity. In the construction, some crypto-graphic tools are used as the basic module of the scheme. Assume that the following modules are secure, including the functional commitment scheme and the signature algorithm. Under the computational assumption, the following proves that our VDB scheme is secure. BDHE −l

Theorem 1. The proposed VDB scheme with updates based on computational assumption DL assumption DDH assumption and q-strong Diffie-Hellman assumption is correct and secure and supports privacy-preserving auditing batch auditing traceability andnonframeability. − l BDHE

The proof of the above theorem is given in Appendix F.

4.2 Efficiency

In order to illustrate the efficiency of our proposed basic auditable VDB scheme (AVDB) and revocable AVDB scheme (RAVDB), Table III shows the comparison of them with a composite scheme (CS), composed of Chen's scheme[11] and Shacham-Waters scheme [23], and Yuan- Yu scheme [28]. The composite scheme demonstrates that the VDB scheme uses an additional audit scheme to achieve VDB's security requirements for query result correctness and data storage integrity. Yuan-Yu Scheme [28] is a public auditing scheme for cloud data sharing that sup-ports user revocation.

Firstly, all four schemes are based on the amortized model, which requires a one-time costly computation in the algorithm. In particular, our schemes generate proof for different data blocks in the algorithm only once, which also has amortization efficiency. Second, our schemes achieve the desired security properties of public verifiability and privacy-preserving integrity auditing. Be-sides, our schemes are efficient. For the user, the amount of computation is independent of the database size. All the proofs used for verification can be generated by the server. This allows users to do very little computing. Users do not always have to be online. For the server, the amount of computation depends on the generation of the proof. Moreover, one of the biggest advantages of our scheme is that the proofs in audit stage can be almost all generated by the proofs in the storage stage. This allows storage and audit to be well integrated to reduce computation. In addition, different from the existing audit schemes where one data block has one authentication tag, our scheme has only Setup Query

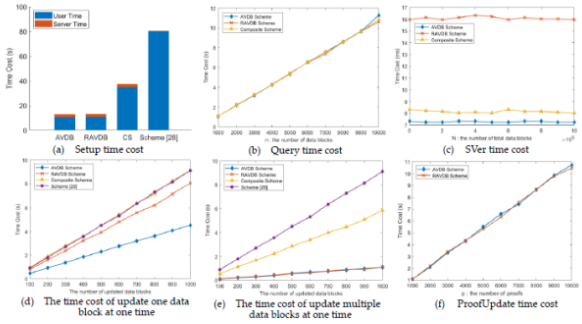

Fig 4.2. Setup and Storage Stage time cost

4.3 Performance Evaluation

We evaluate the performance of our proposed VDB scheme in experiments. We utilize the pairing-based cryptography library (PBC) and the GNU Multiple Precision Arithmetic library (GMP) on a LINUX machine with Intel Core i7- 8550U CPU 2.00 GHz processor and 16GB memory. We simulate all the entities including user, server and TPA on this LINUX machine to evaluate the overhead of our scheme. We set the base field size to be 512 bits and the size of an element in to be bits. q Z ||160 q =

In our experiment, the size of each data block in our schemes can be expanded by dividing each data block into sectors as in experiment [28] and [23]. However, in order to show the efficiency of our method only, we choose not to extend it, that is, take . Our simulations run on 100, 000 to 1, 000, 000 data blocks and the number of blocks per vector. s 1s =1000 n =

We simulate the computation overhead time cost of setup and storage stage for scheme [28], composite scheme and our AVDB scheme and RAVDB scheme in Fig. 7. Since the algorithm is amortized efficient, we only simulated the computation time when the total number of data blocks is . As shown in Fig. 7a, the server's time costs of our AVDB scheme and RAVDB scheme are similar, 10000 N =Setup

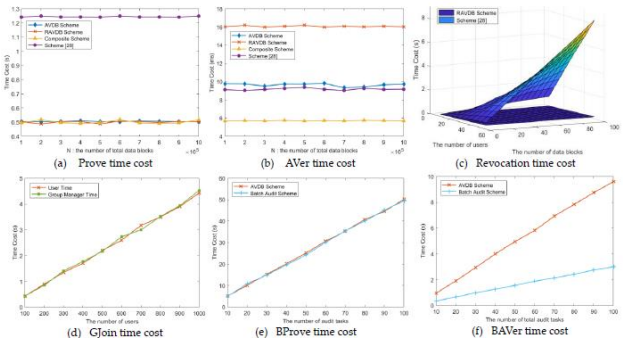

Fig 4.3. Audit stage, Revocation and Batch Audit time cost

which are 2.143s and 2.161s respectively. The server's time cost of composite scheme is 2.228s which is slightly higher than that of our schemes. This is due to the setup time of scheme [23]. Scheme [28] is the scheme that takes the least time for server and only needs 0.122s. In AVDB scheme and RAVDB scheme,

the user's times in this phase are 10.723s and 11.026s, while the time in the composite scheme is more than 3 times of ours, which is 35.030s. In scheme [28], since user needs to generate a tag for each data block, and the hash and exponentiation calculation in the Setup algorithm are more than the first three schemes, the computation time of 80.426s is about 8 times of ours. As shown in Fig. 4.3 b, the Query time cost of our schemes is linear with the number of data *n* and is the same as that of the composite scheme. It takes about 1.1s to query one time when=1000 and takes about 10.8s when*n*=□□000. However, the computational burden of the Query algorithm is on the server side, which has a powerful computational power. And thanks to the existence of the Proof Update algorithm, the cloud does not have to re-calculate proof every time. In addition, the size of *n* should be chosen with a tradeoff between computation and communication. As shown in the SVeralgorithm in Fig. 7c, the verification is performed by the user. Time cost of our RAVDB scheme is about 16.2ms, which is about twice that of 7.3ms of our AVDB scheme and 8.1ms of the composite scheme. This extra time is used to verify the group signature, which provides the RAVDB scheme with user revocation, while the other two protocols do not have this component. For Update and ProofUpdatealgorithms in the storage stage, the time costs of them are all linear with the computing count. User's efficiency of Update algorithm is shown in Fig. 4.3 d and Fig. 4.3 e, respectively, which is two cases of updating one data block and multiple data blocks at one time. In Fig. 7d, the composite scheme and scheme [28] are equivalent in time when updating one data block at a time, and 9.11s is required for 1000 updates. In the Update algorithm, users in our RAVDB scheme only need to update part of the group signatures, so the time cost of this scheme is slightly lower than the above two schemes, and it takes 7.97s to update 1000 data blocks. In the AVDB scheme, there is no complicated tag update process, so users can update 1000 data blocks in 4.53s. Fig. 7e shows the amortization efficiency of our scheme in the Update algorithm. In our two schemes, updating multiple data blocks at once requires only one signature update, which makes it only 1.11s to update 1000 data blocks. At the same time, the composite scheme update time of 1000 data blocks is reduced by 3.25s. The time cost in scheme [28] remains unchanged because there is no reduction in computation. In the Proof Update algorithm in Fig. 4.3 f, our two scheme take
about 10.6s to update p =10000 proofs. Proof Update algorithm is performed by the server, who is powerful enough to compute them. GJoinalgorithm is good for both users and GM. In Fig. 4.3 e, BProvealgorithm is just as efficient as the AVDB's Prove algorithm. However, as shown in Fig. 4.3 f, the batch audit method is 68.7% faster than the nomal audit method. For 100 audit tasks, the BProvealgorithm only needs 3s, while the Prove algorithm needs 9.6s. And as the number of audit tasks increases, the Prove algorithm grows much faster than the BProvealgorithm. The user's communication cost is mainly in the Setup and Update algorithm which are shown in Table IV. Since the size of data needed to be transferred for fixed data blocks is the same in the four schemes, we only compare the size of tags needed to be transferred for fixed data blocks. In the Setup algorithm of all four schemes, the size of tags to be transferred is proportional to the number of total data blocks N. When the user transfers 5 million data blocks, the AVDB scheme will transfer 0.03MB of tags, while the RAVDB scheme will transfer about 0.22MB. The scheme with large transmission size in this phase is the composite scheme. The transfer size of scheme [28] is
30.52MB, which is similar to the composite scheme. These two comparison schemes are about 1000 times of the transmission size as that of our two schemes. This is because in our experiment, we set n =1000 , and our schemes aggregate n data tags into one, which is greatly reducing the size of user transmission in the Setup algorithm. In the Update algorithm, the tag transfer sizes of AVDB scheme and RAVDB scheme do not increase with the number of data blocks updated each time. In the AVDB scheme, no matter how many data blocks are transferred each time, only about 0.06 KB of tags need to be transferred, while the RAVDB scheme is about 7 times more. The size of tag transfers in the composite scheme and scheme [28] is proportional
to the number of data blocks per update. The composite scheme needs to transfer 31.31 KB tags for$w$ = 500 data blocks, while scheme 28 needs to transfer 62.5 KB. It is equivalent to 1000 times of the AVDB scheme and 143 times of the RAVDB scheme. And as the number of updated blocks goes up, the difference gets bigger.

V. SCREENSHOTS

Fig 5.1Group Manager Home

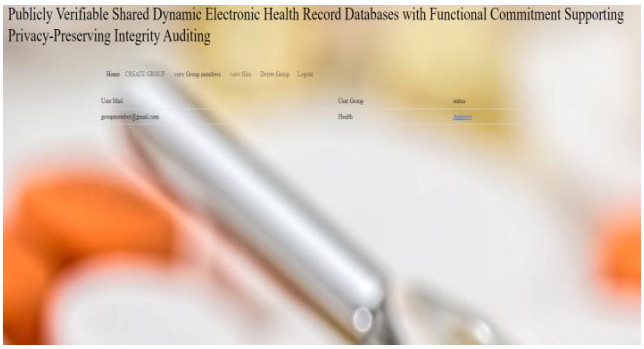

Fig 5.2 Group manager View Group member Approve

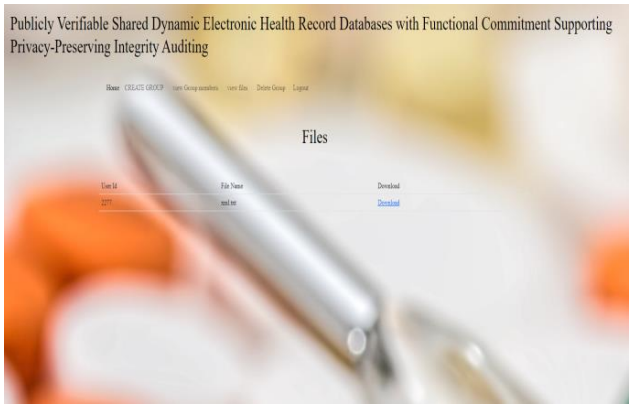

Fig 5.3 Group manager View Files

Fig 5.4 Group manager Delete Group

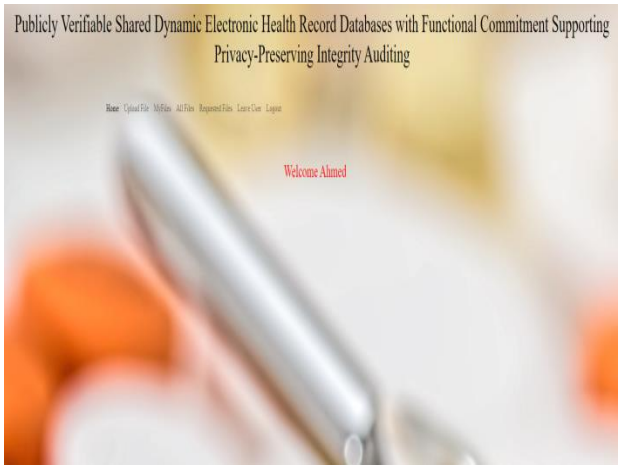

Fig 5.5 Group Member Homepage

Fig 5.6 Group Member MyFiles

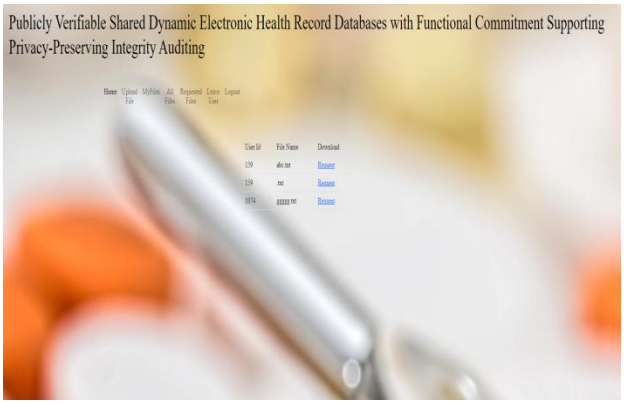

Fig 5.7 Group Member All Files

Fig 5.8 Group Member Leave Users

VI. CONCLUSION

The concept of verifiable database is a great tool for verifiable EHR storage. However, proof reuse and the technique of proof updating by the server to improve system efficiency fails to achieve data integrity checking. In this work, we propose a novel updatable VDB scheme based on the functional commitment that supports privacy-preserving integrity auditing and group member operations, including join and revocation. Two security requirements of EHR are implemented: the server response correctness and the data storage integrity. Our VDB scheme achieves the de-sired security goals without incurring too much

TABLE IV
USER TAG COMMUNICATION COMPARISON OF OUR PROPOSED AVDB SCHEME AND RAVDB SCHEME WITH COMPOSITE SCHEME AND SCHEME [28]. THE VARIABLE N IN THE **Setup** ALGORITHM IS THE NUMBER OF TOTAL DATA BLOCKS. THE VARIABLE w IN THE **Update** ALGORITHM IS THE NUMBER OF UPDATES.

		Scheme	AVDB	RAVDB	CS	Scheme [28]
Setup	N	1 million	0.0061 MB	0.0427 MB	6.1096 MB	6.1035 MB
		3 million	0.0183 MB	0.1281 MB	18.3288 MB	18.3105 MB
		5 million	0.0305 MB	0.2136 MB	30.5480 MB	30.5175 MB
Update	w	100	0.0625 KB	0.4375 KB	6.3125 KB	12.5 KB
		300	0.0625 KB	0.4375 KB	18.8125 KB	37.5 KB
		500	0.0625 KB	0.4375 KB	31.3125 KB	62.5 KB

computational increase. And our VDB scheme provides the minimum communication cost for the terminal with limited performance. To design a functional commitment scheme that applies to our program, two algorithms are added to make the FC scheme updatable. A practical im-proved concrete VDB scheme under computational assumption is presented. In addition, batch auditing for our VDB scheme supports multi-cloud server, multi-user and multi-storage vector scenarios. It makes the auditing process more efficient. Furthermore, we prove that our functional commitment scheme with updates and our VDB scheme can achieve the desired security proper-ties. The performance of our

scheme is more efficient com-pared with other different algorithms. BDHE –l.

VII. FUTURE ENHANCEMENT

Furthermore, we prove that our functional commitment scheme with updates and our VDB scheme can achieve the desired security properties. The performance of our scheme is more efficient compared with other different algorithms.

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Investigating the Effectiveness of Graphical Password Authentication Techniques in User Security

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Abstract— **Graphical password authentication is a type of authentication method that uses images, patterns, and gestures to secure access to electronic systems. The method has gained popularity due to its ease of use, high memorability, and resistance to cracking attacks compared to traditional text-based passwords. This research paper explores the current state of graphical password authentication, including its strengths and weaknesses, and provides insights into future developments in this area. We present a thorough review of existing graphical password authentication techniques, such as pattern locks, cued click points, and drawing gestures, and evaluate their performance based on security, usability, and user acceptance. The paper also highlights the importance of user behavior analysis and cognitive psychology in improving the design and implementation of graphical password authentication systems. Our findings suggest that a multi-modal approach combining visual, behavioral, and physiological characteristics can significantly enhance the security and usability of graphical password authentication. The paper concludes with a discussion of open challenges and future research directions in this field.**

Keywords—security, graphical, password, authentication

I.INTRODUCTION

Password is a secret that is used for authentication. Passwords are the commonly used method for identifying users in computer and communication systems. It is supposed to be known only to the user. A graphical password is an authentication system that works by having the user select from images, in a specific order, presented in a graphical user interface (GUI). For this reason, the graphical-password approach is sometimes called graphical user authentication (GUA). Human factors are often considered the weakest point in a computer security system. Patrick, etc. [1] point out there are three major areas where human-computer interaction is important: security operations, developing secure systems, and authentication. Here we focus on the authentication problem. User authentication is one of the important and fundamental components in most computer security systems. Biometrics is one of the important authentication methods used to tackle the problems associated with traditional username-passwords. But here we will deal with another alternative: using an image as a password. According to a recent computer world news article, the security team at a large company ran a network password cracker and within 30 seconds, they identified about 80% of the passwords. On the other hand, passwords that are difficult to guess or break are often difficult to remember. Studies showed that since the user can only remember a limited number of passwords, they tend to write them down or will use the same passwords for different accounts. To address the problems with traditional username-password authentication, alternative authentication methods, such as biometrics [2,7] have been used. In this paper, however, we will focus on another alternative: using pictures as passwords. In addition, if the number of possible pictures is sufficiently large, the possible password space of a graphical password scheme may exceed that of text-based schemes and thus presumably offer better resistance to dictionary attacks. Because of these (presumed) advantages, there is a growing interest in graphical passwords.

Graphical password authentication is a type of authentication method that uses images or patterns instead of traditional text-based passwords. This method of authentication provides an alternative to the traditional password system and is based on the principle that humans are better at remembering visual information than text. In graphical password authentication, the user is presented with a series of images or patterns and is asked to select or connect specific points to create a password. The password is then verified by comparing the selected images or patterns with the stored password. This method has been widely researched and has been shown to provide improved security and improved user experience over traditional text-based passwords. This paper aims to explore the current state of graphical password authentication and its potential for enhancing the security of online systems.

The purpose of this research paper is to explore the efficacy and practicality of graphical password

authentication in comparison to traditional text-based passwords and to discuss the potential benefits and drawbacks of the system.

II. GRAPHICAL PASSWORD AUTHENTICATION METHODS

Existing authentication methods can be distributed into three main regions [2].

1. Token-based authentication method

2. Biometric-based authentication method

3. Knowledge-based authentication method

A. Token-based authentication

Token-based techniques, such as important cards, bank cards, and smart cards are extensively used. Lots of token-based authentication schemes also use knowledge-based techniques to improve security. For example, ATM cards are usually used and collected with a PIN number [3].

B. Biometric-based authentication

Biometric-based techniques, such as fingerprints, iris photographs, or facial appreciation, are not until now broadly accepted. The main problem of this scheme is that such schemes can be costly, and the identification method can be slow and often untrustworthy. However, this type of system offers the uppermost level of security [4].

C. Knowledge-based Authentication

Knowledge-based techniques are the most broadly used authentication methods and contain text-based and picture-based passwords. The picture-based methods can be further divided into two kinds: recognition-based and recall-based graphical techniques. Using recognition-based methods, a user is accessible with a set of images and permits authentication by recognizing and isolating the images he or she selected through the registration phase. Using recall-based techniques, a user is requested to replicate something that he or she produced or selected previously during the registration phase [5].

III. RELATED WORK

Graphical password schemes can be divided into three major categories based on the type of activity required to remember the password: recognition, recall, and cued recall. Recognition is the easiest for human memory whereas pure recall is the most difficult since the information must be accessed from memory with no triggers. Cued recall falls somewhere between these two as it offers a cue that should establish context and trigger the stored memory. Among existing graphical passwords, CCP most closely resembles aspects of Pass faces, Stories, and Pass Points.

Conceptually, CCP [6] is a mix of the three; in terms of implementation, it is most similar to Pass Points. It also avoids the complex user training requirements found in a number of graphical password proposals, such as that of Wein shall. Pass faces is a graphical password scheme based primarily on recognizing human faces. During password creation, users select a number of images from a larger set. To log in, users must identify one of their pre-selected images from amongst several decoys. Users must correctly respond to a number of these challenges for each login. Davis et al implemented their own version called Faces and conducted a long-term user study. Results showed that users could accurately remember their images but that user-chosen passwords were predictable to the point of being insecure. Davis et al. proposed an alternative scheme, Story that used everyday images instead of faces and required that users select their images in the correct order. Users were encouraged to create a story as a memory aid. Faces for memorability, but user choices were much less predictable. The idea of click-based graphical passwords originated with Blonder who proposed a scheme where a password consisted of a series of clicks on predefined regions of an image. Later, Wieden beck et al proposed to Pass Points, wherein passwords could be composed of several (e.g., 8) points anywhere on an image. They also proposed a “robust discretization” scheme, with three overlapping grids, allowing for login attempts that were approximately correct to be accepted and converting the entered password into a cryptographic verification key. Wieden beck et al. examined the usability of Pass Points.

There has been extensive research on the topic of graphical password authentication in the field of computer security. The main focus of these studies has been on the user's acceptance and memorability of graphical passwords, as well as the security of the authentication system. Some related works include:

1.A study by S. Dhamija and R. D. Wetzel (2006) which compared the memorability and security of graphical passwords to text-based passwords. The results showed that users found graphical passwords easier to remember and that the security of the system was equivalent to traditional passwords [7].

2.research by J. Gong, B. Prenell, and X. Wang (2007) which explored the use of dynamic images in graphical password authentication. The study found that using dynamic images increased the security of the system, but also made the authentication process more difficult for users [8].

3.A work by A. Adams, R. Biddle, and T. Moore (investigated the use of biometric authentication in conjunction with graphical passwords. The study found that combining biometric authentication with graphical

passwords provided a higher level of security compared to using graphical passwords [9].

4.Research by S. Lee, J. Lee, and H. Kim analyzed the security and usability of graphical passwords on mobile devices. The study found that graphical passwords were easier for users to remember and more secure than traditional text-based passwords on mobile devices [10].

5.In December 2009, H. Gao proposed a paper on a "graphical password scheme using color login." In this paper, Gao presented a graphical password authentication system that utilized color patterns as the password. The system required users to select a set of colors in a specific order to gain access to their accounts. The study found that the color-based graphical password scheme was both secure and user-friendly. The results showed that users found the color-based system easier to remember compared to traditional text-based passwords, and the security of the system was comparable to traditional password authentication methods. This study highlights the potential benefits of using color patterns in graphical password authentication and provides a new direction for further research in the field.

6.In May 2011, M. Sreelatha proposed a Hybrid Textual Authentication Scheme in a research paper. In this scheme, the user was required to select a set of characters and images in a specific order to gain access to their accounts. The combination of text and images was intended to provide a more secure and user-friendly authentication method compared to traditional text-based passwords. The results of the study showed that the Hybrid Textual Authentication Scheme provided a higher level of security compared to text-based passwords, and users found the system easier to remember and use. This study highlights the potential benefits of combining text and images in password authentication systems and provides a new direction for further research in the field.

7.Graphical Password-Based Authentication Based System for Mobile Systems" is a research paper written by Er. Aman Kumar and Er. Naveen Bilandi, is affiliated with the Department of Computer Science and Engineering at DAV University in Jalandhar, Punjab, India. The paper focuses on the development of a graphical password-based authentication system for mobile systems. The authors discuss the benefits and limitations of using graphical passwords for mobile devices and present a system that incorporates this method of authentication into a mobile environment. The results of their research provide insights into the potential effectiveness of graphical passwords for enhancing the security of mobile devices.

8.Password Authentication Using Text and Colors" is a research paper written by Miss. Swati Tidke, Miss Nagama Khan, and Miss. Swati Balpande, who is a student of Computer Engineering at RTM Nagpur University and M.I.E.T Bhandara. The paper presents a new method of password authentication that combines both text and colors. The authors describe the design and implementation of their system, as well as the results of their evaluation. The results show that the use of both text and colors can provide a secure and user-friendly method of authentication, and the authors suggest that this approach has the potential for wider use in various applications [11].

9.Graphical Password as an OTP" is a research paper written by Veena Rathanavel and Swati Mali, who are students of M. Tech in Computer Engineering at K J Somaiya College of Engineering in Mumbai. The paper focuses on the use of graphical passwords as one-time passwords (OTPs) for authentication. The authors discuss the security limitations of traditional OTPs, such as SMS-based OTPs, and present a new method of OTP-based authentication that utilizes graphical passwords. They describe the design and implementation of their system and evaluate its performance, security, and usability. The results show that the use of graphical passwords as OTPs provides a secure and user-friendly alternative to traditional OTPs, and the authors suggest that this approach has the potential for wider use in various applications [12].

10. Color Shuffling Password-Based Authentication" is a research paper written in 2017 by Aayush Dilipkumar Jain, Ramkrishna Khetan Krishnakant Dubey, and Prof. Harshali Rambade K. Elissa, who were affiliated with the Department of Information Technology at Vidyalankar Institute of Technology in Mumbai. The paper presents a new method of password authentication that uses color shuffling. The authors describe the design and implementation of their system, which utilizes a combination of color patterns and sequences to create unique passwords. They evaluate the performance, security, and usability of the system and provide insights into the potential benefits and limitations of color shuffling for password authentication. The results of their research suggest that color shuffling has the potential to provide a secure and user-friendly alternative to traditional text-based passwords [14].

These studies provide valuable insights into the potential benefits and drawbacks of graphical password authentication and demonstrate the ongoing interest in the topic.

IV. PROPOSED WORK

The first step in accessing the homepage is to create or log in to a user account. If the user is already registered, they are prompted to enter their credentials and log in. The system checks if the entered password matches the one on

record. If the password is incorrect, the user is allowed to try again a maximum of five times. After the fifth attempt, the user is automatically blocked to prevent unauthorized access. If the user manages to enter the correct password within five attempts, they are logged in successfully. On the other hand, if the user is not registered, they are required to provide all the necessary information to create an account. In this system, the password is not a traditional text-based password, but rather a sequence of images that the user is asked to remember. This image sequence technique is a unique approach to enhancing security, making it difficult for attackers to guess the password. However, it's important to consider the user experience and ensure that the user will be able to remember the sequence of images, as well as to implement secure methods for storing the password to prevent unauthorized access. Overall, a multi-layered approach to security and user experience is crucial when designing a login system [15].

The process in a step-by-step format:

a. The user accesses the homepage.
b. The system checks if the user is registered or not.
c. If the user is registered:
i. User is prompted to log in with credentials.
ii. System checks entered password
iii. If the password is incorrect, the user is allowed to try again up to 5 times
iv. If password the is correct, the user is logged in successfully
v. If 5 attempts are exceeded, the user is automatically blocked.
d. If the user is not registered:
i. User is prompted to enter details to create an account.
ii. User is given a sequence of images to remember as a password.
iii. The user is registered and the image sequence is stored securely.

A. Block Diagram

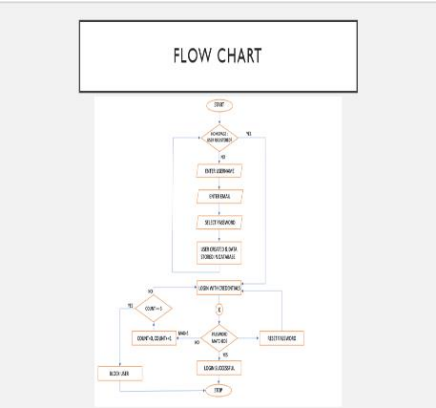

Fig. 1. Block Diagram of Graphical Password Authentication

V. RESULT AND DISCUSSION

Graphical password authentication is a relatively new method of authentication that uses images, patterns, and other graphical elements to provide a secure way for users to log in to a system. In this paper, we will discuss the results and implications of several studies on graphical password authentication.

Results

a. Usability and Memorability: One of the primary advantages of graphical passwords over traditional alphanumeric passwords is that they tend to be more usable and memorable. Users generally find it easier to remember images and patterns than complex strings of letters, numbers, and symbols. Furthermore, users can select images that are meaningful to them, which makes it easier to recall their passwords.

b. Security: Graphical passwords are considered to be more secure than traditional passwords in several ways. One of the main reasons for this is that graphical passwords are less vulnerable to dictionary attacks. These types of attacks involve automated software that attempts to guess passwords by trying a large number of possible combinations. Graphical passwords tend to be more complex and difficult to predict than alphanumeric passwords, which makes them harder to guess.

c. User Acceptance: Graphical passwords are generally well-accepted by users. Studies have shown that users tend to prefer graphical passwords over traditional passwords, particularly in situations where entering complex passwords can be difficult, such as on mobile devices.

d. Resistance to Shoulder-Surfing: Graphical passwords are also more resistant to shoulder-surfing attacks. These types of attacks involve an attacker watching the user enter their password. Because graphical passwords can be entered using a mouse or touch screen, it is more difficult for an attacker to observe the pattern or image used.

Discussion:

i. Potential for Increased Security: The results of these studies suggest that graphical passwords have the potential to provide greater security than traditional alphanumeric passwords. This is particularly true for mobile devices and other situations where entering complex passwords can be difficult. However, there are still concerns about the security of graphical passwords, such as the potential for smudge attacks. These types of attacks involve guessing the password based on the smudges left on the touch screen, which can be a security risk.

ii. Usability Concerns: While graphical passwords tend to be more usable and memorable than traditional passwords, there are still some usability concerns. For example, users may have difficulty creating complex and secure images or patterns. Additionally, there may be a learning curve associated with using graphical passwords, which could be a barrier to adoption.

iii. User Acceptance: The studies suggest that users generally prefer graphical passwords to traditional passwords, particularly on mobile devices. However, it is unclear how well graphical passwords would be received in other contexts, such as in a workplace or government setting. More research is needed to determine the extent to which graphical passwords are well-accepted in different contexts.

iv. Accessibility: Another potential issue with graphical passwords is accessibility. Users with visual impairments or other disabilities may have difficulty creating or remembering graphical passwords. This could be a barrier to adoption for some users.

v. Implementation: Finally, there are implementation concerns associated with graphical passwords. For example, the user interface for graphical passwords may be more complex and difficult to design than for traditional passwords. Additionally, there may be compatibility issues between different operating systems and devices.

The results of investigating the effectiveness of graphical password authentication techniques in user security can vary depending on the specific study and methodology used. However, in general, the findings suggest that graphical password authentication can provide an additional layer of security compared to traditional text-based passwords. The use of images, patterns, or shapes as part of the authentication process can make it more difficult for attackers to guess the password, especially if the sequence or pattern is unique and hard to remember.

On the other hand, some studies have also found that certain graphical password authentication techniques can be less

secure than traditional text-based passwords. For example, if users choose easily recognizable images or patterns, it may be easier for attackers to guess the password. Additionally, the complexity of the graphical password authentication process can also affect its effectiveness, as users may find it harder to remember a complex sequence of images compared to a simple text-based password.

In conclusion, the effectiveness of graphical password authentication in user security is dependent on multiple factors, including the specific technique used, the level of complexity, and user behaviour. It's important to consider these factors and implement multiple layers of security to provide comprehensive protection for users.

VI. CONCLUSION AND FUTURE WORK

Graphical password authentication techniques have been the subject of extensive research in recent years, with the aim of providing an alternative to traditional text-based passwords. The effectiveness of these techniques in enhancing user security has been a topic of debate, with studies providing varying results. However, it is generally agreed that the use of images, patterns, or shapes as part of the authentication process can provide an additional layer of security compared to traditional text-based passwords.

One of the key advantages of graphical password authentication is that it can make it more difficult for attackers to guess the password. This is because the password is based on a unique sequence or pattern of images, rather than a text-based password that is vulnerable to dictionary attacks or other forms of cracking. However, the complexity of the graphical password authentication process can also be a drawback, as users may find it harder to remember a complex sequence of images compared to a simple text-based password.

Another factor that affects the effectiveness of graphical password authentication is user behavior. For example, if users choose easily recognizable images or patterns, it may be easier for attackers to guess the password. Therefore, it is important to consider user behavior and psychology when designing graphical password authentication systems.

Graphical passwords have the potential to improve the overall security of authentication systems. This is because they are less vulnerable to common attacks such as dictionary attacks and shoulder-surfing.

Graphical passwords are generally more usable and memorable than traditional passwords, making them a better choice for mobile devices and other scenarios where entering complex passwords can be difficult.

Graphical passwords are widely accepted by users and can even be considered more engaging and fun than traditional passwords.

However, there are still some concerns about the security of graphical passwords. For example, there is a risk that users may choose predictable or weak images, which could make them vulnerable to attacks. Additionally, there are concerns about the potential for smudge attacks, where attackers can guess the password by analyzing the smudges left on the touch screen.

In conclusion, the effectiveness of graphical password authentication techniques in user security is dependent on

multiple factors, including the specific technique used, the level of complexity, and user behavior. It's important to find the right balance between security and usability to provide comprehensive protection for users.

The field of graphical password authentication is constantly evolving, and there is great potential for future work in this area. Some possible areas of focus include:

e. Developing new and more effective graphical password authentication techniques: This could include the use of machine learning algorithms to analyze patterns in user behavior or biometric identification methods to enhance security.

f. Improving the usability of graphical password authentication systems: Further research into user behavior and the psychology of password selection could help to improve the usability and security of graphical password authentication systems.

g. Integrating multiple authentication methods: Exploring the integration of multiple authentication methods, such as graphical passwords and biometrics, could provide even greater levels of security and user convenience.

h. Evaluating the security of graphical password authentication systems under real-world conditions: This could include conducting studies to evaluate the resistance of graphical password authentication systems to attacks by real-world attackers.

i. Improving the privacy of graphical password authentication systems: Future work could focus on developing privacy-enhancing technologies for graphical password authentication systems, such as using encrypted data storage or protecting user data from unauthorized access.

In conclusion, graphical password authentication is a promising alternative to traditional password authentication. It offers improved security, usability, and user acceptance. However, further research is needed to address the remaining security concerns and to improve the overall effectiveness of the method. the future of graphical password authentication is promising, and there is great potential for further research in this area. By exploring new and innovative methods of authentication, researchers can continue to enhance the security and convenience of authentication systems for users.

VII. ACKNOWLEDGMENT

We feel great pleasure in submitting the paper “Investigating the Effectiveness of Graphical Password Authentication Techniques in User Security”.We wish to express a true sense of gratefulness in the direction of our guide, Dr. Rajesh Bansode. We would also wish to thank our teachers in the department who at the very discrete step in the preparation of this paper contributes their valuable guidance and helped to solve every trouble that arose. Also, most likely we would like to express our sincere gratitude to our family for always being there when I needed them the most.

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Transparent Blood Bank System (Using Blockchain)

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Abstract: **- The Blood Bank System using Blockchain technology offers a secure and transparent way of managing the blood supply chain. It allows for a decentralized database of blood donors and recipients, making it easier to track the history of donated blood and ensure its safety. The use of smart contracts enables automated and tamper-proof processes for blood transfusions, further increasing the security and reliability of the system. By incorporating block chain technology, the Blood Bank System reduces the risk of fraud, and human error and improves the overall efficiency of the blood donation process. With this stem, there is an increased level of trust and accountability, helping to save lives and make the blood donation process more efficient. Certainly! The implementation of a Blood Bank System using Block chain technology can have many benefits. Firstly, the decentralized nature of the system ensures that all transactions are transparent, traceable, and tamper-proof. This helps to reduce the risk of fraud and counterfeiting and increases the confidence of both blood donors and recipients in the safety of the blood supply chain. This allows healthcare professionals to quickly and easily access critical information such as blood type, health history, and any previous transfusions, reducing the risk of adverse reactions and improving patient outcomes. The use of smart contracts also ensures that all processes related to blood transfusions are automated, reducing the possibility of human error and increasing efficiency.**

Keywords:-Blood-Bank, Decentralized Blood Bank, Blockchain, DAPP, SuPPy chain management, Transparent System for donor and receiver

I. INTRODUCTION

Blood is one of the essential parts of our body. Blood can be donated at blood banks, hospitals, and mobile blood drives, and the donated blood is then used to help patients with various medical conditions, including anemia, cancer, and injuries. There are various types of blood donations, including whole blood, which is the most common

type of donation, and various blood components such as red blood cells, plasma, and platelets. Donors are typically screened for eligibility and must meet certain criteria, such as age, weight, and health status, to ensure the safety of both the donor and the recipient. The benefits of blood donation include the saving of lives, reducing the risk of heart disease and stroke, and providing a sense of personal fulfillment.

Another benefit of the Blood Bank System using Blockchain is the automation of various processes through the use of smart contracts. These contracts can be programmed to automatically verify the eligibility of donors, track the movement of blood from donation to transfusion, and even handle payments. This helps to eliminate the risk of human error and fraud, ensuring that the blood supply chain remains reliable and secure.

In addition to these benefits, the Blood Bank System using Blockchain also offers increased efficiency. By streamlining various processes and reducing the need for manual intervention, the system speeds up the time it takes to get blood from donation to transfusion. This can be critical in emergency situations where time is of the essence.

Overall, the Blood Bank System using Blockchain technology offers a revolutionary solution for managing the blood supply chain. Its combination of security, transparency, and efficiency makes it a valuable tool for saving lives and improving the overall blood donation process.

It is important to note that blood supplies are always in demand and it is crucial to maintain a steady supply of blood to meet the needs of patients. By becoming a regular blood donor, individuals can help ensure that blood is always available when it is needed.

II. LITERATURE SURVEY

The main objective of the paper[1] is To automate blood donation management operations in a way that is entirely decentralized, traceable, transparent, auditable, private, secure, and reliable, they suggest using a private Ethereum blockchain-based system. To address the storage constraints, they combine the private Ethereum blockchain with the decentralized storage provided by the InterPlanetary File System (IPFS). The blockchain-based blood donation management system can be easily adjusted to the requirements of other industrial applications.

The proposed work of paper[2] is The suggested method, Online Blood Bank site, uses blockchain technology to fix the problems with the current system. The Blood Bank assists those in need of blood by providing them with general information about blood donors in their city who belong to the same blood group. Give these data security utilizing blockchain technology. The benefits of the suggested system are listed below. It is very adaptable and user-friendly, allowing those needing blood to look for

donors by blood type and city name. In the current method, a person's time and work are much reduced.

The paper proposes the BloodChain system, a blockchain-based blood supply chain. Blockchain technology can establish traceability in the blood provision process even with ambiguous data regarding blood origin and quality, challenging storage and transit conditions, and traceability issues. Patients can utilize this to access the system and view critical data while maintaining their privacy. Every stakeholder in the supply chain for blood donations has access to transparency and privacy thanks to blockchain technology. The development of the blood donation system will be greatly aided by blockchain technology, which promises to solve important problems in the healthcare sector that have never been studied previously.

III. METHODOLOGY

Blood donors can donate blood at campsites and blood banks, and the blood donation information will be recorded on the blockchain. A new data block is added to the blood bank containing information such as Aadhaar number, blood type, and blood ID. This blood has not been tested and cannot be classified as safe or unsafe. Blood is now taken to a blood testing center and declared "tested and safe" or "tested and unsafe" after a physical examination. A QR code is generated that consists of a hashed combination of the Aadhaar number, blood ID, and batch number. This QR code is automatically downloaded and placed on the physical blood pack. In both cases, donors are informed of the acceptance or disposal of their blood. Blood can be transferred by changing any of the following attributes:

Timestamp, Blood Owner, Owner Location, Verified. Blood marked "tested and safe" is now available to patients.

If blood is required now, the hospital should provide the required blood type. Algorithms find the best blood bank based on determinants. The coefficient of determination formula is calculated based on the idea that the distance between two entities is as small as possible. A large amount of blood must be available. Once you have found a suitable blood bank, transfer the blood from that blood bank to your current hospital. Hospitals can virtually see details of blood received You can also view blood bank locations on Google Maps. Finally, once the blood is physically received, upload the blood's QR code to confirm that the correct blood was received.

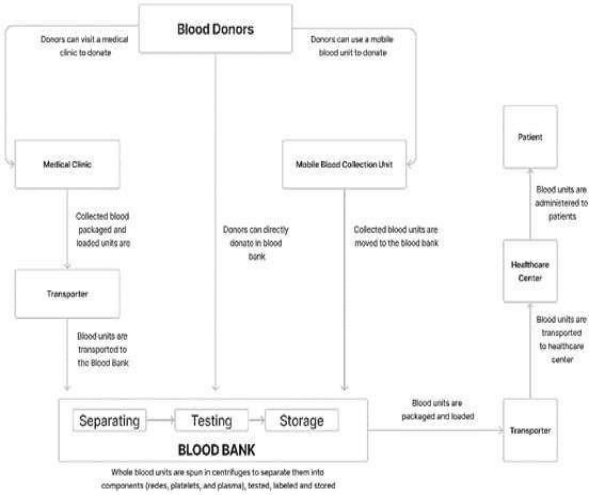

Figure 1 shows a typical blood donation process. First, there are three ways to donate blood. Option 1, is through a health center where blood units are sent to the nearest blood bank. Option 2, using a mobile blood collection unit. Option 3, is directly through a blood bank. Each donated blood is separated, tested, and stored in a blood bank. The separation process is based on centrifugation of whole blood units into red blood cells, platelets, and plasma components. Tests are then done to determine blood type and show possible infection. Once test results are obtained, transfusion-suitable units are labeled and stored in a refrigerated freezer or walk-in refrigerated freezer. According to Food and Drug Administration (FDA) and American Blood Bank Association (AABB) standards, red blood cells are stored refrigerated and have a shelf life of 42 days. Per FDA requirements, plasma is frozen in the freezer for up to 1 year and platelets are stored at room temperature for up to 5 days. Donated blood is packaged and loaded onto carriers for patient treatment as directed by doctors. Finally, after the health center receives the blood bags, they are handed over to the patient.

Solution:- Donors can donate blood, possibly at the campsite or at the blood bank itself. Information about the donated blood is recorded in the blockchain. A new block of data consisting of Information like Aadhaar numbers, blood group, blood ID, Fingerprint Etc. is appended to the Bloodstore. This blood is not yet verified; hence, it cannot be classified as safe or unsafe. Now the blood is taken to the blood inspection center, where after physically checking it, the Blood will be declared as "Tested and Safe" or "Tested and Unsafe". As this happens, a QR code will be

generated which is the combination of Aadhaar numbers, blood ID, and Batch number's hash. This QR code will be automatically downloaded and is to be stuck on physical blood packets. The Donor will be notified in both cases about acceptance or discarding of his blood. Blood can be transferred by changing one of the attributes from Timestamp, owner of the Blood, Location of Owner, and

verified. The blood, which is marked "Tested and Safe" can now be used for patients. Now, on the Hospital side, if blood is required, they have to specify the required blood group. Then our algorithm will search for the most optimal blood bank based on the Deciding factor. Deciding Factor Formula is calculated based on the thought that the distance between the two entities must be as minimum as possible. They must have a greater quantity of blood available. After finding the optimal blood bank, the Blood will be transferred from that blood bank to the current Hospital. Then the Hospital can see details of the Blood they have received virtually. They can also view the location of the blood bank on Google Maps, and finally, when the Blood is received physically, they can upload the QR code present on the Blood and verify the correct Blood is obtained.

IV. RESULT & DISCUSSION

A transparent Blood Bank System using Blockchain technology can have a positive impact on the efficiency and safety of the blood supply chain. Here are some potential results that could be achieved:

Increased Transparency: The decentralized database of the blockchain-based system ensures that information about donated blood, including its origin and testing results, is securely stored and cannot be tampered with. This makes it easier for medical professionals to access accurate and up-to-date information about the blood supply, improving the overall transparency of the system.

Improved Safety: The use of smart contracts in the Blood Bank System reduces the risk of human error and fraud, ensuring that the blood supply chain remains reliable and secure. This helps to improve the safety of blood transfusions, reducing the risk of adverse reactions and infections.

Increased Efficiency: By streamlining various processes and reducing the need for manual intervention, the Blood Bank System using Blockchain technology can speed up the time it takes to get blood from donation to transfusion. This can be critical in emergency situations where time is of the essence.

Improved Donor Management: The Blood Bank System can also help to improve the management of blood donors. For example, the system can automatically track the eligibility of donors and manage the scheduling of blood drives.

Better Supply Chain Management: The decentralized database of the Blood Bank System can help to better manage the blood supply chain. This can reduce the risk of blood shortages and improve the overall availability of blood.

Overall, a transparent Blood Bank System using Blockchain technology has the potential to revolutionize the way blood is managed and improve the safety, efficiency, and transparency of the blood supply chain.

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Fake Product Identification System using Blockchain

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Abstract — **In recent years, Counterfeit products play an important role in product manufacturing industries. This affects the companies name, sales, and profit of the companies. Blockchain technology is used to identification of real products and detects fake products. Blockchain technology is the distributed, decentralized, and digital ledger that stores transactional information in the form of blocks in many databases which relates to the chains. Blockchain technology is secure technology therefore any block cannot be changed or hacked. By using Blockchain technology, customers or users do not need to rely on third-party users for confirmation of product safety. In this project, with emerging trends in mobile and wireless technology, Quick Response (QR) codes provide a robust technique to fight the practice of counterfeiting the products. counterfeit products are detected using a QR code scanner, where a QR code of the product is linked to a Blockchain. So, this system may be used to store product details and generated unique code of that product as blocks in the database. It collects the unique code from the user and compares the code against entries in the Blockchain database. If the code matches, it will give a notification to the customer, otherwise it will give the notification to the customer that the product is fake. With the advent of globalization and the ever-growing rate of technology, the volume of production as well as ease of procuring counterfeit goods has become unprecedented. Be it food, drug or luxury items, all kinds of industrial manufacturers and distributors are now seeking greater transparency in supply chain operations with a view to deter counterfeiting. This paper introduces a decentralized Blockchain based application system (DApp) with a view to identifying counterfeit products in the supply chain system. With the rapid rise of Blockchain technology, it has become known that data recorded within Blockchain is immutable and secure. Hence, the proposed project here uses this concept to handle the transfer of ownership of products. A consumer can verify the product distribution and ownership information scanning a Quick Response (QR) code generated by the DApp for each product linked to the Blockchain.**

Keywords— Counterfeiting, Blockchain, Supply Chain

I. INTRODUCTION

The global development of a product or technology always comes with risk factor such as counterfeiting and duplication, which can affect the company name, company revenue, and customer health. The basic idea of the project is to verify that the product purchased by the customer is fake or real. In comparison with blockchain we have traditional supply chain. Traditional supply chain provides centralized network where the data is in the hand of the company which provides the service or the products in the market, and they own the data so they can manipulate as per their wish, so they are not secure. Counterfeiting of the product are produced to take advantage of the superior value of the imitated products. As mentioned, traditional supply chain provides centralized network whereas Blockchain provides decentralized data base, every transaction involving the data value for the product. Over the years, the identification of counterfeit goods in market has always posed a challenge for all supply chain stakeholders. As per the latest assessment of EU Intellectual Property Office (EUIPO) and the Organization for Economic Cooperation and Development (OECD), the global sales of counterfeit and pirated goods have increased alarmingly to 460 billion euros which is about 3.3% of the global trade [1]. The sales and profits of companies around the world have been affected by this phenomenon. The clothing and pharmaceutical sectors experienced sales losses of about 26.3 billion euros and 10.2 billion euros respectively [2]. Moreover, with the advent of recent technologies and E- commerce, the market of counterfeit goods has exploded on social media platforms. The anonymity, reach and segmenting tools of Ecommerce and social media have smoothed the pavement for counterfeiters. Hence, counterfeiting as in producing twins or fakes of real products pose great threat to innovation and economic growth This is done by creating a record whose authenticity can be verified by the entire community since blockchain runs by peer-to-peer network. In such a way manufacturer can use this system to provide genuine products to the customer. This will help to maintain the customer trust and to increase the brand value of the product in the market. In blockchain every block consists of data, hash, and previous block hash. Data contains the relevant information and hash consists of the unique code. It is impossible to change data of any block since person changing the data requires to own most of the network. If we try to change the data of any block the hash will get changed. So, this becomes the major advantage over the traditional centralized architecture where the data in blockchain is immutable so that the customer who buys the product gets the genuine information of the product. Our System provides the emerging technology of web use cases, Quick Response (QR) codes provide a robust technique to fight the practice of counterfeiting the products. Counterfeited products can be detected using a QR code scanner, where a QR code of the product is linked to Blockchain. So, this system may be used to store product details and generated unique code of that product as blocks in database. It collects the unique code from the user and compares the code against entries in the Blockchain database. If the code matches, it will give all the information of the product otherwise no information will be outputted to the customer which shows that the product is fake or counterfeited. In this paper, a decentralized application system (DApp) has been introduced that uses Ethereum blockchain technology in its architecture. The DApp simulates a real-world supply chain and ensures the ownership of product is transferred and recorded in the blockchain network. Besides, the system proposed here can also be implemented in

Ecommerce and retail sites that can considerably bring transparency in the virtual platforms for all consumers. Though Radio Frequency Identification (RFID) has been used for research in this sector previously, it has posed security and privacy risks which can be efficiently dealt with using blockchain.

A. MOTIVATION

In recent years, the spread of counterfeit goods has become global. There are many fake products in the current supply chain. According to the report, fake product incidents have risen in the last few years. It is necessary to have a system for customers or users to check all details of the product so that users can decide that the product is real or fake. In India currently, there is no such system to detect counterfeit products. So, the solution involves a simple QR code-based identification that can help the end-user or customers to scan and identify the genuineness of the

product by using a smartphone.

B. OBJECTIVE

The idea of this project came into existence because of the increase in the counterfeit products.

The objectives of this project are:

1.To Design Anti Counterfeit System using Blockchain.

2.To secure product details using a QR code.

3. Provide security to the clients by offering data to client.

II.. PROBLEM STATEMENT

The worldwide improvement of an item or innovation consistently accompanies hazard factors, for example, forging and duplication. Forging items can influence the organization's name and the client's wellbeing. Presently days discovery of phony item is the greatest test. Fake items are causing a significant impact on the organization and the client's wellbeing. Hence, item creators are confronting enormous misfortune. India and different nations are battling such fake and fake items. In the proposed framework, the framework produces QR codes utilizing Blockchain innovation. This innovation stores exchange records in blocks. These squares are secure and difficult to access and change the data from it. By utilizing a QR code we can recognize the fake items.

III. EXISTING WORK

In Existing system, 'A Comparison Survey Study on RFID Based Anti-Counterfeiting Systems' describes a frequency identification tag for the detection of fraud products that has been considered over the last few years. In this system we represent a review based on a test topic for duplicate items using Radio Frequency Identification tags in products. In this system, Radio frequency identification (RFID) and remote sensor networks are most used for remote development and It offers a number of possibilities for future while RFID tags like an actuator require a control signal and a power source. RFID detects areas and physical evidence of labeled objects – but unlike using laser light from verified tags, it uses low-frequency radio waves to collect and store data. In a cell or distribution center, this system is used to make the assortment of information automated. The transceiver scans the radio waves and sends them to the RFID tag. Separate data is then transferred from a small microchip tagged to the RFID reader.

IV. LITERATURE SURVEY

1] A Survey of Counterfeit Product Detection by Prabhu Shankar, R. Jayavadivel. Counterfeit products are growing exponentially with the enormous amount of online and black-market. So, there is a strong need to address the challenges of detecting counterfeit products and designing appropriate technology to improve detection accuracy. This is one of the active research areas to be explored in the current world. This paper discusses various techniques for identifying counterfeit products.

2] Smart Tags for Brand protection and anti-counterfeiting in the wine industry by steven, Marko. This paper describes a brand protection and anticounterfeiting solution for the wine industry based on smart tags and Cloud enabled technologies. The main idea behind smart tags is to utilize quick response codes and functional inks supported by the Cloud system and two-way communication between the winemaker and end-user.

3] A Blockchain-based Supply Chain Quality Management Framework by Si Chen, Rui Shi. In this paper, we propose a blockchain-based framework. This framework will provide a theoretical basis for intelligent quality management of the supply chain based on blockchain technology. Furthermore, it provides a foundation to develop theories about information resource management in distributed, virtual organizations.

V. METHODOLOGY

The Methodology used to develop this system includes a high- end development tool to run our own local blockchain for Ethereum called Ganache, to interact with Ethereum blockchain we make use of cryptocurrency wallet called Meta mask, Remix IDE tool to run the Smart Contract Program, XAMPP server provides interface for SQL (phpMyAdmin) which makes handling database easy, Blockchain proof-of-work implemented using PHP. First, we need to create a Meta mask account and run Ganache. •

In Ganache, open accounts tab and then copy the private key of any account present there. Paste the copied private key in the import section of the account. Here, we are setting up a node and use this private key to sign and approve the transactions. Now, we write the Smart contract code in the Remix IDE code section. We need to save this code and compile it. Then, we deploy it by choosing Injected Web3 as the environment. We need to copy the contract address and contract ABI to app.js file. Next, we need to go to the XAMP server and activate Apache and MySQL.

We need to make sure that our project folder is placed in the htdocs folder of the root directory. We then open PhpMyAdmin and write the SQL queries and execute it. The database is set up. Lastly, we need to open the

localhost URL to run this Decentralized Shopping platform that we have created.

The manufacturer's functions include adding the company to the blockchain by providing company name and setting the minimum registration fee to become a seller or retailer for the company. The manufacturer solely preserves the rights to enroll products in the network. The manufacturer can also control the distribution status of products and transfer ownership after a seller has bought the product stock. The manufacturer performs two major functions namely adding and distributing products in this system. For adding a product Algorithm 1 is used.

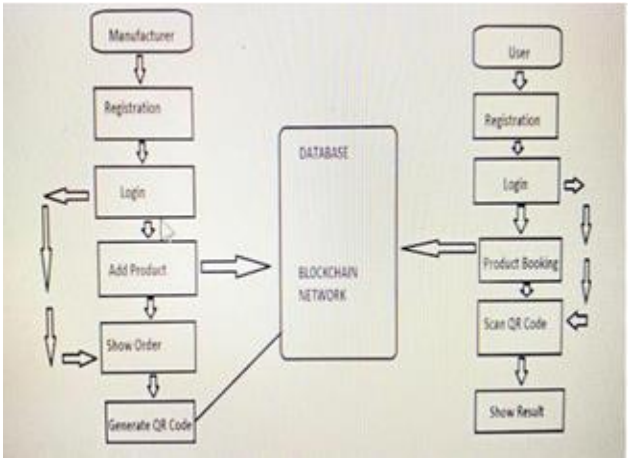
A seller can pay the minimum fee set by the manufacturer and register for the company. After registering once, the seller can buy any product as well as track its distribution. A product status is set from 'Ready To Go' to 'Shipped' after the manufacturer ships it out to the seller.

A consumer can scan the QR code provided with each product and verify the transfer of ownership of product from manufacturer to seller. The consumer can also verify the name of the current owner of the product and check its distribution status.

Blockchain technology provides promising opportunities in the supply chain management paradigm. Blockchain data is stored on nodes where each node has a complete copy of the blockchain database. Orders, payments, accounts, price of products etc. can be tracked, shared and secured using a blockchain network. Some important features of blockchain technology in supply chain management includes: 1) Security and Privacy: Blockchain uses public key encryption method of cryptography for data security. Users have public and private key pair which are used to validate transactions and these transactions are immutable and permanent. 2) Decentralization: As blockchain is a distributed ledger technology, it doesn't rely on third party or any centralized authority. 3) Transparency: Data stored in Blockchain is public and anyone can enquire on their transactions. The transactions can be governed by a set of rules known as the smart contract. The system proposed here uses Meta Mask cryptocurrency wallet for transactions and the smart contract here has been deployed in the Rinkeby Test Network of the Ethereum Blockchain. The DApp is based on three major stakeholders, The Manufacturer, the seller and the consumer.

F. Ethereum DApp Architecture Fig. 4 here depicts the base architecture of the system. The user interface (UI) here has been developed using ReactJS. If the user wants to interact with the smart contract, the DApp will use Web3.js which communicates with Meta Mask through its provider. Meta Mask creates a transaction and signs it with the user's private key. This transaction is then sent to Ethereum

network. The transaction is processed, verified and added to a block in the network. The private keys of the user are never recorded in the process so user can safely interact with the network.



VI. RELATED WORK

Various researchers have proposed different methods for establishing a blockchain-based supply chain management system. One of them presented a counterfeit product identification system using android application where a product can be searched in the Blockchain network. Another paper displayed a fake product detection system using blockchain where SHA-256 Algorithm was used to identify a product

There is no good solution before to differentiate fake products from original products. Blockchain technology can be helpful to tackle such problems. The project's main goal is to help people to identify the product is an original product or a fake product.

We proposed a fake product detection system using blockchain technology as an android application for the detection of counterfeit products. The proposed system ensures that the detection of fake products in day to-day life. The proposed system consists of three main parts, customer or user android application, Manufacturer's or company's android application, and Cloud/ Database.

The first application is the Manufacturers or company side application in which we have to first register ourselves. After registration login into the application, we have some options. One option is to add a product in which the manufacturer can add the product details. Another option is to show the order in which they can see customers' order details and after that, they can decide the accept or reject the order. The manufacturer also can see the product is delivered or not.

A second application is the Customer application in which we have to first register in-app after that we can log in to the application using id and password. In this application, there is an option to show products where customers can see the product details like name, total quantity, price of a product, details of the manufacturer. In that, we can product book the product by inserting the quantity of product. In this application, we can see orders using show my order where we can see the product details, name, quantity, date, time, price, and status of product which is produced is delivered or not. In this app we have a QR code scanner in which we scan the QR code of the product then it shows that the product is fake or real. There is another option which is a blockchain in which it displays the name of generated block product

quantity, generated Hash Value, and the product is corrupted or not.

In this project customer login, the in the application. After login, he fills in the details for ordering the product and book the product. The order of the product can be shown to the manufacturer. Manufacturer deciding whether the product request is acceptable or not. After the manufacturer accepting the order of the product it generates the unique QR code of a product. Once an order of product is stored on the network hash code is generated of that product and it is possible to maintain the transaction of the product. In the proposed system QR code is generated for a particular product. Customers scan the QR code on the product or package using the smartphone's QR code reader application or customer application have the option of QR code scanner. After scanning, we get the result of the product is real or fake. In the end, the Blockchain system holds these product details along with a history of transactions to enable the tracking of the product along the distribution chain. All the product details, block name, a hash value is stored in the firebase cloud database.

VII. CONCLUSION

Counterfeiting products are growing exponentially with the enormous amount online. So, there is a strong need to detecting counterfeit products and blockchain technology is used to detect fake products. Furthermore, the information is encoded into a QR code. Customers or users scan the QR code and then they can detect the fake product. Digital information of product can be stored in the form of blocks in blockchain technology. Thus, in this paper we discussed the system and the solution to fight against the malpractices of counterfeiting of the products and proposed the system which is useful for end user to detect whether the product is fake or not by checking the throughout history of the product in the supply chain. End user can scan QR code assigned to a product and can get all the information that has been put up throughout the supply chain in the blockchain on which end to end user can check whether the product is genuine or not.

Ownership tracking system is being reshaped through distributed ledgers of Blockchain technology. Due to rapid changes in the Ecommerce and business sectors, the current trends of supply chain are being affected. The DApp developed here ensures greater transparency in the supply chain management and can also be entrusted for use in Ecommerce. As such, administrative costs and complicated procedures are eliminated by this process. Besides, the cost for enrolling each product in the proposed model is only

0.000209 ether which is equivalent to 0.65 US dollars that can sufficiently reduce costs for large chain stores. The model also ensures enduser verification system through a QR code and transactions here can be verified on Etherscan too. As future work of the proposed model, the functions included can be improved further to bring reliability in the supply chain management.

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Analysis of Healthcare System using Classification Algorithms

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Abstract—**Classification is a method of predicting similar information from the value of a categorical target or categorical variable. It is a useful technique for any kind of statistical data. These algorithms are used for different purposes like image classification, predictive modeling, data mining techniques, etc. The main goal of supervised learning is to build a simple and clear class labeling model of the predictive features. The classifiers are then used to classify the class labels of the test cases where the values of the predictive features are known with the value of the unknown class labels. In other words, the goal of machine learning is to build a concise model of the distribution of class labels in terms of predictor features. The resulting classifier is then used to assign class labels to check the cases where the predictive feature values are known. In this paper, we illustrate various classification techniques used in supervised machine learning that incorporate a number of parameters. We have compared four machine learning algorithms including Decision Tree, Random Forest, K-nearest Neighbor, Support Vector Machines using four different datasets regarding healthcare systems. In this review article, we summarize machine learning techniques that are widely used in the field of health systems due to their data processing and analysis capabilities.**

Keywords— **Healthcare, Classification, Machine Learning**

INTRODUCTION

Machine learning is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns, and make decisions with minimal human intervention. It has grown rapidly in recent years in the context of data analysis and computing, typically enabling applications to function in intelligent ways. Also commonly referred to as the most popular modern technology, providing systems with the ability to automatically learn and improve from experience without being specially programmed [11].

Through the use of statistical methods, algorithms are trained to perform classification or prediction, revealing key insights in data mining projects. This information then guides decision making across applications and businesses, ideally impacting key growth metrics. As Big Data continues to grow and evolve, the market demand for data scientists will increase, requiring them to help identify the most relevant business questions and, subsequently, data to answer them [13].

In order to create intelligent methods for identifying and treating disease, scientists are focusing on machine learning. Because ML can identify disease and virus infections more precisely, patients' illnesses can be identified earlier, the risky stages of diseases may be avoided, and there will be fewer patients overall. The work of anticipating COVID-19 infection can be automated, and ML can also assist in predicting COVID-19 infection rates in the future [4].We believe this technology will be a powerful tool for allocating medical resources and hospital capacity planning by making accurate real-time assessments of mortality risk, taking into account the highly specific characteristics of individual patients [12].

In healthcare, the most common application of traditional machine learning is in precision medicine - predicting which treatment protocols are likely to be successful on a patient based on various patient attributes. and treatment context. Most machine learning and precision medicine applications require a trained data set for which the outcome variable is known. This is called supervised learning [14]. Machine learning in healthcare is increasingly being used and helps patients and clinicians overcome industry challenges and create a more unified system to improve workflow. It requires advanced preparation before application implemented in healthcare to distinguish between types of data associations, similar types of data, learning from data gives the proper output. The larger the data sample provided to the "machine", the more accurate the machine's output becomes [5].

In high income nations like the UK, a team at the Cambridge Center for AI in Medicine created the
Cambridge Adjutorium system, which uses a state-of-the-art ML framework to precisely predict the rate of mortality, the need for ICU admission, and the requirement for ventilation in hospital patients with COVID-19. The system's accuracy rate ranged from 77% to 87 percent, which was a pretty high accuracy rate even though it was trained using extremely small datasets (CHESS data from Public Health England) [9]. The main advantages of ML/AI nowadays are diagnostic and predictive analysis, however efforts are being made to benefit

additional medical problem domains. Recently, considerable advancements have been achieved in the ability of machine learning algorithms, in particular deep learning algorithms, to autonomously diagnose illnesses while decreasing the cost and expanding accessibility of diagnostics [17].

I. Motivation

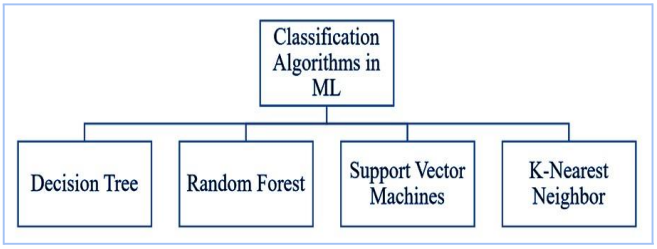
The research area of ML, or "machine learning," is constantly growing and offers many opportunities for investigation and application. Even if machine learning has had a minimal impact on healthcare, Mr. James Collin claimed at MIT that it is the technology that would define this decade. Several new companies in the ML sector are focusing seriously on the medical field. Even Google has entered the fray and created a machine learning programme for detecting cancerous tumours on mammograms. Stanford utilises a Deep Learning algorithm to detect skin cancer. The US healthcare system generates about one trillion gigabytes of data annually. Scientists and academic specialists have identified a number of risk factors for chronic illness as well as its distinct characteristics. Additional data stands for more learning for machine, but for higher precision, these many features need a huge quantity samples [8].

The use of machine learning is highly done in processes like feeding the data into ML models and guiding and correcting them to make the right judgments. The technology has a wide range of applications for enhancing research in clinical trials. By applying advanced predictive analytics to clinical trial applicants, medical professionals can evaluate a wider range of data and reduce the cost and time of medical testing. There are various ML applications that can further improve the efficiency of clinical trials and can help to determine the optimal sample size to increase effectiveness and reduce the likelihood of data errors. We believe machine learning technologies can help the medical and healthcare industries explore new fields and entirely rethink the delivery of healthcare [10].

II. Related Work

Mathematical models known as machine learning classification algorithms are utilized to approach classification problems. The method of organizing machine learning algorithms involves choosing the right algorithm to tackle a specific problem and achieve efficient results based on the available input datasets and the model preparation process. A classification algorithm's initial step in operating is to confirm that the variables, whether input or output, have been appropriately encoded. The next step is to separate the dataset into the training dataset and the testing dataset after it has been processed. The next stage is to choose the model that best fits our issue after partitioning the dataset into training and testing. [16].

These are the different machine learning classification algorithms that we have implemented to comprehend the datasets effectively.



The decision tree classifier is considered to be one of the most well-known methods to represent the classification of the classifier data. This approach is referred to as a decision tree since a tree can symbolize the collection of splitting rules used to divide the dataset [3]. It is used in text mining as a classification system to ascertain how customers feel about a product. The training data set is used to build a decision tree model, and the validation data set is used to determine the appropriate tree size needed to achieve the optimal final model. Businesses can use decision trees to determine which products will bring in more revenue when they are launched [7].

Random forest is one method of ensemble learning that falls into the category of homogeneous basic learners with respect to the type of constructive classifier. As the name suggests, all basic learners are decision trees, so they are simpler in structure than similar methods [2]. It also perform efficiently on large databases, can handle thousands of input variables without dropping variables, provide estimates of important variables, and are unbiased in generalization error as the forest grows. It produces internal estimates that are free of , has an efficient method of estimating missing data, and preserves accuracy [1].

Support Vector Machine or SVM is one of the most well-known Supervised Learning algorithms, which is based on statistical learning theory. It has played an important role in pattern recognition, a very popular and active research field among researchers. Research in some areas where SVM works well has spurred the development of other applications like SVM for large data sets, multiple classifications, and imbalanced data sets [15] . With as much as 90% of the compounds being correctly categorized, they have been used to classify proteins .

The K-nearest neighbor (KNN) algorithm is a supervised machine learning algorithm used primarily for classification purposes. KNN, a supervised algorithm, considers the features and labels of the training data to predict the classification of unlabeled data. In general, KNN algorithms can classify records using a training model similar to the test query by considering the k nearest training data points

(neighborhoods) that are closest to the query under test. By evaluating the most probable gene expressions, it can estimate the risk of prostate, cancer and heart attacks [22].

Logistic Regression is one other algorithm that is used for classification purposes. It focuses on how various independent variables affect a single result variable. Finding the association between independent factors and a dependent variable is done using regression analysis. It is a technique for predictive modelling that use an algorithm to forecast continuous outcomes. The logistic function's curve shows the possibility of several things, such as whether or not a mouse is obese depending on its weight or whether or not the cells are malignant, etc [25].

Naïve A family of classifiers known as "Bayes classifiers" is based on the Bayes theorem application and strong parameter independent requirements. They are probabilistic in nature. The Bayes theorem can be utilised as a classifier's decision rule for disease prediction. Using the Bayes method, the likelihood of the disease based on the number of symptoms can be predicted [26].

Gradient Descent is a general-purpose optimization process that may locate the best answers to a variety of issues. The general concept is to iteratively adjust parameters to minimise the cost function. The size of the steps, which is defined by the learning rate hyperparameters, is a crucial Gradient Descent (GD) parameter. The algorithm will need to go through many iterations in order to converge, which will take a lot of time. If the learning rate is too high, we risk jumping the ideal value.

There aren't many educational resources that concentrate on particular business difficulties, which is surprising given the variety of business problems that a data scientist must tackle. This essay seeks to cover the different components of one of the most prevalent business difficulties by particularly addressing the question, "What classification is in machine learning?". In general, the nature and qualities of the data, as well as the success of the learning algorithms, determine the effectiveness and efficiency of a machine learning solution. Techniques such as classification analysis, regression, data clustering, feature engineering and dimensionality reduction, association rule learning, or reinforcement learning are available in the field of machine learning algorithms to efficiently construct data-driven systems [6].

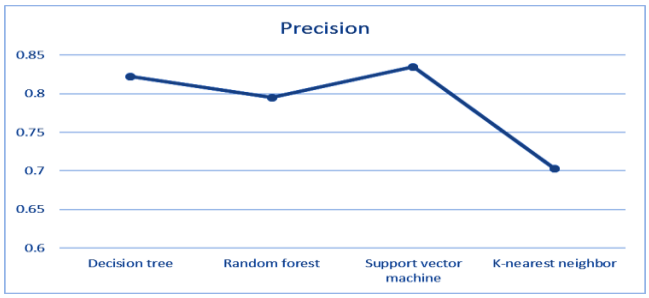
The performance of the classification models for a certain set of test data is evaluated using a matrix called the confusion matrix. Only after the true values of the test data are known can it be determined. A confusion matrix is a performance measurement technique for machine learning classification. It's a kind of spreadsheet that helps determine the performance of a classification model using a set of test data whose true values are known [23]. The need for confusion matrix and parameters is, it assesses how well classification models perform when they make predictions based on test data and indicates how effective our classification model is. Selecting fewer features may enhance categorization and provide a better understanding of the underlying process that produced the data, in addition to reducing the dimensionality of the data [24].

We have discussed and studied four classification algorithms which are Decision Tree, Random Forest, Support Vector Machine and K-Nearest Neighbour. We computed the various model parameters using the confusion matrix on the four different datasets and got the analysis accordingly.

Some of the confusion matrix and parameters that are progressively used are mentioned below:

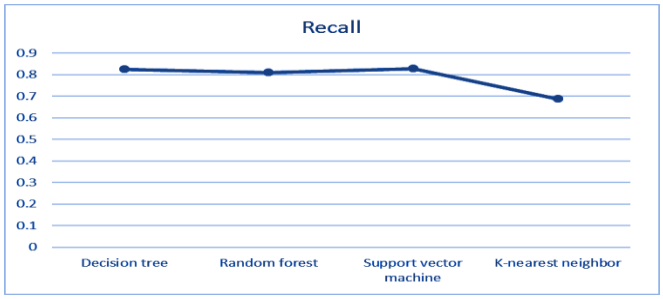
A. Precision B. Recall C. F1-score D. Support A. Precision

Precision is calculated by dividing the total number of true positives by the total number of true positives + false positives. False positives are instances where the model falsely classifies a case as positive when it is actually negative. A good classifier's precision should preferably be 1 (high). These metrics inform users about the percentage of positive predictions really positive [18].



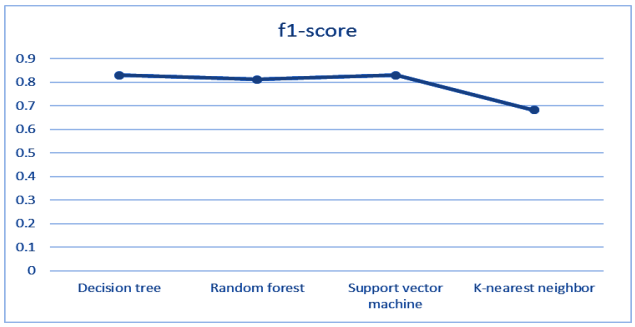
B. Recall

Recall is a metric that measures the proportion of accurate positive predictions among all possible positive predictions. Recall gives an indicator of missed positive predictions, unlike precision, which only comments on the accurate positive predictions out of all positive predictions. Recall measures the capacity to locate all relevant instances of a class in a data set. Measures the completeness of the classifier results. It is the ratio of the total number of positive flagged examples to the total number of truly positive examples [19].



C. F1-score

Also known as F-Score or F-Measure, this metric calculates the performance of an algorithm by considering both precision and recall. Although F1 is generally more beneficial than accuracy, especially if you have an uneven class distribution, it is not intuitively as simple to understand as accuracy. This metric balances recall and precision because it is difficult to compare two models when available, classifier it wasn't a balance. So it's a weighted average recall and precision values. [20].



D. Support

Support seems to indicate that it is the number of occurrences of each particular class in the true answers (the test set answers). It can be calculated by summing the rows of the confusion matrix. Disproportionate support in the training data may indicate structural weakness in the scores reported by the classifier, and may indicate the need for stratified sampling or recalibration.

Support is the number of true response samples that fall into that class is the actual number of occurrences of the class in the dataset. No difference between models just to diagnose the performance evaluation process [21].

ML for healthcare: Challenges

The identification and prediction of populations at high risk of experiencing particular unfavorable health outcomes, as well as the creation of public health interventions that are specifically aimed towards these populations, are significant applications of ML in public health. The medical curriculum has to incorporate a variety of ML-related topics so that medical personnel may successfully direct and analyze research in this field. Any ML model needs high-quality data that are typical of the population to which the model's outputs should be applied if it is to produce reliable results. 1) Safety Issues: Superior performance in a controlled lab setting—a frequent ML community practice—is not proof of safety. The ML/DL system's patient safety is assessed using its level of safety. The majority of a clinician's daily responsibilities are monotonous, and the patients they see have common medical issues. They have the responsibility of diagnosing uncommon, subtle, and concealed medical illnesses that affect one in a million people. Current systems must be made safe by enabling ML to perform effectively on hidden strata, outliers, edge, and nuanced instances.

2) Privacy Issues: Using user data by ML systems to make predictions raises privacy concerns, which is one of the main challenges in data-driven healthcare. Users (i.e., patients) anticipate that the providers of their healthcare services will take the appropriate precautions to protect their inalienable right to the privacy of their private information, such as their age, sex, date of birth, and health information. Two different forms of potential privacy dangers exist: disclosing private data and using data improperly (perhaps by unauthorized agents). Privacy is based on the traits and nature of the data being gathered, the setting it was developed in, and the patient population. As a result, it's crucial to use the right techniques to mitigate privacy breaches because they can have serious consequences.

3) Ethical and machine learning: Ensuring the ethical use of data is crucial in ML applications that focus on users, such as healthcare. Before gathering information to create ML models, explicit steps should be taken to comprehend the targeted user group and their social characteristics. Furthermore, it's crucial to recognise how data collecting can undermine a patient's wellbeing and dignity in this context. If ethical issues are not taken into consideration, applying ML in realistic settings will have unfavorable outcomes. Additionally, it is critical to have a comprehensive understanding of the system in uncertain and complex settings in order to ensure the fair and ethical operation of automated systems.

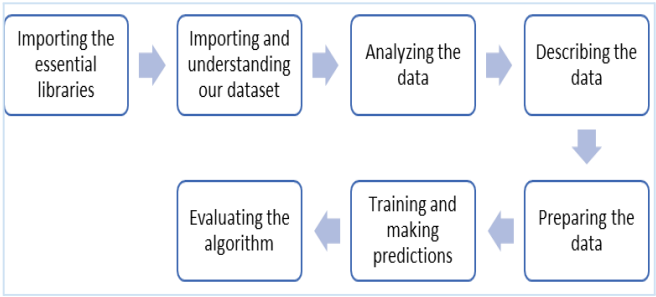
4) Access to High-Quality Data: One of the biggest problems in healthcare is the lack of representative, diversified, and high-quality data. For instance, compared to the many collections of large-scale, multi-modal patient data created on a daily basis by various small and large-size healthcare institutions, the quantity of data that is available to the research community is quite modest in size and restricted in scope. On the other hand, it can be extremely difficult and expensive to collect high-quality data that closely reflects actual clinical circumstances. The ability to forecast diseases and make treatment-related decisions is made possible by the availability of high-quality data. Subjectivity, duplication, and bias are just a few problems with the data that are gathered in practice.

III. Proposed Work

Without the use of any human intelligence, different data science models can quickly and accurately produce outcomes in the health care sector. In addition to generating precise and effective recommendations, machine learning models also free up healthcare professionals' time to focus on research and perform better in emergency situations by decreasing the manual work they must do.

For finding out which algorithm is best for a certain analysis of a health issue, this study was carried out. Classification algorithms in machine learning were implemented on four different datasets in the field of healthcare and a detailed evaluation was carried out. The first dataset is a heart disease prediction dataset where the "target" field pertains to the existence of the patient's heart problems. 0 means there is no disease, while 1 means there is a disease. The diabetes disease is the second dataset. The goal is to determine whether a patient has diabetes based on diagnostic parameters where the "outcome" field indicates if the person tested positive or negative for diabetes. The third is the chronic kidney disease prediction dataset. Based on specific diagnostic metrics present in the dataset, the dataset's goal is to diagnostically determine whether a patient has chronic kidney disease or not. "Class" serves as the dataset's target variable. The last dataset is about prediction of breast cancer in a patient. "Classification" variable acts as the indicator of the disease. Analysis was carried out by running the algorithms on these datasets.

The initial process was importing the datasets and checking the dimensions of the data. After that, the information is divided into attributes and labels and then into training and testing sets as part of the data preprocessing procedure. The training is done on the training data and then predictions are made. Lastly, the algorithm is evaluated and the confusion matrix for the same is derived for displaying the values of the important metrics used in the classification tasks. The steps followed during the classification:



A. Importing the essential libraries

Libraries are collections of commands and operations written in a particular language. A strong collection of libraries can help programmers complete complicated jobs faster and with fewer lines of code changes. As per our dataset we imported the basic libraries as numpy, pandas, matplotlib and seaborn.

B. Importing and understanding our dataset

Understanding data is being aware of its existence, the needs it will address, its location, and its content. After reading the csv file we will get to know what are the contains in the rows and columns by using word dataset. We imported datasets of health related to heart, diabetes, kidney and breast cancer. Further verifying it as a dataframe object in pandas.

C. Analyzing the data

The entire data analysis procedure is automated by machine learning to deliver richer, quicker, and more thorough insights. The shape of the dataset will show the number of rows and columns present in our dataset. And then printing out a few columns to stay organized with the contents present in our dataset.

D. Describing the data

With the project definition completed prior to data preparation and the evaluation of machine learning algorithms completed later, this approach offers a context in which we may think about the data preparation necessary for the project.

E. Preparing the data

The process of making raw data ready for further processing and analysis is known as data preparation. The gathering, preparation, and labeling of raw data into a format appropriate for machine learning (ML) algorithms, followed by data exploration and visualization, are crucial phases.

F. Training and making predictions

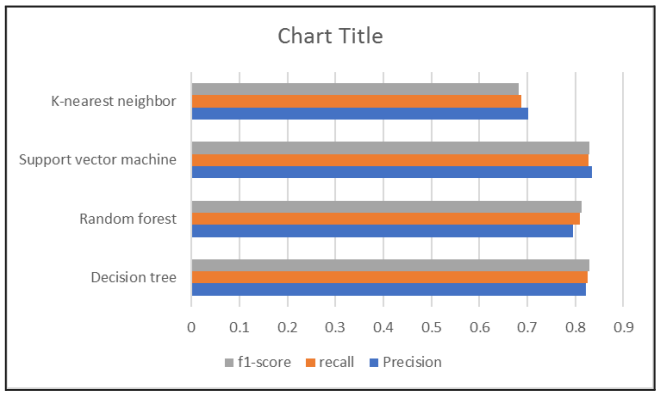
A very sizable dataset called training data is utilized to instruct a machine learning model. Prediction models that employ machine learning algorithms are taught how to extract attributes that are pertinent to particular business objectives using training data. The training data for supervised ML models is labeled.

G. Evaluating the algorithm

An algorithm will be tested against the test set after being trained on the training dataset. Any project must have a machine learning algorithm evaluation. Your model might produce satisfactory results when measured against one metric, such as accuracy score, but unsatisfactory results when measured against another, such as logarithmic loss. After carrying out the following steps, this chart was derived which showed the comparisons based on the parameters.

IV. Result and Discussion

The algorithms were evaluated and the best possible and suitable solution was tried to be achieved. It was observed that support vector machine and decision tree algorithms were proved to be the most effective for the four varied healthcare datasets.



There are three different colors of graphs used representing the f1-score, recall and precision for the classification algorithms. The f1-score and the recall values for support vector machines and decision tree seem to be almost similar through the chart above. But the precision value is what matters while comparing them as the support vector machine leads followed by the decision tree algorithm. The random forest is ranked the third regarding the precision value whereas the KNN is the least precise.

The precisions for SVM and decision tree algorithms are above 80% , declaring them as the most effective algorithms for our datasets. After that, the accuracy for the algorithms was also considered and it was found that SVM is the most accurate with a score of 83% and shortly followed by the decision tree with 82%. The lowest accuracy was for KNN with a value of 68%.

Parameters	Decision tree	Random Forest	Support Vector Machine	K-Nearest Neighbor
Training time complexity	O(n*log(n)*d)	O(n*log(n)*d*k)	O(n^2)	O(knd)
Run time complexity	O(maximum depth of the tree)	O(depth of tree* k)	O(k*d)	O(nd)
Accuracy	0.82	0.77	0.83	0.68
Advantages	i. Easy to Visualize. ii. Manages data which is both numerical and categorical.	i. Can deal with big datasets and missing values. ii. Will produce a variable's importance.	i. Optimal for highest dimensional spaces. ii. The algorithm is memory-efficient.	i. Fast computation time. ii. No data assumptions are made.
Disadvantages	i. Occasionally fails to generalise well. ii. Unstable when input data changes.	i. It is somewhat uncontrollable, like a black box. ii. Slow real-time prediction and complicated algorithms.	i. Won't offer probability predictions. ii. Can estimate probabilities but takes a lot of time.	i. Expensive in terms of computation and needs plenty of memory. ii. It is extremely sensitive to insignificant aspects.

Time complexity can be considered as a scale for how quickly or slowly an algorithm will operate given an input size. Time complexity is often expressed in terms of an input size like n. Runtime complexity defines how well an algorithm performs, or how much extra time or processing power is needed to run the algorithm. The time complexities are compared in the above table for these distinct algorithms based on some parameters like k which defines the number of neighbors and d which stands for the dimension of the data. The training time complexity demonstrates that random forest is used for a large amount of data with reasonable features. Also it can be observed that SVM should not be used if n is large and KNN loops through every training observation and computes the distance d. The pros and cons are as well discussed for estimating the algorithms based on various aspects.

V. Conclusion

All of the information obtained during a medical visit with a doctor is applied by machine learning approaches to extract specific patient traits. In our study, we tried to estimate which algorithm works the best on our datasets in the healthcare field by calculating their accuracy, precision and other factors too. Thus, we were able to conclude that the SVM worked way better than the decision tree, KNN and random forest after evaluating it on various parameters. If numerous fields are considered, there is a much higher need for specialists than there are qualified candidates. This causes a great deal of anxiety for doctors, and delayed diagnoses of patients who need life-saving treatment are common [16]. However, considerable advancements have been achieved in the ability of machine learning algorithms, in particular deep learning algorithms, to intelligently diagnose illnesses while decreasing the cost and expanding usability of diagnostics.

Acknowledgment

We are thankful to our college for providing us with the opportunity and direction to explore this sector. We also want to express our gratitude to everyone who assisted us in finishing this research. We express our gratitude to everyone who contributed to this study because without their

motivation and insightful comments, it might not have been possible to complete the research paper by the deadline.

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Dollar Price Prediction using ARIMA

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Abstract: The proposed project analyses and forecasts the exchange rates on Indian rupee by using time series data concepts from the year 2020 to 2022, using the Box-Jenkins ARIMA technique. Based on the study presented, the ARIMA model's test results show that the proposed model is quite accurate and stable in showing results and hence works well for forecasting the USD exchange rates. Forecasting the exchange rates plays a vital role in minimizing the risks and maximizing the profits for the people working in the financial markets, trading as well as general public across the world. ARIMA uses the stationary time series dataset in order to provide accurate predictions. The time series data used in this paper has been obtained from Yahoo Finance, calculated and analyzed dollar exchange rate for the following day, subsequent 15 days, 30 days, 60 days respectively from the current date. In addition to that, we were able to achieve a small MAPE score/forecast accuracy i.e. 0.923 which indicates that the model gives better accuracy. The Daily exchange rates from 5th June 2020 to the current date were used for the prediction.

Keywords: Autoregressive Integrated Moving Average (ARIMA), forecasting, USD, INR, analysis

I. INTRODUCTION

As per the recent data provided by the Census Bureau's 2018 American Community Survey (ACS), there has been an increase of nearly 50 percent in the number of Indians in US from 2010 to 2018[1]. The IT workface from India is easily employed in countries like United States of America, United Kingdom etc. The sophisticated lifestyle and the exchange rate are the two main reasons for the migration.

The exchange rate which is also known as foreign exchange rate influences a variety of decisions made by participants in the foreign exchange market like investors, importers, governments, exporters, bankers, commercial banks, corporations, tourists and policy makers. It's one of the vital influencing factors for both developing and developed countries [1]. Exchange rate forecasting is essential for international finance enthusiasts and researchers, especially for floating exchange rates[2].

The significance of exchange rates forecasting from a practical perspective is that accurate forecasts can provide valuable information to people in various sectors such as firms, investors and central banks regarding asset allocation, risk hedging, and policy formulation. The real time importance of accurate exchange rate forecasting is that it has important implications for the development of efficient market hypotheses and theoretical models in international finance sector [14].

When it comes to buying and selling, forecasting/prediction is regarded as one of the most key things when choosing an investment market. Every prediction that gives an output needs to calculate accuracy. The accuracy and prediction is influenced by many errors and one such error is human calculation error. It wastes a lot of time and effort for the financial experts. We need a way to overcome this problem that is quite difficult to be solved manually.

Periodic data refers to the data observed over a period of time. The periodic data collected over a certain period of time is used for analyzing the patterns and forecasting of the outcome. ARIMA (Autoregressive Integrated Moving Average) models are models that completely ignore the independent variable when making predictions. This is a model used to measure statistics to measure events occurring over a period of time. Models are used to make sense of past data and predict future outcomes. An ARIMA model is a mixture of two models: an autoregressive (AR) model and a moving average (MA) model.

In this paper, the work has been divided into several sections. Section 1 describes about theneed of scientific and well-defined approach for this study. The similar, related research byvarious authors is discussed in section 2. In section 3, the methodology/procedure for the same is presented. Experimental evaluation and discussion of results are mentioned in section 4 and 5. Finally, conclusion and future related scope of the work is mentioned in the section 6.

II. RELATED WORK

The time series prediction models are developed based on the assumption that past data affects the forecasts of future statistical data points.[3-5] With the forecast item as exchange rate, ARIMA is demonstrated to be an excellent answer for prediction [16-18]. Nyoni (2018) has undertaken an intensive survey of empirical research in Nigeria and different international locations that use ARIMA-primarily based totally time collection tactics to forecast alternate rates [16]. El-Masry and Abdel-Salam (2007) analysed the impact of organization length and overseas operations at the alternate charge publicity of UK non- monetary companies. They discovered that that a better percent of UK corporations are uncovered to contemporaneous alternate charge modifications than

the ones stated in previous research. A majority of the researchers who have analysed this time series forecasting concluded that ARIMA is the best model for time series data[17].

Research that been achieved via way of means of Ahmad Amiruddin Anwary in 2011 has examined "Prediction Rupiah against US dollar", by using the approach of Fuzzy Time Series". with an accuracy degree of the expected outcomes measured via way of means of the Average Forecasting Error Rate (AFER) cost. This research used little amount of statistics, so the prediction will become barely much less than the optimal value [7]

In these days, many authors are interested about the forex rate problem in selecting the most accurate model for forecasting.[9-11].Among the ones, He and Jin [8] used the inverse ARIMA-GM model for forecasting the foreign exchange rate for (US Dollar/Japanese Yen). Their hypothesis stated that the merged model has better forecasting accuracy for exchange rate. Researchers V. Thuy and D. carried out the autoregressive disbursed lag (ARDL) bounds testing technique to analyse the relation between exchange rate volatility and exports carried out. The outcomes confirmed that the alternate charge volatility may have a opposite impact for the export magnitude over a long period of time [12].

The study proposed by RM Pattanayak and Panigrahi.S in 2020 explains that the performance of FTS forecasting model based on support vector machine is robust. It states that using FLRs (Fuzzy Logic Relationships), the statistical superiority of the model is high when compared to other models with a best mean rank value of 70.30[28].

The research paper by Nonita Shrama, Monika Mangla, SN Mohanty, entitled "Employing Stacked Ensemble Approach for Time Series Forecasting" demonstrates that the accuracy of forecasting can be improved significantly by using the stacked generalization ensemble model. The results of the study reveal that the model outperforms traditional methods such as Auto ARIMA, NNAR, ETS, and HW. [33] .

The study "The use of ARIMA Method to forecast Short Term Load Electricity Consumption" that has proposed by Febi Satya P. in 2015 shows the outcomes display that the Mean Absolute Percentage Error (MAPE) score is pretty high, which is 6.03%.[13].

Whereas the MAPE score we achieved for our study is around 92.3%. It is a fact that rise in the volatility of a variable and or the usage of vulnerable forecasting approach within the monetary marketplace is dangerous to monetary improvement because of their damaging effect on global exchange and overseas investments [31]. Hence, forecasting a variable in the monetary markets is an issue of vital importance, in particular within countries like United States of America[31-33].

Recent research study "Forecasting of Sunspot Time Series Using a Hybridization" proposed by S. Panigrahi and RM Pattanayak shows that their proposed PHM-MAX- ARIMA-ETS-SVM gives a better accuracy than the existing hybrid and individual models[6]. The research work titled "A novel probabilistic intuitionistic fuzzy set based model for high order fuzzy time series forecasting that was proposed by RM Pattanayak and H.S.Behara shows a novel probabilistic intuitionistic fuzzy time series forecasting (PIFTSF) model with the help of support vector machine (SVM) to solve the problem of both uncertainty and non-determinism that is related with the real time series data. Such methods work effectively when compared to other traditional methods [23-27].

In the recent study "A hybrid deep learning framework with CNN and Bi-directional LSTM for store item demand forecasting" done by Reuben Varghese Joseph, Anshuman Mohanty and Soumyae Tyagi the hybrid model proposed by the researcher CNN-BiLSTM with lazy Adam optimizer has given better accuracy when compared other traditional machine learning models for forcasting [34-37].

III. METHODOLOGY

In this section, we discuss the techniques used for collecting the data, developing the ARIMA model of the bellow-mentioned time-series data.

The study is divided into four stages: (1) The Dataset, (2) data preprocessing, (3) using the ARIMA approach, and (4) test accuracy.

IV. THE DATASET

The data utilized is the Dollar (USD) – Rupee (INR) exchange rate, which was obtained from Yahoo Finance. Seven attributes make up the dataset: open price, close price, high, low, adjusted price, volume, and date. The time series data has maximum of 657 records which starts from June5, 2020 to December 10, 2022. (Figure 1 shows a dataset collected from yahoo finance)

	INR=X.open	INR=X.high	INR=X.low	IN
2021-06-07	72.9098	72.9160	72.7411	
2021-06-08	72.8094	72.9787	72.7440	
2021-06-09	72.9753	73.0135	72.8700	
2021-06-10	72.9853	73.2385	72.9390	
2021-06-11	73.0123	73.3184	72.8950	
2021-06-14	73.2317	73.2940	73.1005	
2021-06-15	73.1853	73.3763	73.1596	
2021-06-16	73.3439	73.3870	73.2600	
2021-06-17	73.8241	74.2385	73.2680	
2021-06-18	74.2539	74.5223	73.8070	
2021-06-21	74.1440	74.4408	74.0456	
2021-06-22	74.1352	74.3876	74.0205	
2021-06-23	74.3322	74.5448	73.5108	
2021-06-24	74.2469	74.2628	74.1044	
2021-06-25	74.1903	74.3910	74.1168	
2021-06-28	74.2130	74.3283	74.0625	
2021-06-29	74.2856	74.3378	74.1890	

Figure. 1. Dollar vs Rupee Exchange rate Dataset (source: Yahoo Finance)

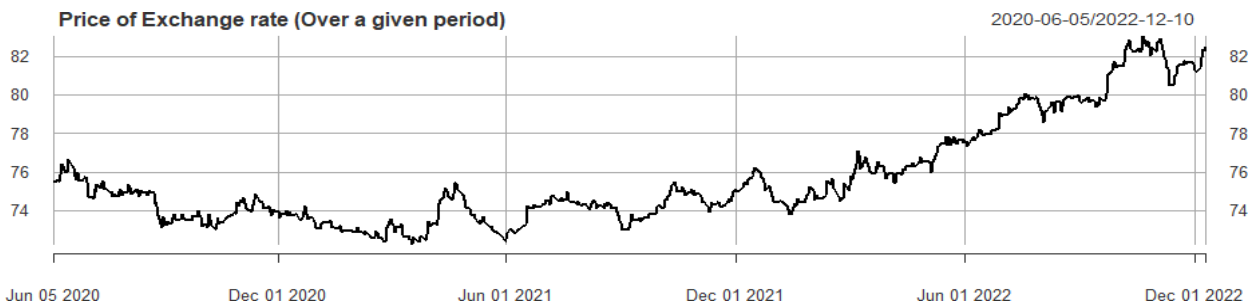


Figure 2: Price of Exchange rate (Over the period 2020-06-05 to 2022-12-10)

V. DATA PREPROCESSING

The data preparation/Preprocessing stage must be completed before the prediction process can begin. This stage involves the following steps (a) load data, (b) attribute reduction, (c) data cleaning, and (d) stationarity testing.

Load data refers to the process of loading data in .csv format. Following the successful completion of the data import procedure, the following results were shown in figure 3.

```
> INR = pdfetch_YAHOO("INR=X",from = as.Date('2020-06-5'), to= as.Date('2022-12-09'))
> summary(INR)
     Index              INR=X.open      INR=X.high      INR=X.low      INR=X.close
 Min.   :2020-06-05   Min.   :72.38   Min.   :72.54   Min.   :72.27   Min.   :72.30
 1st Qu.:2021-01-21   1st Qu.:73.78   1st Qu.:73.94   1st Qu.:73.52   1st Qu.:73.78
 Median :2021-09-08   Median :74.74   Median :74.95   Median :74.53   Median :74.75
 Mean   :2021-09-07   Mean   :75.69   Mean   :75.93   Mean   :75.48   Mean   :75.69
 3rd Qu.:2022-04-26   3rd Qu.:76.52   3rd Qu.:76.82   3rd Qu.:76.34   3rd Qu.:76.54
 Max.   :2022-12-10   Max.   :83.00   Max.   :83.39   Max.   :82.67   Max.   :83.00
 INR=X.adjclose   INR=X.volume
 Min.   :72.30   Min.   :0
 1st Qu.:73.78   1st Qu.:0
 Median :74.75   Median :0
 Mean   :75.69   Mean   :0
 3rd Qu.:76.54   3rd Qu.:0
 Max.   :83.00   Max.   :0
```

Figure 3. Load data

The procedure of deleting non-essential data attributes is called Attribute reductions. The researchers opted to eliminate the following attributes open price, closing price, high, low, and volume. As a result, the experiment only employs the two remaining attributes: adjusted price and date attribute. The adjusted price column was selected as it represents the steady price of the Dollar exchange on a given day. This column has been renamed Price. Figure 4 depicts dataset after reduction.

	Price
2021-06-07	72.9097
2021-06-08	72.8094
2021-06-09	72.9753
2021-06-10	72.9853
2021-06-11	73.0123
2021-06-14	73.2316
2021-06-15	73.1808
2021-06-16	73.3447

Figure 4. The dataset after reduction

In the data cleaning phase, the researchers have identified all the null values in the dataset and removed them.

The time series statistical property with remains constant with respect to time is called Stationarity. The model's performance depends on the Stationarity of the data in time series analysis[19-22]. Therefore, converting the non-stationary into stationary is curial part of the time series analysis. The researchers used the ADF test (Augmented Dickey–Fuller test) to assess whether or not the data is stationary (If the p value is less than 0.05, the data is termed as stationary; otherwise, the data is not.)

In this study the researchers use differencing to transform non-stationary data to stationary data. Data is turned into stationary data via differencing, that indicates the variation or change in value of observation. The process of subtracting unit root from the time series is knowns as differencing process[29-30].

The order of coefficient d on ARIMA will depend on how much differencing has been done. The data is referred to as non-stationer homogeny level d ARIMA if it has undergone a multiple differencing process to remain stationary (0, d, 0).

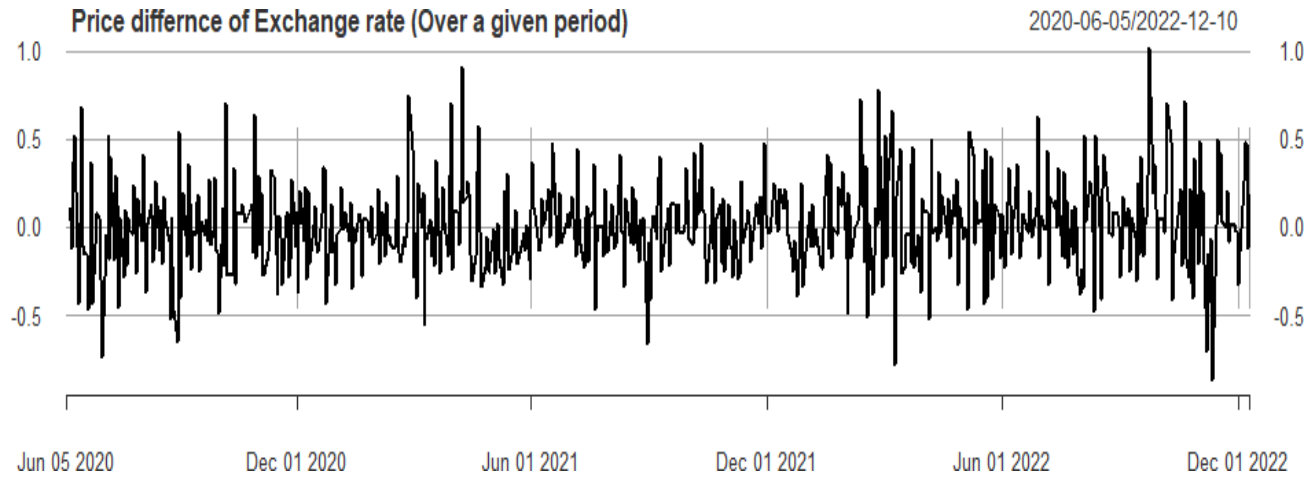


Figure 6. The data after converting it into stationary

VI. PREPARING THE MODEL

ARIMA (Autoregressive Integrated Moving Average) is an acronym that combines the moving average and regression models. We predict the variable of interest in an auto regression model by utilizing a linear combination of the variable's historical values. The moving average model predicts future values by leveraging prior forecast inaccuracy. The ARIMA equation, which combines the AR and MA equations, is abbreviated as given below.

$Xt = \mu + \emptyset 1 Xt{-}1 + \emptyset 2 Xt{-}2 + . . + \emptyset p Xt{-}p + et - \emptyset 1 et{-}1 - \emptyset 2 et{-}2 \ldots - \emptyset q et{-}q$

Where:

$\emptyset p$ = Autoregressive parameters to p

et = White Noise, error value at time t

μ = independent variable

$\emptyset q$ = Parameter of Moving Average

For the training and testing we have split the original dataset in 30:70 ratio. We fit the ARIMA on the training data with the appropriate P, q, and d values to obtain the best ARIMA model. By charting the PACF (Partial autocorrelation function) and ACF (Autocorrelation function) graphs, the order of AR(p) and MR(q) may be established (figure 7). After determining the optimal model, we forecast the future price of the USD v INR exchange rate.

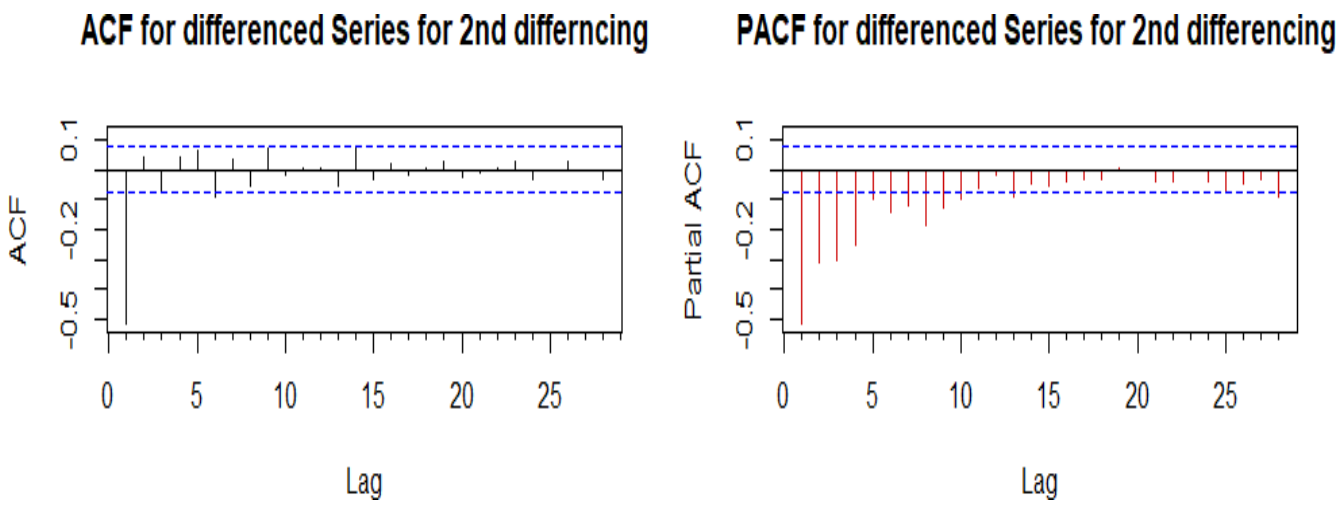


Figure 7 : PACF and ACF for the 2nd differencing

VII. RESULTS AND DISCUSSION

Experimental Evaluation

Performance Evaluation

The following measures are used to assess the model's accuracy:

Mean Absolute Error (MAE), Mean Percentage Error (MPE), Mean Absolute Percentage Mean Square Error (ME), Root Mean Square Error (RMSE) (MAPE).

The model with the lowest MAPE is chosen as the best fit model after we assess the model's performance on the test dataset.

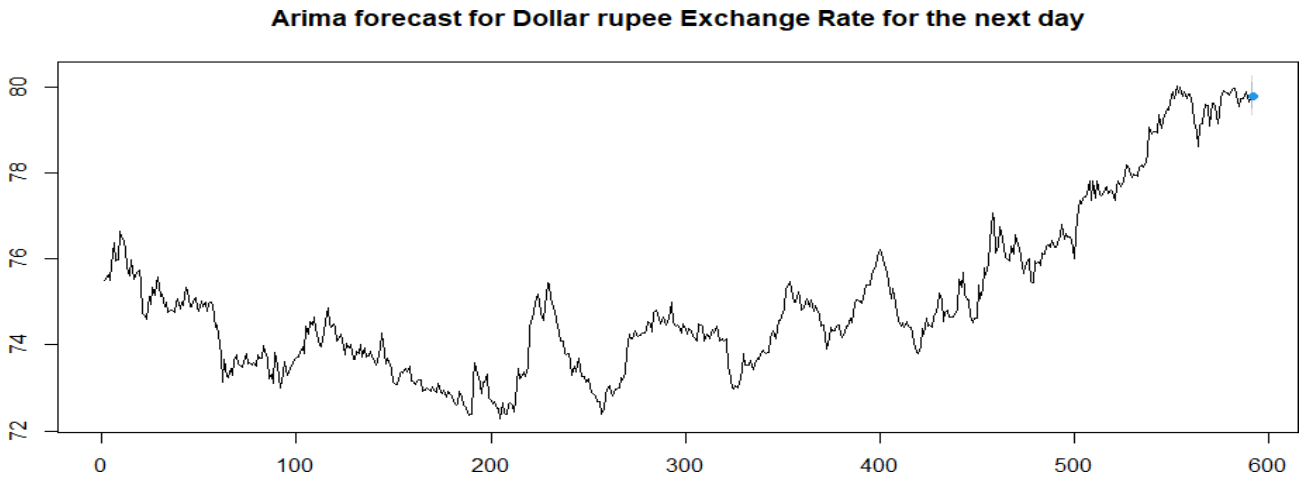
Experimental Setup Used

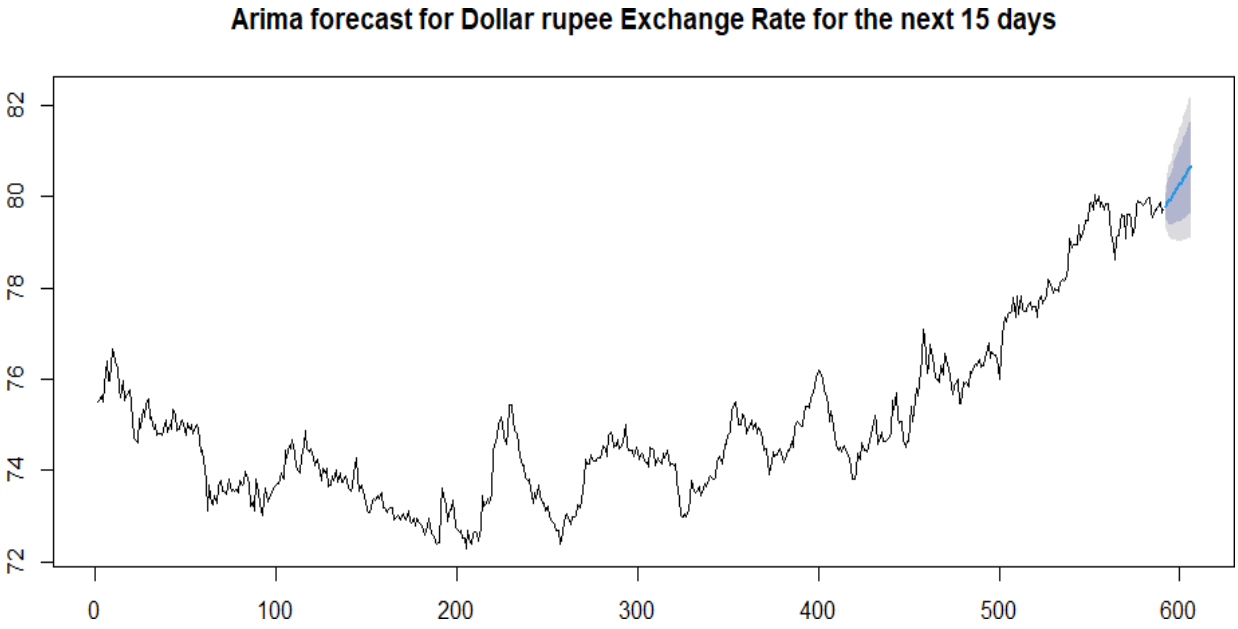
The experiment was carried out on a conventional laptop which consists of Windows 11 operating system, i7 processor, 16GB of RAM. The result displayed in this study was the best result obtained when experiment was carried out.

The predictions were made by specifying the number of days that we are anticipating. We have forecasted Exchange rates for the following day, 15 days, 30 days, and 60 days. Figure 8 displays the prediction's outcome.

(a)

(b)


Arima forecast for Dollar rupee Exchange Rate for the next day
72
74
76
78
80
0
100
200
300
400
500
600


Arima forecast for Dollar rupee Exchange Rate for the next 15 days
72
74
76
78
80
82
0
100
200
300
400
500
600

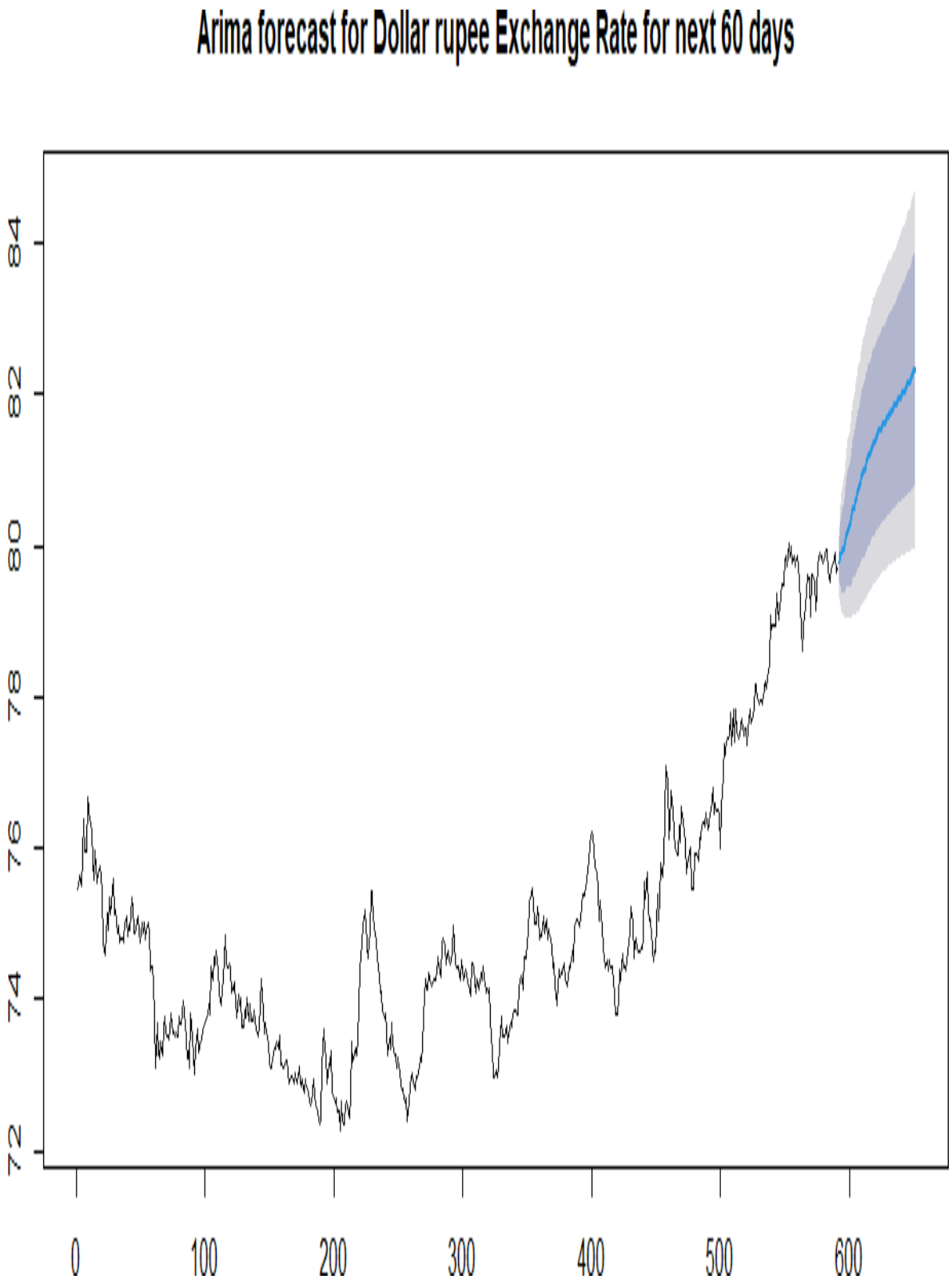


Figure 9 : The result of next day(a),15days(b),30 days(c)and 60 days(d)chart predictions.

From the below test result, we can observe that the performance of the model is with a MAPE score 0.9232047.

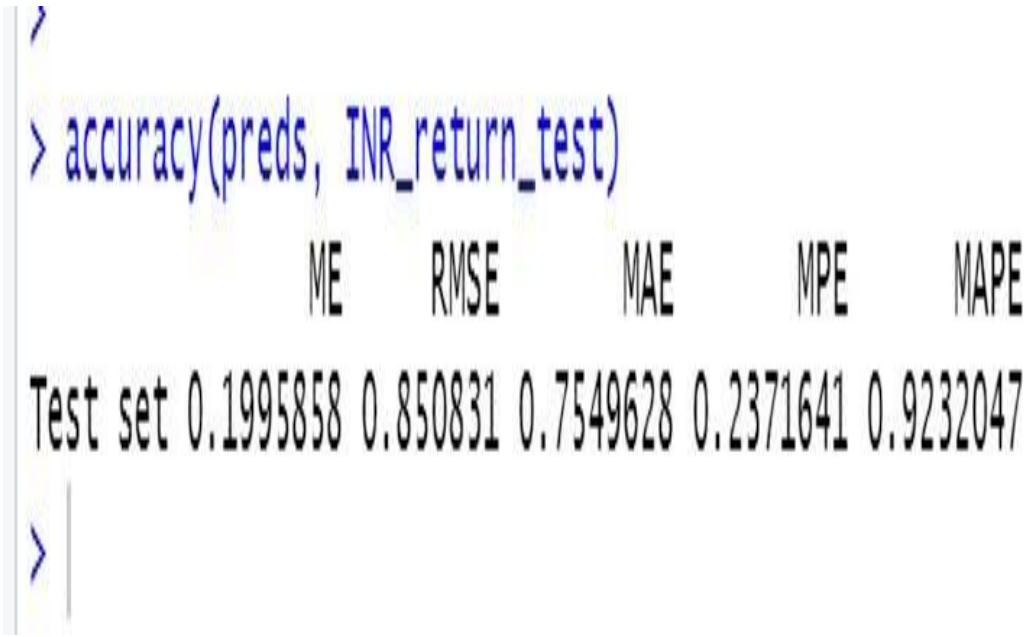


Figure 8: The test results

In this study, we have used ARIMA approach to forecast the future price of the dollar exchange with appropriate orders of auto regression and moving average which were observed form PACF and ACF graphs respectively in our the study we have observed the p(Order of Auto regression) value to be 20 and q(Order of Moving average) value to be 6

. As the data provided is not stationary we convert it into stationary data in our case we have 2nd difference to make the data stationary this gives the order of d.

From the accuracy of the model, we can say the model is performing very well with a low MAPE score of 0.923. According to the anticipated statistics, the dollar price will be slight rise during the following 60 days, beginning on December 11, 2022. Traders may rely on the model for preliminary dollar price predictions since it is both cost and time efficient.

VIII. CONCLUSION AND FUTURE SCOPE

Based on the findings, we came to the conclusion that the ARIMA (20,2,6) model is the most accurate model to forecast the value of rupee against the US dollar . The MAPE test results for the proposed ARIMA (20,2,6) model is 0.92322047, we can conclude that this model is workable to forecast the value of rupee against US dollar. The findings in the present study indicated that the exchange rate of rupee versus dollar increased slightly for the current day, 15 days, 30 days, and 60 days starting on December 10, 2022.

Since we have achieved a remarkable increase in accuracy of the model, this exchange rate time series can be extremely useful for the traders of FOREX market by making accurate predictions and reducing the risk factor in trading. The future scope of this research includes using various economic factors that influence exchange rate such as GDP (Gross Domestic Product), inflation and money supply. By using these factors various trends or patterns of movement are created that impact the exchange rate. Dua and Suri (2019) analysed the relationship between four exchange rates and found a significant bidirectional causality. Predicting these exchange rates in a Vector Autoregressive Integrated Moving Average (VARIMA) model can give better results, thereby improving the accuracy of the model. Such time series forecasts provides governments and policy makers a direction to design policies in the light of forecasts.

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Drowsy alert system using Detection of drowsiness using aurdino application

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Abstract - **In this cutting-edge world, fast mechanical improvement makes ready for human local area to encounter the solace and headway throughout everyday life. In spite of the fact that the universe of science raises numerous advancements, people can always been unable to get their life from death, as life is questionable. All throughout the planet, a huge number of mishaps are going on consistently and for a large portion of them, tiredness of the driver is the significant reason. People can't handle the nature however can be savvy enough to deal with the nature. Lazy driving is a genuine danger for drivers. Sleepiness can be brought about by numerous reasons. Utilization of certain medications, drugs, liquor can likewise cause sluggishness. In this manner, languor is a genuine danger for drivers. There are numerous gadgets existing in the present-day market however a large portion of them costs exorbitant cost and furthermore they are not conveying precise outcomes. This model will fill in as the best minimal expense framework which gives exact outcomes. In contrast to other existing frameworks, this framework is fit for conveying yield in high exactness rate which is fundamental, as this a daily existence saving framework.**

Keywords – ***Drowsy, alert, Arduino.***

I.INTRODUCTION

As indicated by the National Sleep Foundation, about portion of the U.S. grown-up drivers concede to reliably getting in the driver's seat while feeling tired and about 20% confess to nodding off in the driver's seat previously year – with over 40% conceding this has occurred at any rate once in their driving professions [1] . These frightening figures show how pervasive sleepy driving is. What drivers may not understand is how much lazy driving puts themselves – and others – in danger [2]. Indeed, an expected 5,000 individuals passed on in 2015 in crashes including tired driving, as per a Governors Highway Safety Association report.

II. Drowsiness Effects While Driving

Driving while lazy is like driving under impact of liquor: Drivers' response times, consciousness of dangers and capacity to support consideration all deteriorate the drowsier the driver [2]. Driving in the wake of going over 20 hours without rest is what might be compared to driving with a blood-liquor convergence of 0.08% – the

U.S. legitimate cutoff. We are multiple times bound to be in a fender bender on the off chance that you are exhausted [3].

III. LITERATURE SURVEY

The creator examined various phases of rest is Observing framework for eye ball has been created for recognizing the sluggishness of the drivers [4]. A framework following the laziness of the driver was planned. The creator gone through a neurological report on rest and its stages [5]. Tech issues and extensions were studies to recognize exhaustion and for the weakness the executives [6]. Unwinding consequences for reaction time was dissected and considered [7]. A framework was produced for checking the condition of the driver for rest location [8]. Business transport security and life- guarding significance was dissected through this work [9]. A framework checking the sleepiness of the driver was created [10]. Electroencephalogram investigation for exhaustion driving location was carried out [11].

IV. EXISTING SYSTEM

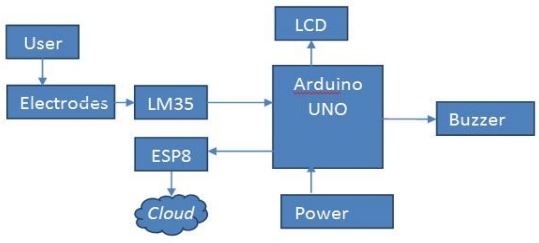
In the current framework, with the assistance of noninformative vision-based ideas, languor identification framework is created [12]. Numerous frameworks which are accessible require a camera which is introduced before the driver which point towards the driver's eye. In weighty vehicles this game plans aren't appropriate [13]. It identifies just 40% of the face. Essentially in guiding development observing framework, when the sensor gets broken or harmed the data it peruses and ships off the board will be mistaken and it is additionally be significant expense [14].

V. Proposed System

In the current frameworks, there are numerous inconveniences to list-down however the principle detriment in every one of the current frameworks is the expense and the exactness of the outcomes. Every one of the current frameworks are expensive that a low-end vehicle driver can never bear. Just the first class brands and top of the line models have the ability of conveying exact outcomes, such frameworks are by and large valued high on the lookout. In nations like India, where the greater part of the populace is working class, possessing low-end vehicles, they can't manage the cost of such exorbitant frameworks even though they save the existences of the drivers, which is beyond value.

In the proposed framework, the framework really works with the information that is brought from the mind through cathodes. Essentially, Brainwaves are observed and sleepiness is distinguished. So, the precision will be 100%.

The Proposed framework alarms in a flash when the driver feels sluggish which is exceptionally precise. This framework is convenient and simple to send. This framework is relevant to numerous gadgets. This framework is less expensive when contrasted with another existing enemy of languid ready framework.



The above figure shows the square graph of the proposed framework. Each square addresses a capacity associated with conveying the outcome. Cathode's block addresses the terminals which are utilized to get the essential contribution from the cerebrum. The procured signals are then shipped off LM358 ADC. In this square, the obtained simple sign is changed over into computerized signal and the sign is passed to the Arduino. Here, in the Arduino block, the sign is checked and just if the sleepiness condition is fulfilled, the sign is passed to the ringer and the bell gives the caution to the client quickly.

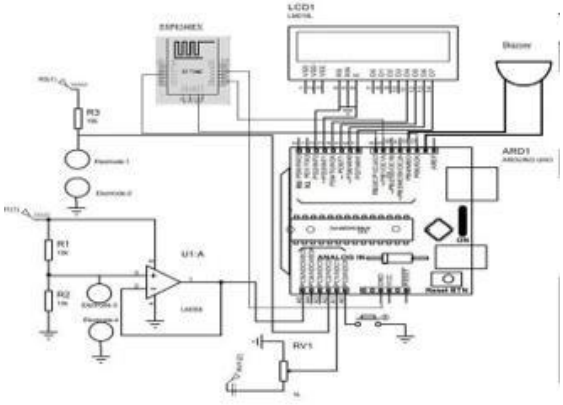


Figure 2. Circuit Diagram

The above figure shows the circuit graph of the AntiDrowsy Alert System. Terminals are utilized here to catch the electrical signs and the cathodes are getting associated with the Arduino UNO ATmega328P microcontroller. In this microcontroller according to the prerequisites and if the condition fulfills, the sign is given to the bell and the control is given to the LCD screen and the alarm message is shown on the LCD screen alongside ready sound. The terminals 1 and 2 are associated with the overhead headset and fixed at the scalp of the client and cathodes 3 and 4 are reference anodes where they are set at the fingers. At the point when the electrical signs of the client fluctuate as indicated by the developments of the body which then, at that point distinguishes the scope of the client accomplishes the languid state, the signal is then communicated to the microcontroller and the program gets executed and the ringer alerts. The LM358L Integrated Circuit utilized here changes the sign from simple over to advance by the prerequisites for the microcontroller. ESP8266EX is a Wi-fi module which sends the information to the

cloud for the investigation of the client and saved in the website page.

S.NO	Component	Specification
1	Electrode	Silver Chloride (AgCl)
2	Arduino UNO	Atmega 328, 14 digital pins, UART, Operating Voltage:5V
3	LM358L Dual OP-AMP	Supply range: 3V to 36V
4	Buzzer	Operating Voltage : 4V - 8V Minimum Sound Output-85dB
5	LCD display	16*2 display Operating Voltage : 4.7V -5.3V
6	ESP8266EX Wi-Fi module	32 bit microcontroller Maximum power supply : 3.3V I/O Voltage: 3.6 V(max) Source current:12Ma Frequency range :80-160mH
7	Overhead headset	-

Fig.3.Hardware Specification

Hardware set up of the proposed system The parts were associated and equipment arrangement was done effectively for the confirmation of the yield. Cathodes in the earphones notice the brainwaves from the mind and the got signal is passed to ADC convertor to change the acquired simple sign over to advance. Presently the changed over Digital sign is passed to the Arduino where the dynamic is done and if the Arduino discover the sign to be in the tired reach which is pre- modified, then, at that point the sign is passed to the ringer and through the bell, the alarm is given to the client immediately.

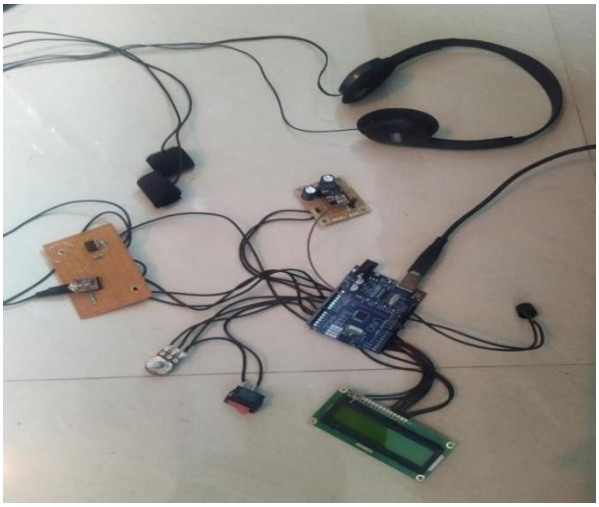


Figure3.Hardware set up of the proposed system

VI. RESULT & Conclusion

Lazy driving is a genuine danger to drivers and this framework successfully helps the driver not to rest by giving moment alert. This framework could be formed into an item in less term and everybody can bear the cost of this all things considered of minimal expense. Along these lines, this minimal expense against sleepy ready framework works effectively subsequently keeping the driver from mishaps because of laziness.

VII. REFERENCE

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Analysis to identify Dyslexia, Dyscalculia, Dysgraphia and Attention deficit hyperactivity disorder in school going children early on.

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Abstract— **Attention deficit hyperactivity disorder and Specific or special learning disability are two diverse disorders that commonly co-exist in children. Children with attention deficit hyperactivity disorder are distinguished by problem behaviors, while one with specific learning disability is characterized by scholastic lags or difficulties. Both coexist in half of the cases, with each contributing to the consequences of the other. Currently, these disorders are screened and diagnosed traditionally by therapists, who conduct assessments that are largely in-person and paper-pen based. Instead of undergoing these expensive tests in accordance with medical guidelines, a digital and automated system that can help identify these specific learning disability, as well as attention deficit hyperactivity disorder, from the comfort of one's own home can be extremely helpful. This paper aims to develop this digital system via the use of pattern recognition, natural language processing, and computer vision to help identify individuals or students with these disorders.**

Keywords—***Special learning disabilities, natural language processing, computer vision, pattern recognition.***

I. INTRODUCTION

People with specific learning disabilities suffer from disorders that affect their ability to learn. The disability is commonly associated with dyslexia, dysgraphia, and dyscalculia. These disabilities are defined as shown below.

- Dyslexia is a brain based/neurological learning condition that primarily impacts reading, spelling and writing. However they do not have vision issues and are most likely to have a normal IQ and generally lack phonemic awareness.
- Dysgraphia is a a type of a neurological condition in which a human being has extreme difficulty in writing ability for their age level. They generally tend to use the wrong word for what they are trying to communicate.
- A dyscalculic individual is unable to comprehend or understand numbers, and they do not possess mathematical ability.

V U Umme Azra

It is a phonological processing problem that causes dyslexia. People with dyslexia must take a word such as "fantastic" and break it down into parts in order to read and understand it. Words like "stik" and "fone" are also regularly spelled phonetically for "stick" and "phone" respectively. This condition has something to do with how the brain of a dyslexic person works. The brain is sectioned into two areas:

- Left Hemisphere: It is concerned with the operation of the mind, speech, science, logic, and mathematics.
- Right Hemisphere: Activities such as creativity, instinct, art and music are taken care of here.

The right hemisphere and frontal lobe are more active in the brains of those with dyslexia than those without it. Thus, their mind needs to process information for a longer period of time, making it difficult for them to read.

Dysgraphic children are generally observed to have poor transcription skills. As a result, students struggle to complete written tasks such as copying notes from the blackboard and perform poorly in formal exams. Their writing is generally messy and challenging to read, irrespective of the type of written information.

Children with dyscalculia generally have a difficult time trying to decode mathematics. During counting sessions, they tend to skip numbers and have trouble determining patterns, such as the smallest and largest numbers. They struggle to identify numbers and can see "2" as "Z". They also have a hard time identifying quantities.

ADHD, on the other hand, is a behavioral condition that affects 2.4 million school-going children, which is almost equal to 9.66 percent of the world's population, according to a recent study conducted in July 2022. Both (SLDs and

ADHD) coexist in half of the cases, with each contributing to the consequences of the other.

These learning disorders, along with ADHD, only worsen with age. As a result, it is very important to identify such a condition at an early age, preferably among school-going children. There is a huge gap between identifying at-risk children, referring them for assessment, and then treating them. Each is a process on its own, and less than 1% of those identified will actually end up getting effective treatment. Treatment is a professional activity, best administered by trained professionals, but screening must be performed by someone who knows what the issue is. Technology, however, can aid us, and guide us at every stage of this right from identifying to treating such children.

To screen for such disorders and prevent them from affecting students, machine learning models have been developed that utilize data from students with diagnosable disorders, undiagnosed students, and students without diagnoses. After collecting the data, it is pre-processed. For the model, random forest, K nearest neighbors, decision Tree, and Support Vector Machine are used since these models have the best accuracy, ranging from ninety to ninety-six percent. This project aims to provide a digital means to detect disorders like Dyslexia, Dyscalculia, Dysgraphia, and ADHD when the symptoms are mild and easier to manage.

II. LITERATURE REVIEW

[1]"Radford, Jim, et al. Detecting Dyslexia from Audio Records: An AI Approach. HEALTHINF. 2021".

This paper includes the use of dyslexic and non-dyslexic students' audio files to detect dyslexia. Each audio file uses two parameters, namely Reading Reaction Time (the duration between the display and actual reading of the text) and Reading Time (the duration of reading the text displayed). Each of these parameters is used as input on various current AI/ML algorithms for the purpose of detecting any hidden patterns that can be used to identify or more likely separate dyslexic and non-dyslexic children. Once done, a neural network model is built that achieves higher accuracy than current algorithms in identifying dyslexia among students.

[2]" Raatikainen, Peter, et al. Detection of developmental dyslexia with machine learning using eye movement data. Array 12 (2021): 100087."

In this paper, Data was collected via a certain set of multiple choice questions that were supposed to be answered by them. Eye movement was tracked and collected using an EyeLink eye-tracker during the question display that contained the task and the distracter. Students were classified as having a learning disability if their reading frequency fell below the 10th worst percentile. Random forest was used to distinguish the movement of the human eye, which were then passed to the support vector machine classifier as inputs. In this paper, machine learning models are used to recognize students with poor reading performance using their eye movement, which was recorded when the student was tested for reading. The input for the support vector machine model was chosen using the most important eye movement patterns. This hybrid model achieved an accuracy of up to 89.7% with a recall of about 84.8%.

[3] "Jamhar, Mohammad Azli, et al. Prediction of Learning Disorder: A-Systematic Review. International Visual Informatics Conference. Springer, Cham, 2019."

This paper surveys various papers' models and trends of which machine learning model is being most frequently used. It analyzes the methods and the accuracy for models. The paper helps better understand how each model works for similar objectives or problems and helps give insight on how to use those models for similar problems accurately.

[4]"Dutt, Sarthika. Comparison of Classification Methods used in Machine Learning for Dysgraphia Identification. Turkish Journal of Computer and Mathematics Education (TURNCOAT) 12.11 (2021): 1886-1891."

For the detection of dysgraphia, this paper proposes two categories; Motor skills and cognitive skills. Survey for 240 students was conducted, out of which 142 students had learning disabilities. The proposed model uses Elastic Net, which is linear regression with penalties. Although the elastic net did not provide the most accurate results, it was identical to the other algorithms used to compare; namely K- Nearest neighbors, random forest and decision tree.

[5]"Ghasemi, Elham, Mansour Ebrahimi, and Esmaeil Ebrahimie. Machine learning models effectively distinguish attention-deficit/hyperactivity disorder using event-related potentials. *Cognitive Neurodynamics* (2022): 1-15."

The result of the study shows that the continuous usage of several right features has a vital role in increasing the efficiency of the classification. Accurate features in the processed classification had to be approved. This paper mainly included models such as Support Vector Machine (SVM), deep learning, generalized linear model, logistic regression, random forest, decision tree, naive bayes etc. This improves the accuracy of the model used.

[6] "Khale, Rohit Detection of ADHD using Machine Learning Algorithms ISSN: 2319-7064 Impact Factor (2018): 7.426. "

They can determine the functional and structural images of the brain for diagnosis of ADHD. For the given unlabeled dataset in the given paper they have provided gathering structure (k-means) to make clusters in view of MRI images of ADHD acknowledged students . Classification algorithm

K-Nearest Neighbor classifiers the input given in the paper [7]"Germanò, Eva, Antonella Gagliano, and Paolo Curatolo. Comorbidity of ADHD and dyslexia. *Developmental neuropsychology* 35.5 (2010): 475-493."

ADHD patients have issues such as problem solving, planning, managing orienting, alerting, cognitive flexibility, sustained attention and organizing , so developing the gray matter and size of the skull would develop with time.
In certain cases ADHD and RD co-exist such that patients might have comorbidity in identification and thus curing. A person with short attention span tends to lag in academics and sports and extracurricular activities such as dancing, singing and performing on stage.

[8] "ADHD and Dysgraphia: Underlying Mechanisms. Esther Adi-Japha1, Yael E. Landau2, Lior Frenkel1, Mina Teicher1, Varda Gross-Tsur2 and Ruth S. Shalev[2019]."

In this paper, Dysgraphia was identified using three primary factors, which include linguistic processing, motor programming and motor kinematics. Students with ADHD had more number of spelling mistakes and showed a pattern introducing letter interchanges, over writing and rewriting due to mistakes. This suggests that the spelling mistakes and writing mistakes in students with ADHD and reading are primarily from non-linguistic deficits, and linguistic factors do not play a primary role.

[9] "Giri, Nupur, et al. Detection of Dyscalculia Using Machine Learning. 2020 5th International Conference on Communication and Electronics Systems (ICCES). IEEE, 2020."

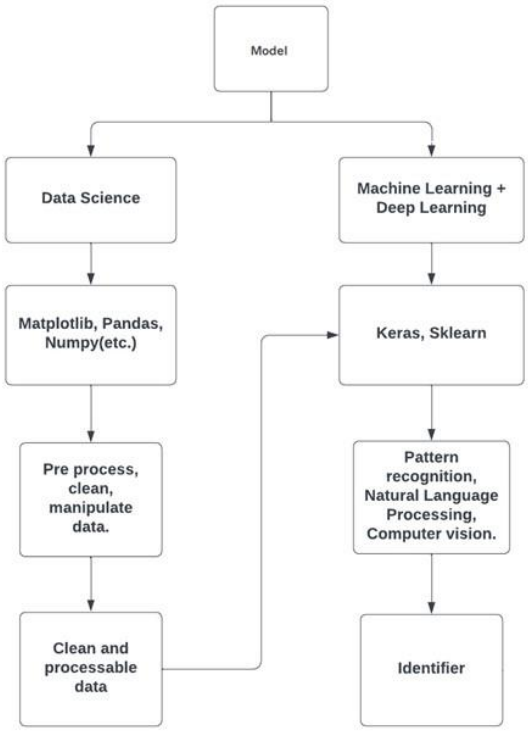
In this paper, machine learning models like random forest and decision tree was used. The initial questionnaire used to collect data was "Wide range achievement test". The data collected was used as input for a random forest, which was used for training of the model. Intelligence quotient questions were also considered to ask students and collect data. This model yielded 99.96 % accuracy.

[10]"Mobile Application for Dyscalculia Children in Malaysia. Ariffin, Mazeyanti & Abd Halim, Fiqa Azureen & Aziz, NorShakirah. (2017). "

It was developed with Android Studio. Number counting, object counting, addition operations, and subtraction operations are the four subsets of games that were created for the Calculic Kids. The target audience for this initiative is children with dyscalculia in Persatuan Dyslexia Malaysia. The results were seen how they responded and noted it for future reference. Additionally, for system improvements, teacher feedback was also gathered.

III. PROPOSED METHOD

3.1 Overview model



3.2 Inputs

For this model, four types of data is collect, they are as follows:

1)Corner's Rating Scale
2) Audio Recording
3) Maths Quiz
4)Handwriting

1) Conner's Rating Scale

From Conner's Rating scale extracting the questionnaire, wherein the approved questions which are asked to the ADHD children by teachers in a special centers or via parents.The following outputs from the questionnaire would determine the children stage of ADHD and thus it would be easy to identification of the child's ADHD
Identifying ADHD at an early stage can possibly be through their near ones where their child is under observation all while long and could possibly detect through their behavioral activities. With this the determination of the ADHD in a particular child at a certain age could lead to prevention and early access to the medical help required.

2) Audio Recording

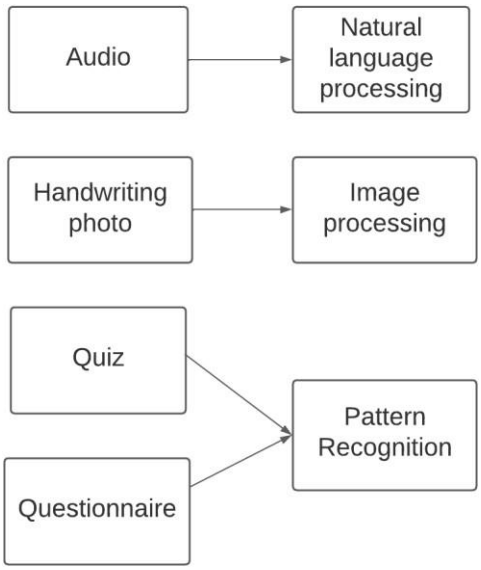
Collecting data from the audio of the student, and determining whether the child is dyslexic or not.
The Audio Recording process just records the audio and mostly determines all the SLD's that might as well help their kids with reading, writing and talking disabilities. Using the Natural language processing (NLP) pre-processes the audio. 3) Math Quiz

Child responding to dyscalculia, who is bad at math gives a quiz to determine their learning disabilities might give an assessment to conclude that he/she is not only bad at
academics but math in particular

4) Handwriting

Dysgraphia could be determined by the handwriting of the child, wherein the child doesn't know the recognition of alphabets or writes a mirror image of an alphabet. For example: b as d or p.
For the trained model, the input will be an image of the writing. This is then input to convolution neural networks.

3.2 Model



The proposed model has three parts.

1) Natural language processing 2) Image processing 3) Pattern recognition

1)Natural language processing

Dyslexia is the inability to read. While reading the student or child tends to mispronounce words or not pronounce the word at all. To identify this disorder, the input taken is an audio file. The type of audio file used is a WAV audio file.
WAV is basically the wave form and the audio data together. Inorder to use the WAV file, it should be pre-processed first. Noise and disturbances are removed from the WAV file in order to get useful and processable data. The cleaned WAV file is then divided into parts on the basis of sound, in other words phonemes. Phonemes are sounds like "ka", "sh" or "s". These are then put into an order which will create sentences. By analyzing the way words are being pronounced, dyslexia can be identified.

2) Image processing

Dysgraphia is the inability to write properly. To identify this disorder, the handwriting of the student should be analyzed. In order to do that, handwriting from students with no disorders and students with disorders are labeled accordingly. For the trained model, the input will be an image of the writing. This is then input to convolution neural networks. The model should be able to differentiate between the handwriting of students with dysgraphia and students without dysgraphia.

3) Pattern recognition

Dyscalculia is the inability to do basic math. It can be identified with a math quiz. The math quiz will contain questions like, differentiate between "x" and "+" and basic math problems. For ADHD, a behavioral questionnaire is used. Patterns are recognized using supervised learning, where we collect data from students diagnosed with dyscalculia and ADHD and students who do not have these disorders, this is the training set. The testing set will contain the combination of students with and without disorders, without labeling. According to how questions are answered and in which pattern, ADHD and dyscalculia is identified.

IV. RESULTS

This model aims to detect four disorders. In order to detect all the four disorders separately or if they coexist, five types of data are collected; For dyslexia the audio of dyslexic children, dysgraphia the handwriting of dysgraphic children, dyscalculia math quiz responses of dyscalculic children, for ADHD the questionnaire responses and responses of normal students for all the four disorders with respect.

V. CONCLUSION AND FUTURE WORK

This paper proposes a model to detect four disorders which can coexist. Students with learning disabilities experience problems in a traditional classroom learning environment leading to poorer mental health. Those difficulties can result in emotional struggles as well as social perceptions, resulting in a student's failure to succeed and being accepted by their peers. This model aims to detect these learning disabilities at an early stage by focusing on data collection from school going children early on. Future work for this model is to make a website for detection of these disorders.

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Apple Stock Price Prediction using Regression Techniques

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Abstract — **In the course of working on this project, we conducted a regression analysis on the stock price of apple between the years 1980 and 2021. For this particular study, we relied on the technique of linear regression, from which we derived the accompanying graphics. These graphs are utilised to make projections on the value of Apple shares for the following year. The model will provide either numbers that are approximately accurate or values that are predictions. The dataset can be acquired from Kaggle, and the reference section will include a link to the site where it can be found. We will also be trying various regression approaches, and we will demonstrate that the regression obtained by linear regression is the most effective method for analysing this dataset.**

Keywords— **Apple, Stock, Prediction, Linear regression, Poisson regression.**

I. INTRODUCTION

In recent years, a great deal of exciting research has been conducted in the field of utilising Machine Learning Algorithms for analysing price trends and predicting the movement of stock prices and indexes. The majority of stock traders rely on Intelligent Trading Systems in today's market since these systems assist them in predicting prices based on a range of scenarios and circumstances, which enables them to make immediate decisions regarding investments. If a trader is intelligent, he or she will anticipate future stock prices and either purchase a stock before its price rises or sell it before its value falls. An accurate prediction prediction algorithm can immediately result in significant profits for investment firms, suggesting a direct correlation between the accuracy of the prediction algorithm and the profits generated by its use. Although it is extremely difficult to replace the expertise acquired by an experienced trader over the course of their career, it is extremely difficult to replace the expertise acquired by an experienced trader over the course of their career. The forecasting of stock market movements has been a popular topic for a very long time and is currently the subject of intensive study by academics from a range of disciplines. Machine learning is a well-established method that has numerous uses. It has been the focus of a substantial amount of research into its potential for predicting financial markets.

Investing in conventional financial institutions such as banks, which often offer a low return on investment [1, 2], is no longer seen to be a lucrative option by investors. These days, the stock market is often regarded as one of the most crucial aspects of the whole financial system [3]. The practise of purchasing shares of publicly traded companies is gaining ground in today's society. Almost all of us are drawn to the idea of being able to increase one's wealth in a very short amount of time while also realising returns that are often higher than average. In return, businesses that sell stocks earn capital that can be put toward expanding their operations. On the other hand, it is frequently a lengthy haul, and the money that is invested may not be recovered for several decades at a time. In other instances, the amount of money that is invested does not result in a profit at all but rather a loss. As a result, each step needs to have serious consideration put into it, and the acquisition of stocks needs to be done with the appropriate amount of consideration. Any potential investor in the stock market hopes to acquire the ability to accurately forecast the quantity and timing of stock purchases. However, the quantity of stocks an investor can purchase is also contingent on the total value of their assets. The subsequent analysis and evaluation of the historical development of stock prices and the company whose stocks we want to buy is the next important step for the subsequent valuation of the funds that were invested. This step is the next important step for the subsequent valuation of the funds that were invested. This comprises its overall economic status as well as its turnover as well as the introduction of new products to the market. There are a lot of different things that can

cause a gain or a drop in value in the long run. If we are able to accurately forecast how the stock price of a certain firm will evolve, we stand a good chance of realising a substantial financial gain [4]. This sensation, along with the capacity to make accurate predictions, is what differentiates successful investors from those who are not successful. The value of stocks is actually determined by the amount of interest in them. The supply and demand for stocks are the driving forces behind the development of stock prices. When there is a strong demand for a stock but a limited supply, the price of that stock will go up. This is true for every commodity that can be purchased on the market. As a result of fluctuations in supply and demand brought on by a variety of circumstances, the price of a stock naturally moves about over time. Stock prices are believed to be particularly dynamic and prone to swift fluctuations because of the underlying nature of the financial realm as well as in part because of the mix of known factors (Previous Day's Closing Price, P/E Ratio, etc.). This is due to the underlying nature of the financial sector, which is why this is the case. One is able to create predictions and judgements based on these criteria by utilising a range of methods to approach the data as well as the procedures. It is generally agreed that the so-called time series method is one of the most conclusive statistical methods for analysing the dynamics and development that have occurred over the course of time. It is vital to have a time series of changes in stock prices in order to discover the factors that caused changes in stock prices and defined their performance in the past, as well as for the purpose of estimating how stock prices will vary in the future.

Any person who is thinking about getting into the stock market eventually wants to be able to precisely predict the amount of stock they will buy and when they will buy it. However, the total worth of an investor's assets is also a factor in determining the number of shares of stock that they are permitted to purchase. The subsequent analysis and evaluation of the historical development of stock prices and the company whose stocks we want to buy is the next important step for the subsequent valuation of the funds that were invested. This step must be taken before the subsequent valuation of the funds that were invested can take place. The subsequent appraisal of the funds that were invested is dependent on this stage, which is the next critical step in the process. This includes the state of its economy as a whole, as well as its turnover and the introduction of new products to the market. Long-term changes in value can be brought about by a diverse range of factors, some of which generate appreciation, while others bring about depreciation. We have a decent probability of realising a significant monetary gain [4] if we are able to precisely estimate how the stock price of a particular company will develop in the future. This feeling, in conjunction with the ability to create correct forecasts, is what separates great investors from those who are not successful in their investment endeavours.

II. Literature Review

Apple Inc. is not only one of the richest firms in the world, but also one of the most well-known. As a direct result of the amazing success it has seen, Apple's liquid assets had a value of $121 billion as the company's fiscal year 2012 came to a conclusion. The corporation made the commitment in April 2013 to return up to$100 billion to shareholders through stock buybacks and cash dividends before the end of the 2015 calendar year [5]. Apple Inc. must have a well-established financial management and decision support system specifically due to the fact that the company is actively participating in the financial market. Knowledge-based decision support systems for financial management, according to Khan et al. [2], should be considered an essential component of investment strategies. [Citation needed] They came to the conclusion that investors stay away from traditional investment institutions like banks because of the low return on investment offered by these institutions. One of the most common places for people to put their money these days is in the stock market. The ability of day traders, investors, and data scientists to accurately forecast the price of stocks is getting increasingly challenging. These are complicated functions that are determined by a large variety of interacting elements that have an effect on the dynamic progression of price changes [6]. Politics, social prospects, sales of the company, and other socio-economic elements can all have an impact on the global perception of equities, which in turn is determined by the equilibrium between supply and demand [7]. This is also confirmed by Gupta and Chen [8,] who state that stock prices and financial markets are frequently based on sentiment. As a result, research efforts are being made to predict stock market trends using public sentiment expressed on social networks such as Facebook and Twitter. Gupta and Chen [8] also confirm this. [8] They say that stock prices and financial markets are often based on sentiment. It is possible to make more accurate forecasts by taking into account price swings and by gaining an insight of how people are feeling [9]. However, Chaudhari and Ghorpade [10] feel that predicting stock return is a significant difficulty in the financial sector due to the non-linear changes in the company's return on investment in stocks. This is one of the reasons why predicting stock return is difficult. Inaba [11] conducted an analysis of 37 developed and developing countries' participation in the global market for commodities and found that developed countries had larger profits on their international stock prices than underdeveloped countries did. On

the other hand, due to factors that change over time, the return on investment for stock investments increased more quickly in developing countries. These factors include not only the openness of international trade and finance, but also institutional factors representing the development of information and communication technologies, the protection of property rights, and the transparency of information disclosure. Moreover, these factors include not only the openness of international trade and finance, but also the openness of international trade and finance.

III OBJECTIVES

To design a model that would predict the stocks of Apple Inc using regression techniques.

B. Methodology

Linear

C. Regression

The method of linear regression analysis was the one that we utilised for this purpose. A quantitative outcome variable (y) can be predicted using linear regression, also known as the linear model. This prediction can be based on one or more predictor variables (x). To construct a mathematical formula that defines the variable y as a function of the variable x is the objective of this endeavour. After we have constructed a model that is statistically significant, we will be able to use it to make predictions about the future based on the new x values.

When you create a regression model, one of the steps that you must take is to evaluate how well the predictive model works. In other words, you need to evaluate how accurate the model is in predicting the result of a new test using data that was not used in the construction of the model. This data was not included in the initial data set.

When evaluating the accuracy of a predictive regression model, it is common practise to consider the following two key metrics:

Root Mean Squared Error

It determines how accurate the model's predictions are. It is the difference, on average, between the values of the outcome that have been observed and known and the value that has been predicted by the model. The formula for calculating RMSE is as follows: RMSE = mean ((observed - predicted)^2)%>% sqrt (). The RMSE should be kept as low as possible for the best models.***R-square***

IV PROPOSED SYSTEM

A. Dataset description

Individual data are gathered from Kaggle [12] for the purpose of conducting research on time series. This page details the evolution of Apple Inc.'s stock values over time, specifically providing daily data over the span of 1980 to 2021. Excel from Microsoft is used to perform processing on the data that was acquired. There are 10,469 rows total in the dataset. It contains 7 attributes namely date, open, high, low, close, adjclose and volume.

It is a representation of the squared correlation between the known values of the outcomes that have been observed and the values that have been predicted by the model. The better the model, the higher the R2 value should be.

Poisson distribution

One of the essential subjects is known as the Poisson distribution. It is put to use in the process of calculating the probabilities of an event using the rate of value on average. Poisson distribution is a discrete probability distribution.

The formula for the Poisson distribution function is given by:

$$f(x) = (e^{-\lambda} \lambda^{x})/x!$$

Where,

e is the base of the logarithm

x is a Poisson random variable

λ is an average rate of value

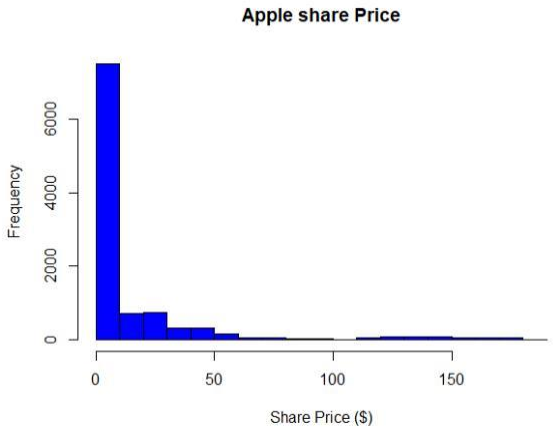

Fig1 depicts the Apple share price in a share price v/s frequency graph

Firstly, we have imported the dataset followed by that we have splitted the dataset into train and test datasets in the ratio of 0.8:0.2(80% train and 20%test dataset).Much of data pre-processing has not been done as the dataset seemed to be perfect without any null values nor any unnecessary attributes.
The obtained data are evaluated both qualitatively and quantitatively. The resulting values are also graphically illustrated.
Secondly, we have done predictions using both linear regression and Poisson distribution and the results have been graphically represented in the below section.

V. RESULTS

The linear regression model has given a residual standard error of 0.4376 and R-squared being 0.9997 for the given dataset.
Using Poisson distribution, the null deviance came out to be 424013 and the residual deviance was 115825, but Poisson distribution cannot be used as our data is clearly linear.

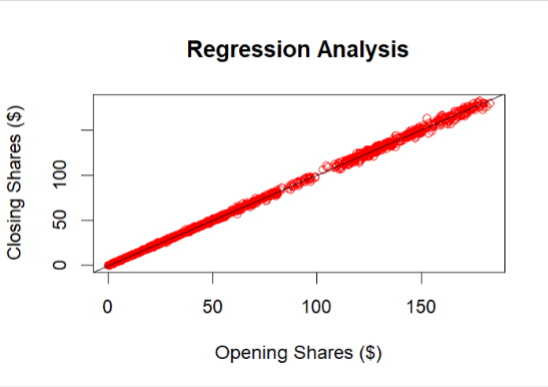

Fig 2: The linear regression analysis between opening and closing shares.

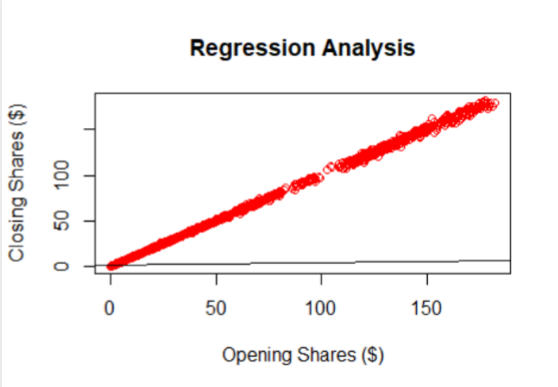

Fig 3: The Poisson distribution analysis between opening and closing shares.

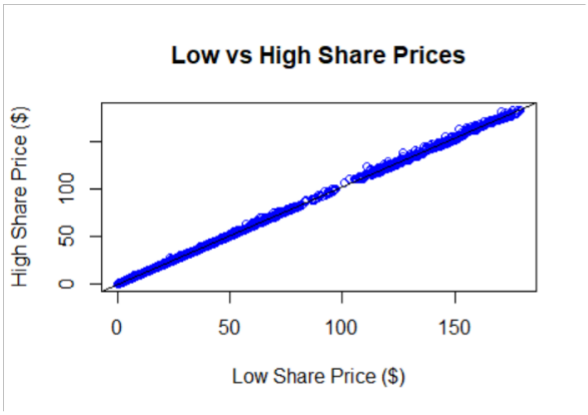

Fig 4: The linear regression analysis between low and high shares

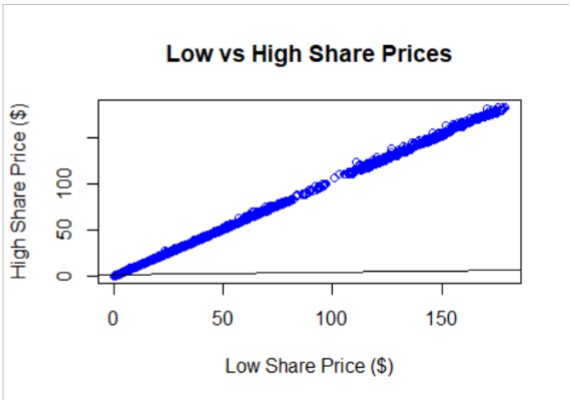

Fig 5: The Poisson distribution analysis between low and high shares

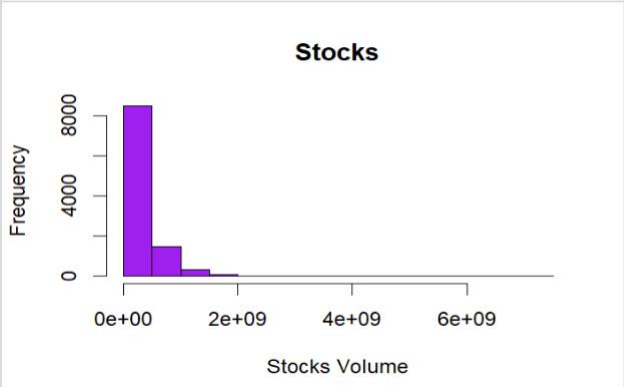

Fig 6: Depicts stocks volume v/s the frequency

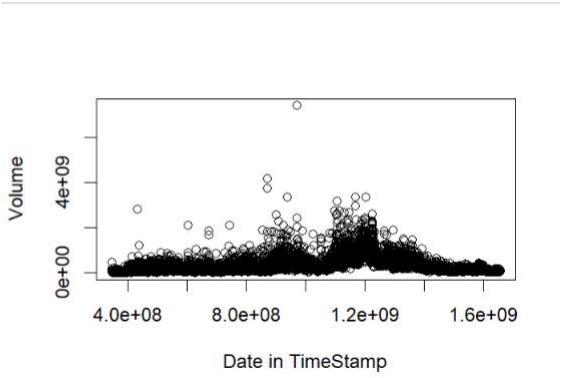

Fig 7 : Depicts date wise volume of stocks

V. FUTURE SCOPE AND LIMITATION

The extended scope of this project will require the addition of more criteria and aspects, such as the financial ratios and various instances, amongst other things. The greater the number of characteristics that are taken into account, the higher the level of accuracy. The algorithms can also be used to analyse the content of public comments and, as a result, identify trends and links between customers and the employees of businesses. The application of conventional algorithms and data mining methods is another method that can assist with performance structure forecasting for the entire organisation. In the not too distant future, one of our goals is to combine neural network analysis with additional methodologies like genetic algorithm or fuzzy logic. It is possible to employ a genetic algorithm to determine the most effective network architecture and training settings. The predictions made by neural networks are accompanied with an element of uncertainty, which can be taken into consideration with fuzzy logic's help. The application of their applications in conjunction with neural networks may result in an improvement to the prediction of the stock market. Because of the constraints of this research, our choice of statistical methods is limited to either linear regression or multiple linear regression. Due to the fact that the data is linear, it is not possible to utilise other regression methods such as Poisson regression or logistic regression

VI. CONCLUSION

Based on the findings presented above, we can draw the conclusion that the linear regression model is the most effective. It is not possible to use the Poisson distribution on these data because they can be linearly separated, and attempting to use the Poisson distribution with this dataset resulted in the model not functioning very well. In addition, linear regression was producing encouraging findings, with an error of 0.4 being the absolute minimum. As a result, we can reach the conclusion that linear regression is effective because it accurately predicts the results.

ACKNOWLEDGMENT

This paper on 'Apple Stock Price Prediction Using Regression Analysis' has been possible only because of kind co-operation lent by my teacher and project guide Dr. Sachi Nandan Mohanty without which this would not have been possible. We would also like to thank our parents, who have provided us with all possible resources to gain the best possible knowledge. At last, we would like to thank Mr. Durga Rao Jenjeti for his guidance and support.

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Retail Data Analysis for Business Intelligence

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Abstract—**The purpose of this study is to increase knowledge and understanding of how retailers implement customer relationship management in retail using business intelligence and data mining tools. Our projects focus on analyzing commercial sales and consumer demand for specific products/services, providing insight into how companies can maintain market leadership and gain an edge over their competitors.**

Analyze and draw conclusions based on three data sets. Based on commercially available products and customer demographics.On basis of customer purchase towards a product.Based on the data above, we analysis how a product is performing in the market to give the businesses a better information to enhance their product for better launch and execution of their product in the market.

Store's desires/objectives and techniques focused on marketing, customer service, information clients via statistics analysis and increasing acquisition and retention through client loyalty pack- ages. records mining gear recognized supported advertising and marketing and patron analysis efforts. Findings offer perception into the challenges outlets face as they implement a more client- centric business approach.

Keywords - **Retail Data , Analysis, Data mining, Finance study.**

I. INTRODUCTION

Retail Data Analytics does exactly what its name suggests. Analytics for everything in your business, from sales and inventory to customer data. This allows you to effectively track customer activity such as purchases and store attendance. Without the ability to track and analyze decision-making, purchasing and customer behavior, businesses risk falling behind. That's why retail data analysis is a powerful tool for your business.

According to Study, small businesses are not yet taking full advantage of technology in the marketplace. Our results show that 67 percent of single-store retailers still do not have a point-of-sale (POS) system, let alone one with analytics capabilities. In the world of retail, store owners face the challenge of how to leverage the vast amount of data at their fingertips. After all, operational data can give small businesses a competitive edge. Imagine You and your competitor operate in the same market, have approximately the same number of customers and the same product price. The same goes for how much you spend on advertising. So how do you get to the top? The answer lies in making better decisions using data-driven information. In the digital age, retailers need to keep track of a million things and there is not enough time in the day.

Retailers can use big data analytics to gain more insight into how customers are behaving or what the best prices are. Despite the potential benefits of using big data analytics, businesses have been slow to build big data platforms for decision making .

One among the most important motives to apply information analytics to guide decision-making is to make certain your selections are based totally on real reality (cold, tough numbers), not simply a person's notion of truth. Analytics can also assist

you understand what's taking place with your commercial enterprise in a lot more detail than you could in any other case. Practically speaking, a retailer can use information analytics to: recognize the price and range of merchandise offered in a mean order understand which products sell the maximum, the least, and everything in-between become aware of your most precious customers discover what your actual call for become as well as past misplaced sales decide top-quality counseled order quantities and recommend buy portions and allocations establish the surest rate point for a selected product at any precise area.

More than one studies strategy had been discovered beneficial to with a view to get analysis with at most accuracy. We've used each quantitative and qualitative studies techniques on this undertaking to analysis the records, to get insights the use of standards related with R programming, records mining additionally machine studying models. This segment intro- duces the historical past and composition of the retail quarter, which represented the premise of the retail chains examine, the information of the data acquisition approach utilized in capturing purchaser sentiment information, and, subsequently, a description of the categorization method used for textual con- tent mining client sentiment statistics in evaluation comments. We compiled a list of publicly traded stores from Kaggle which classifies 345 publicly traded firms as retail corporations . Dataset 1 summarizes the traits of the shops with appreciate to company size and class of the retail business. We categorized them as adopters or non-adopters of GROs based totally on content

analyses of their posted facts. those included company annual reviews, quarterly reviews, environmental reviews, and news release that are published. All of the retailers that have adopted green retailing practices constituted the populace of our survey observe. We set the sampling scope according to the goal "prescribed retailers" inside the which fulfills both object (1) or (2) as follows: (1) outlets that offer a) any meals or drink, b) any medicine or first-useful resource item, or c) the applications of Retail Data Analysis for Business Intelligence are extensive and include customer segmentation, predictive analytics, inventory management, data visualization and much more. Using these techniques, retailers can improve their operations, boost sales, and gain a competitive edge in the marketplace. Retail Data Analysis for Business Intelligence is a multidisciplinary field that draws on skills and knowledge from statistics, mathematics, computer science and business. Retailers who want to be successful using data analytics must have a good understanding of the technical aspects of data analytics and the business context in which the data is used. private hygiene or beauty product; and (2) shops with five or more certified outlets.

II. Literature Review

A. Structural components

1) Introduction: The need to seize, save and examine massive statistics is the purpose for the development of analytical methods and technology. .It affords a quick evaluate of numerous key massive statistics analytics technologies. These methods are drawn from the fields of mathematics and facts using data mining strategies here are used to extract patterns from records, such rule getting to know, cluster analysis, category and regression, which can be used to determining as an example the characteristics of a success employees or maybe decide customer purchase behavior.

2) Previous understanding: Below are some of the previous understandings on retail data analysis that have been surpassed by our model - 1.Optimization strategies are the numerical techniques the usage of to redesign a system or manner. Optimization strategies may be implemented to enhance over- all performance according to a sure measure. 2. Other way of understanding this is through Neural Networks. Neural networks refer to computational models primarily based on organic neural networks and used for detecting styles in information which can be used for sample reputation, image evaluation, optimization and adaptive manipulate . 3. Device gaining knowledge of machine learning is an artificial intelligence approach which permits computers to adapt behavior based totally on empirical information with a purpose to making sensible choices primarily based on information . 4. Predictive Modeling - Predictive modeling uses a fixed of fashions to expect the probability of an event happening. For example, it can be used to are expecting the likelihood that another product might be resold to a purchaser . 5. Cluster evaluation uses the method of breaking disparate corporations into smaller businesses with comparable traits and can be used to section consumers into groups for more powerful advertising . 6. ETL (Extract, remodel and load) ETL tool is a generation that may extract raw records from various assets.ETL transforms records right into a based layout that could help extract significant facts by means of transforming information according to its shape and loading it into a facts warehouse .

$$AxB = (x, y)|xA^{y}B \quad (1)$$

The cost of huge facts analytics is that they can be derived from big data analytics to help choice makers inside the retail industry.

3) Challenges and Opportunities in Retail Data Analysis: One of the key challenges in retail data analytics is the integration of data from different sources, such as customer data, sales data, and supply chain data. This requires a robust and flexible data architecture that can handle multiple data formats and resources. Another challenge in retail data analysis is the development of efficient analytical tools and techniques to handle the large and complex data sets commonly found in retail. This requires the use of advanced analytical methods such as machine learning and artificial intelligence, as well as a deep understanding of retail. Retail data is generated at high speed and often requires real-time analysis to support decision making and customer engagement. This requires the use of advanced data management and processing techniques such as in-memory databases and data stream processing to handle the large volume and velocity of retail data.

4) Key Applications of Retail Data Analysis for Business Intelligence:: Analyzing retail data can provide valuable insights into customer behavior, preferences and purchasing patterns that can be used to improve customer engagement and increase customer loyalty. Customer analytics can be used to segment customers, understand their needs and preferences, and customize their shopping experience. Analyzing retail data can provide valuable insights into market trends and consumer behavior that can be used to optimize pricing and promotional strategies. Pricing analytics can be used to analyze sales data, monitor competitor pricing, and make data-driven pricing decisions. Retail data analysis can provide insight into sales patterns and trends that can be used to optimize sales strategies and increase revenue. Sales analytics can be used to analyze sales data, monitor product performance, and identify sales opportunities. Retail data analysis can be used to optimize inventory management, reduce costs and increase efficiency. Inventory management analytics can be used to monitor inventory levels, analyze sales trends, and forecast demand to optimize inventory levels.

III. Methodology

The method we done the business retail analysis goes in four major segments. 1) The most important phase in retail information examination is to gather information from different sources like retail location (POS) frameworks, client relationship the executives (CRM) frameworks, and store network the board. Retailers can likewise gather information from outside sources, for example, web-based entertainment and statistical surveying organizations to get a more complete image of purchaser conduct and market patterns. 2) The following stage is to clean and set up the information for investigation. This might incorporate eliminating insignificant information, changing information into a usable configuration, and managing absent or deficient information. The objective of this step is to guarantee that the information is exact, predictable, and prepared for investigation. 3) When the information is prepared, the following stage is to examine it to acquire understanding into client conduct and market patterns. This might include utilizing spellbinding measurements, for example, mean and standard deviation to sum up information, or utilizing further developed scientific strategies, for example, relapse examination and bunch investigation to make expectations and reach determinations. Information representation is a significant piece of retail information investigation since it makes it more clear and convey information experiences. Retailers can utilize information representation devices, for example, diagrams and charts to envision information patterns and examples and convey bits of knowledge to partners. 4) The last move toward retail information investigation is deciphering information insights and going with information driven choices. Retailers can utilize bits of knowledge acquired from retail information examination to arrive at informed conclusions about client commitment, inventory network the executives, evaluating, showcasing and deals.

This observe is largely divided into three components:

1. Analytical strategies, 2. Modeling gear and 3. development frameworks and suggests how a lot of these three factors are conceptually connected. considering the primary element, this paper introduces the term ”analytical strategies” as rising research approaches which might be noticeably applicable to knowledge retail information evaluation on various multichain retail companies. Advert-hoc approach is an information eval- uation method used inside the preliminary research, especially to assist a particular venture. This sort of analytical technique is not often carried out without delay to live structures or manufacturing systems. The technique may be very dependent on abilities of the man or woman. *A. Weekly-sales unemployment*

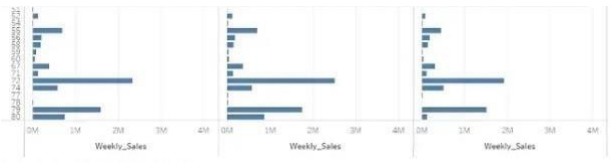

Fig. 1. Sum of weekly sales for each broken down by Date Year

IV. Result

This examine is basically divided into three parts: 1. Analytical techniques, 2. Modeling gear and 3. development frameworks and indicates how a lot of these 3 elements are conceptually linked. thinking about the first detail, this paper introduces the term ”analytical techniques” as rising studies processes which can be pretty applicable to understanding

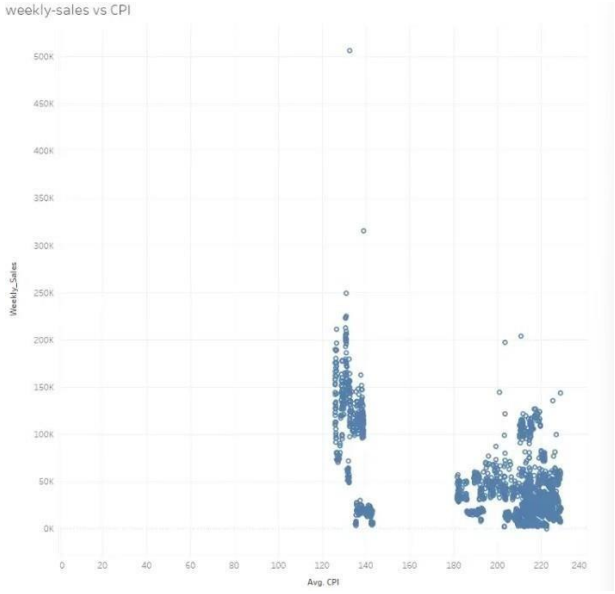

Fig. 2. Weekly Sales versus Average CPI

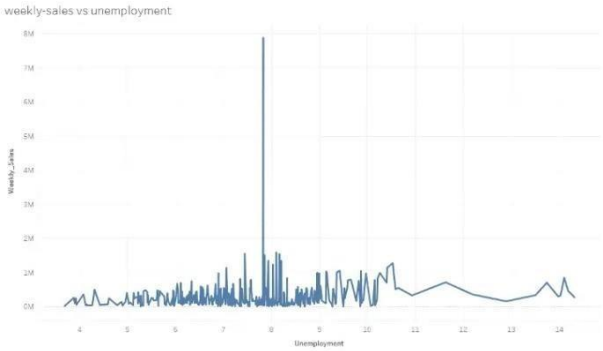

Fig. 3. Weekly Sales versus the Unemployment percentage

retail data evaluation on diverse multichain retail companies. From all the above graph plots and scatter plots it may be visible that the income of a store boom primarily based on the dimensions of the store but after attaining a size of 200000 units the correlation suggests an enormous down slope. Global factors such as Temperature in the area fuel prices have considerable impact on retail sales. After matching the outcomes with actual time statistics, it’s far observed that our records evaluation is accurate.

V. Discussion

Let's discuss the other approaches to get the retail analysis. One common approach to analyzing retail data is to use descriptive statistics to summarize key trends and patterns in the data. This can include calculating summary measures such as mean, median and standard deviation, as well as creating visualizations such as histograms and scatter plots.

Predictive analytics is another important technique in retail data analysis. This involves using statistical models to predict future events or trends based on past data. For example, retail-

Fig. 4. Percentage change of weekly-sales over the months

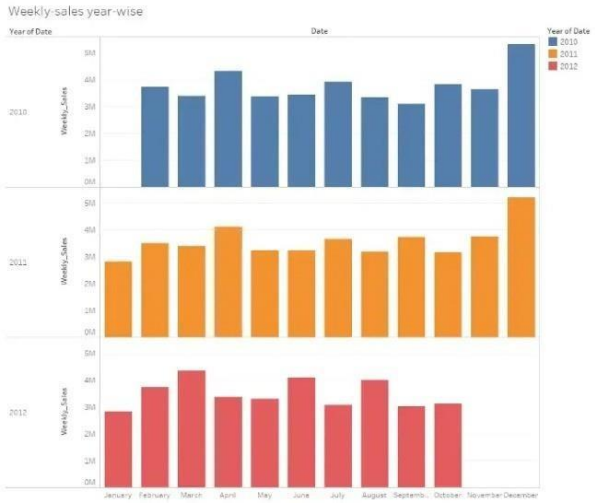

Fig. 5. Weekly sales versus Year wise sales

ers can use predictive analytics to predict demand for specific products, estimate customer lifetime value, and identify factors that influence consumer behavior.

Retail data analysis can also be used for customer segmentation, which is the process of dividing the market into smaller groups of consumers with similar needs or characteristics. Retailers can use this information to create targeted marketing campaigns and create personalized product recommendations.

Another important application of retail data analytics is inventory management. By analyzing sales data, retailers can optimize their inventory to ensure they have enough inventory to meet demand while avoiding overstocking and waste.

VI. Future Scope and Limitations

With a smaller wide variety of products/clients the evaluation isn't always beneficial. thinking about vacations and in unsure conditions occur in our society the facts may be misguided on occasion. Data cleansing should be done with the intention to avoid any misconception in making insights. As the world's populace is rapidly increasing the usage of retail statistics evaluation plays a chief function in commercial enterprise decisions in destiny. Retail corporations are very complicated, and there are too many correlations among elements (demand, fee, inventory, product collection,

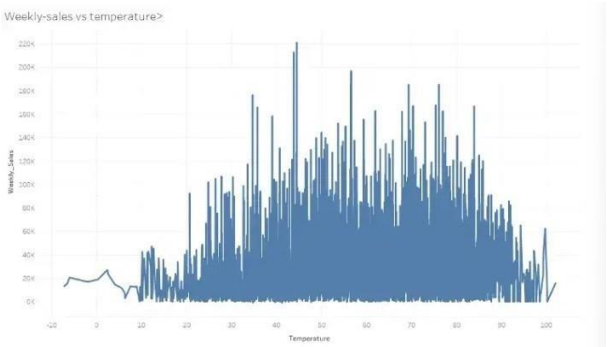

Fig. 6. Weekly Sales versus Temperature

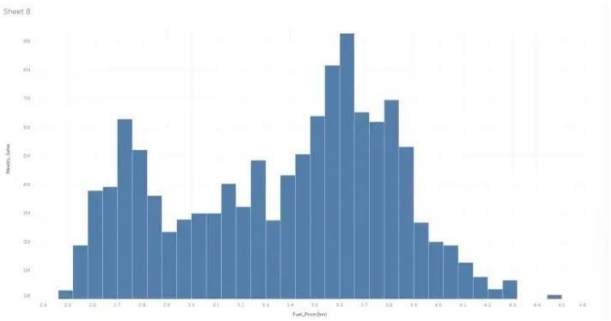

Fig. 7. Weekly Sales versus Fuel Prices

competitors, client behavior, and so on.) for any human to account for they all manually. That's why easy sales forecasts are a great deal much less correct than demand forecasts.

To appropriately forecast the destiny and account for the most critical correlations, retail predictive analytics need to use a combination of AI, superior arithmetic, and wise automation. Integration with the Internet of Things (IoT) is also expected to impact retail data analysis for business intelligence. IoT technologies such as smart sensors and wearables will provide new sources of data that can be used to gain insight into customer behavior and market trends. Predictive analytics is expected to play an increasingly important role in retail data analysis for business intelligence in the future. Predictive analytics can be used to predict future trends and patterns and support real-time decision making.

The quality and accuracy of retail data is a major limitation of retail data analysis for business intelligence. Retailers must ensure that the data they collect is accurate, consistent and

relevant, otherwise the insights gained from the analysis may be inaccurate or misleading. Technical expertise is another limitation of retail data analysis for business intelligence. Retailers must have access to experienced data analysts and IT professionals who have the technical knowledge and expertise to effectively analyze and interpret data.

VII. Conclusion

Retail records analytics are vital for agencies to thrive in nowadays' s dynamically converting markets, amid fastevolving client choices. It allows shops to live on pinnacle of

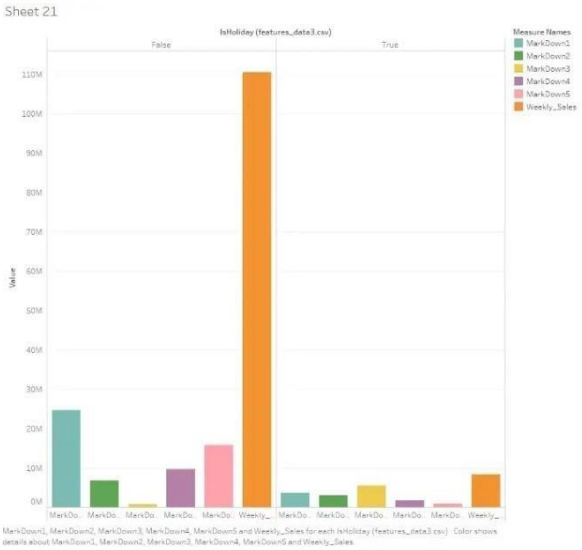

Fig. 8. Weekly Sales versus Fuel Prices

those modifications and improve the choice-making technique oriented at decreasing fees and growing revenues and make certain a high level of patron pleasure. Via accumulating and analyzing facts in massive and various volumes, retailers are capable of apprehend the deepest client needs and alter their supplying to fulfill customers' demands and offer customized, tough-to-withstand deals.

Retail records analytics guarantees providers have all the statistics they want to make the right commercial enterprise decisions below stress. The usage of historical facts, client insights and income information, they're much more likely to make smarter decisions and stay in advance of their competition.

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ML based predictive model for Prognostication of cardiovascular diseases using Feature Selection

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Cardiovascular diseases (CVD) are a major cause of mortality worldwide causing about 17.9 million deaths per year. Cardiovascular illnesses are a group of con-ditions that affect the heart and blood arteries. These illnesses may have an effect on various parts of the heart and/or blood vessels. CVD encompasses coronary artery dis-orders (CAD), such as myocardial infarction and angina. To reduce the risk and deaths caused by cardiovascular diseases it is important to predict it at an early stage. It is crucial to be aware of these cardiac disease-related signs in order to forecast outcomes and offer a solid foundation for diagnosis for which data mining and feature selection prove to be useful. However, manual analysis and prediction are laborious and tiring due to the sheer volume of data. In this study, data science is used to predict cardiac problems. The potential method for heart disease prediction is one that analyses the relationships between variables and extracts hidden knowledge from the data. Through a variety of indications, our study attempts to anticipate cardiac disease correctly and promptly. We propose a cardiovascular disease prediction model which uses a dataset obtained from Kaggle on which we perform various data pre-processing techniques and feature selection is done using chi square and finally the refined data is given to differ-ent machine learning models for building predictive models of the decision-making system. We obtained the highest accuracy of 99.4% using Random Forest, demonstrat-ing the effectiveness and dependability of the heart disease prediction approach we pre-sented.

Keywords: Cardiovascular disease, Feature Selection, Random Forest, Machine learning

1 Introduction

A fist-sized organ that pumps blood throughout the body, the heart, is situated at the left of the sternum and is shielded by the ribcage. The main component of our circula-tory system is the heart. It primarily consists of four main chambers made of

that are propelled by electrical impulses that regulate the rhythm and speed of the heart-beat as well as maintain blood pressure. The heart valves, which act as gateway between the chambers of the heart which opens and closes to allow the flow of blood through the mitral and tricuspid valves, are controlled by the nervous system, which also con-trols the rhythm and speed of the heart rate.The neurological nervous system, which transmits impulses instructing our hearts to beat more slowly when we are at rest and more quickly when we are under stress, and the endocrine system, which releases hormones instructing our blood vessels to con-strict or relax, are the two main systems of the heart. From the aforementioned infor-mation, we can conclude that the heart plays one of the most important roles in a per-son's ability to survive. However, the truth is that heart conditions are among the most prevalent types of illnesses that people experience, and statistics indicate that 17.9 mil-lion people worldwide died from cardiovascular diseases in 2019, accounting for 32% of the deaths caused. 85% of these deaths are caused by heart attacks and strokes [4]. WHO estimates that 31% of worldwide human mortality is caused by cardiovascular diseases. About one person dies from heart disease every minute in the modern era [7]. As per WHO, ischemic and hypertensive heart attacks are one of the leading causes of death. This illness can be lethal if it is not carefully monitored [13].A blockage that obstructs the flow of blood to heart or brain is the main cause of heart attacks and strokes, which are typically sudden events. Unhealthy diet, physical inac-tivity, cigarette use, and problematic alcohol consumption are some of the risk factors for heart disease and stroke [8]. Heart attacks are primarily brought on by blood clotting in arteries, which can also cause chest pain or stroke. As a result, some individuals experience unstable angina [16]. When blood vessel function is impaired by heart dis-ease, coronary artery infections occur, which weaken the patient [6]. The underlying blood vessel illness frequently has no symptoms. However, the consequences of behav-ioral risk factors might manifest in people as high BP, high fasting blood sugar, high blood lipids, overweight, and obesity. An elevated threat of cardiovascular disease death and morbidity exists in those with type 2 diabetes [9]. Mostly low and middle-income countries globally contribute to nearly 75% of Cardiovascular deaths which is heartbreaking because most cardiovascular diseases are preventable and treatable when detected earlier. The inclusion of strategies for managing cardiovascular disease in uni-versal health insurance plans, such as making use of cutting-

edge tools like machine learning which are used to determine, track down, and forecast a variety of medical conditions, holds the key to reducing the prevalence of the cardiovascular disease. Our research's main goal is to provide clinicians with a tool for early cardiac issue detection. The advancement of machine learning applications shows that it is possible to detect cardiovascular disease in its early phases using electrocardiogram and patient data, which will help in overcoming the significant challenges in today's modern world that are contributing to huge number of deaths globally [10]. It will be simpler to provide patients with proper care using machine learning techniques' superiority in pattern recognition and categorization on comparison to the conventional statistical ap-proaches, medical professionals and researchers have resorted to them to create screen-ing tools, while avoiding serious effects on some of the most exciting applications of AI that lie in utilizing big data and machine learning to identify patients at high risk ofdeveloping chronic diseases. Researchers can forecast the chance that susceptible pa-tients may develop cardiac ailments by using data mining techniques [14]. Data science is needed in the healthcare sector to handle the enormous quantity of data that is gener-ated [7]. The objective interpretation of all outcomes for the same patient made possible by machine learning techniques may enhance the precision of each step's diagnostics [11].In order to reduce the input variable to our model by using only the pertinent data and eliminating noise, we have also employed the Feature Selection methods, which auto-matically selects relevant features of our dataset that are trained and tested on our ma-chine learning model based on the sort of problem we are trying to solve.In this study, we have implemented various types of techniques for the prediction of cardiac diseases which include preprocessing the data, feature selection using various data mining techniques and classification and prediction over various data mining mod-els. The rest of the paper is structured as follows: Section 2 addresses related work, Section 3 discusses methodology, Section 4 puts forth the results, and Section 5 con-cludes the paper.2RelatedWork Machine learning algorithms can be used to predict and diagnose heart diseasesResearchers make use of various data mining techniques and computational in-telligence models to predict heart diseases. Predicting heart diseases accurately and on time can save lots of lives and can be very useful for healthcare professionals for diag-nosis.There is a need to precisely predict and provide a reliable basis required for further treatment on time to reduce the risk, complications and death rate caused by heart dis-eases. Improving the ability to predict and identify heart diseases would benefit healthcare professionals and would decrease the risk of death and save lives. Several machine learning algorithms can be used to accomplish this along with feature selec-tion, data mining and various other techniques.esearch by Le, Hung Minh et al. provides a method by combining data mining and feature selection to study the presence of heart disease. The Infinite LatentFeature Se-lection (ILFS) approach is used to re-select heart disease characteristics based on the rank and weights supplied to them. Support Vector Machine is used to divide a subset of the chosen qualities into various heart disease classes. To produce greater quantities and types of data Synthetic Minority Over-sampling Technique is used. Experimental findings showed that the method distinguished between "no presence" and "presence" and obtained 97.87% accuracy and five separate categories of cardiac disease with a 93.92% accuracy [3].In a study by Bashir, Saba, et al. Multiple heart disease datasets are utilized in feature selection strategies and algorithms for experimentation analysis and to demonstrate ac-curacy improvement in predicting heart disease. Using the Rapid Miner tool; applyingfeature selection techniques like Logistic Regression, Logistic Regression SVM, Ran-dom Forest, Decision Tree, and Naive Bayes, and it is observed that the accuracy of the findings is improved [2].Zhang, Dengqing, et al. put forth a DNN and LinearSVC embedded feature selection method-based heart disease prediction system. Additionally, for the feature selection the LinearSVC method and L1 norm are used to choose the best feature subset. They examined the He normal, random normal, and Xavier weight and concluded that He initialization produces the best outcomes. The suggested approach has a 98.56% accuracy rate, demonstrating the viability and dependability of using deep neural net-works and feature selection to predict heart disease. [1].Features importance ranking of two gradient boosting techniques, XGBoost and Cat-Boost was calculated on SA heart, Statlog heart and Cleveland data sets, by Anuradha et al. and observed that CatBoost fared better than the other classifiers [4].The proposed work by Boukhatem et al. uses a variety of data mining approaches, in-cluding Logistic Regression, Random Forest, Naive Bayes, and Decision Trees to clas-sify patient risk factors and assess the chance of heart disease. The effectiveness of various machine learning algorithms has been compared; According to the trial find-ings, the Random Forest method has the best accuracy 90.16%. [7]. Mohan et al. pro-posed combining a linear model and a hybrid random forest to predict heart disease which showed improved results with 88.7% accuracy [5]. In a study by El-Hasnony et al. by iteratively selecting the most relevant data to query their labels, five multi-label active learning selection algorithms (AUDI, Random, Adaptive, MMC, and QUIRE) were used to lower the cost of labelling. [15].In a paper by Πεταρούδας et al. an impressive prediction system referred to Intelligent Heart Disease Prediction System (IHDPS) was proposed, which employs the three widely used data mining approaches of Decision Trees, Neural Network and Naive Bayes. The Decision Trees method is the most accurate, which obtained

an accuracy of 89%, Naive Bayes obtained an accuracy of 86.5%, and an accuracy of 85.53% by neural network [14]. Saikumar et al. Applied the DCAlexNet Convolutional Neural Networks technique to carry out the deep learning-based classification for heart disease detection. Performance metrics such as accuracy of 98.67%, the sensitivity of 97.45%, recall of 99.34%, and an F1 score of 99.34% are generated by the feature based fusion based confusion matrix of DCAlexNet-CNN. These numerical comparison results outperform application robustness and compete with present technology [12]

3 Methodology

Cardiac diseases can be predicted through various indicators so we considered a dataset from Kaggle which consists of 75 attributes or indicators and the target attribute field which alludes to the patient having heart illness or not, where having heart disease is indicated by 1 and no heart disease is indicated by 0. It consists of 1025 rows i.e. patient records of various ages, where 312 are female, and 713 are male. The considered da-taset is made up using four different databases named Cleveland, Hungary, Switzerland, and the VA Long Beach. To predict cardiovascular disease, we follow three major steps5that include Data Pre-Processing, Feature Selection using various data mining tech-niques and Classification using various models.

3.1 Data Pre-processing

Real-world data is inadequate, erratic, inaccurate, and sometimes in an undesirable for-mat and in order to make predictions, machine learning models cannot use the obtained data directly. Therefore, data preprocessing is performed and it aids in improving data quality and preparing the raw data for machine learning models by cleaning, formatting, and organizing it. It promotes the data to be mined for insightful information. Data preprocessing in machine learning is a data mining technique that transforms raw data into readable and understandable format. Data preprocessing includes various proce-dures like data cleaning, outlier removal, data reduction, data standardization, data nor-malization, data transformation, binning etc. which have been performed on the con-sidered dataset for the accurate prediction of cardiovascular diseases.Data cleaning eliminates large portions of irrelevant data, corrects inaccurate data in the train-validation-test dataset and minimizes duplicates.Outliers should be eliminated or rescaled as an important data preparation steps. Out-liers are data points that deviate significantly from the average. They may bias the find-ings and reduce the precision of the machine learning model. The most popular tech-nique for finding outliers is to utilize standard deviation, however there are other ap-proaches as well. Outliers are data points that deviate more than two standard deviations from the mean.

Data reduction is the process of taking a larger amount of original data and reducing it significantly while preserving its integrity. Data reduction techniques include Dimen-sionality Reduction, Numerosity Reduction, Data Cube Aggregation, Data Compres-sion, Discretization Operation.

Rescaling the parameters to have a mean of 0 and a variation of 1 is the process of data standardization. Standardization's objective is to reduce all characteristics to a comparable scale without distorting the variations in the value's ranges.

Data translation into a particular range usually [0 1] or simple data transformation onto the unit sphere are both instances of normalizing in machine learning. The process of connecting disparate, siloed, and normalized data into a single, dimensionally mod-elled, de-normalized, and analysis-ready state is known as data transformation. Without the right technical stack in place, data transformation may be expensive, time-consum-ing, and difficult. However, conversion will ensure the best data quality, which is nec-essary for accurate analysis and eventually allowing data-driven decisions.

Binning is used to reduce the impact of minor observational errors. It is sometimes referred to as data discrete binning or data bucketing. The original data values that lie inside a particular narrow interval are replaced with a value representative of that inter-val, usually mean or median. After successfully preprocessing the data, we move on to feature selection.

3.2 Feature SelectionA dataset consists of numerous features or attributes which help in prediction. But there can be huge number of features and many of which might not play an important role in prediction and as a result of the addition of extraneous information during model train-ing the model's overall accuracy is decreased, its complexity is increased, its capacity to be generalized is decreased, and it becomes biased. Filter methods, wrapper methods, and embedding methods are the three main groups of feature selection techniques. Fea-ture selection plays a crucial role in increasing the prediction accuracy by finding the ideal combination of characteristics or

features for a machine learning model. Better accuracy is obtained by using lesser data.Our data which is preprocessed is now undergoing feature selection, our data is now reduced to 7 features on feature selection, keeping the target attribute intact after pre-processing. The considered features play an important role in predicting heart disease and considering which we obtain higher accuracy and hence now machine learning al-gorithms are provided the data on feature selection for precise cardiovascular disease prediction.

3.3 Classification using various models

KNN:

K-Nearest Neighbour is a supervised learning technique. K-NN algorithm that stores

the data and based on similarity it sorts a new data point. It is used for problems like

classification and regression, although categorization problems are where it is most

commonly employed.

Decision Tree:

Decision Tree is a type of unsupervised machine learning in which the training data is segmented continually based on a particular parameter, on description of the input and the associated output. The two elements that may be utilized to describe the tree are decision nodes and leaves.

SVM:

Both classification and regression employ the Support Vector Machine (SVM), a su-pervised machine learning technique. The SVM method looks for the optimum line or decision boundary that may split the space into several categories as well as a hyper-plane in an N-dimensional space that unambiguously classifies the input points.

SGD:

Stochastic gradient descent is a simple yet very powerful technique for fitting linear classifiers and regressors under convex loss functions, such as (linear) Support Vector Machines and Logistic Regression (SGD). Gradient descent is a general-purpose opti-mization technique that may find the best solutions to a range of problems.

Random Forest:

In the Random Forest supervised machine learning method, a "forest" is created by growing a number of decision trees and combining them. It uses a variety of samples

7

to generate decision trees, using the majority of them for classification and the average of them for regression.

Naive Bayes:

A family of classification algorithms built on the Bayes' Theorem are known as naive Bayes classifiers. It is one of the most straightforward and effective Classification al-gorithms, assisting in the development of rapid machine learning models capable of making prompt predictions.

Logistic Regression:

Guided learning is demonstrated using logistic regression. Assigning data to a discrete set of classes using a classification method allows one to determine or anticipate the likelihood of a binary (yes/no) event occurring.

Gradient Boosting:

Classification and regression tasks are accomplished using a machine learning tech-nique called gradient boosting. It offers a prediction model in the form of several weak prediction models, such as decision trees. It is based on the supposition that the total prediction error is minimized when prior models are coupled with the best potential upcoming model. The main idea is to specify the expected outcomes for this subsequent model in order to minimize inaccuracy.

4 Results

The prediction of cardiovascular diseases was performed on a dataset obtained from Kaggle which was preprocessed using various data preprocessing techniques including procedures like data cleaning by imputing missing values and replacing them with av-erage or most frequent value, selecting relevant features using Chi2 Score with 80% proportion of features upon which the dataset now has 10 attributes or features and one target attribute. The features are now normalized and standardized to $\mu=0$, $\sigma 2 = 1$. We then removed the Sparse features i.e. removed features with too many missing values with a threshold percentage of 5. On removing the sparse features, we now have 8 fea-tures that are considered along with the target attribute. We now implement Principal Component analysis where data is normalized, build the covariance matrix, then find eigen values and eigen vectors, arrange the eigen vectors in highest to lowest order and select the number of principal components, in our data upon PCA we obtain 8 Principal Components. We then apply CUR Matrix Decomposition with rank 10 and relative error of 1.00 upon which we have 7 features in our dataset and one target attribute in which 0 means no heart disease and 1 means heart disease. The dataset is divided into a 30% test set and a 70% train set. Repeated Stratified K-Fold=5 validation of the mod-els KNN,

Decision Tree, SVM, SGD, Random Forest, Naïve Bayes, Logistic Regres-sion and Gradient Boosting on the train set containing the selected subset of features is

formed on 20 times repeat test/train. We obtain prediction accuracy of KNN 81.9%, Decision Tree 95.4%, SVM 86.3%, SGD 82.3%, Random Forest 99.4%, Naïve Bayes 79.8%, Logistic Regression 82.3%, and Gradient Boosting 97.0%

Table 1. Accuracy, Precision, Recall, F1-score of the considemodels

Model	Accuracy(%)	F1 Score(%)	Precision(%)	Recall(%)
KNN	81.9	81.8	81.9	81.9
Tree	95.4	95.4	95.4	95.4
SVM	86.3	86.3	86.5	86.3
SGD	82.3	82.3	82.7	82.3
Random Forest	99.4	99.4	99.4	99.4
Naïve Bayes	79.8	79.8	79.8	79.8
Logistic Regression	82.3	82.3	82.6	82.3
Gradient Boosting	97.0	97.0	97.0	97.0

Precision is a metric used to analyze a model's dependability and its accuracy in cate-gorizing a sample as positive. It is calculated using the ratio of True Positives to True Positives and False Positives.

= (1)

+

The Recall parameter is used to assess how well the model can identify positive test data. It is the ratio of Positive samples that are rightly labelled as positive to the total number of positive Instances samples. The greater the Recall value, the greater the number of positive samples detected.

10

= (2)

+

Models for classification include the F1 Score. The F1 Score is focused on precision and recall. The Harmonic mean of Precision and Recall is the F1 Score.

1=2∗ ∗ (3)

+

From Table 1. We can examine the accuracy of heart illness prognosis using different machine learning algorithms and we have obtained the highest accuracy of 99.4% for Random Forest. Thus, we can conclude that upon data preprocessing and feature selec-tion using data mining methodologies for prognostication of cardiac diseases is useful to predict heart diseases accurately which will help decline the death rate by predicting the risk of the disease and help in diagnosis.

5 Conclusions

Accurate cardiovascular disease prediction is crucial in lowering risk and death rate. In this research we proposed a cardiovascular disease prediction model which uses various data mining techniques, feature selection techniques which play a major role in increas-ing the accuracy by reducing the input variables by considering only relevant data and avoid noise. It reduces the data which in turn reduces the complexity of processing and prediction by the model and thereby increases the accuracy. We performed prepro-cessing and feature selection which included procedures like imputing missing values, selecting relevant features using Chi2 score with 80% proportion of features, it is now normalized and standardized to =0, =1, we then removed the sparse features with 5% threshold and then applied Principal Component Analysis and then applied CUR matrix decomposition with rank 10 and relative error of 1.00 upon which the dataset is now processed, refined, transformed, and 7 features have been selected successfully and one target attribute in which 0 indicates no heart disease and 1 indicates the presence of heart disease. The dataset produced is split into 70% train and 30%

test set. Further we performed 5-fold cross validation on various machine learning models namely KNN, Decision Tree, SVM, SGD, Random Forest, Naïve bayes, Logistic Regression and Gra-dient Boosting which produced accuracies of 81.9%, 95.4%, 86.3%, 82.3%, 99.4%, 79.8%, 82.3% and 97.0% respectively. We conclude that Random Forest has shown the highest accuracy of 99.4% with F1 score 99.4%. From the aforementioned results ob-tained we can conclude that machine learning models with feature selection, Data min-ing techniques can be useful for prognostication of cardiovascular diseases

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SMART JACKET

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ABSTRACT

People have been aware of the negative effects of mental stress on their health for decades. High-level stress must be detected early on to avoid these negative outcomes. Researchers have begun to notice excessive tension in people who use wearable technologies during their everyday routines, following the introduction of wearable technologies that have the potential to become a part of our daily lives.

We developed an automatic stress detection system based on smart wearable devices that people can use in their daily life. Our research was conducted using a previously published and well-established approach. This suggests that the proposed system has the potential to have a large impact on people's lives. It can be used to prevent stress in a variety of contexts, including job, school, and home. **Keyword**: GSM, GPS, Accelerometer, Arduino, Temperature Sensor, Pulse Sensor, WI-FI Module

I.INTRODUCTION:-

In today's culture, stress in everyday life is a huge problem. It's a growing issue that's become an unavoidable part of our daily lives. Acute and chronic psychological stress is the two types of stress. Acute stress is more common than chronic stress. According to the American Psychological Association, acute stress is induced by pressure from the recent past and the near future.

Athletic challenges, test taking, and anxiety while meeting new people can all produce acute stress. Chronic stress, on the other hand, might be brought on by long-term pressures and expectations as a result of socioeconomic

circumstances, interpersonal connection issues, or a bad job. Chronic stress, if not well handled, can lead to serious health issues.

Because the signs of acute stress are more obvious, it is examined more thoroughly than chronic stress. Stress is one of the world's most serious health problems. Stress has different effects on people's health depending on the sort of stress. Acute stress can result in mental distress, muscular tightness and tension, back pain, headaches, heartburn, digestive problems, and excessive arousal.Excessive arousal in people with heart problems can lead to heart attacks, arrhythmias, and even sudden death. Stress should be managed as soon as symptoms arise, according to researchers, in order to avoid long-term consequences. To put it another way, stress must be diagnosed early on in order to prevent further injury and chronicity.

Researchers have developed an autonomous stress monitoring system that employs smart wearable devices and powerful affective computing algorithms due to the negative impacts of stress on human health, social life, and the economy. This design is appropriate for

automobiles, aeroplanes, factories, and workplaces, as well as job interviews and everyday life.This technique can help determine social stress levels during meetings or reciprocal dialogue. The ideal plan would be practical in everyday life, with unobtrusive sensors and equipment that people might easily wear while going about their daily lives. We offer an autonomous stress level detection technique using a sensor network in this paper. The human body is monitored through sensors. In this study, we present and test a portable system based on the Arduino system for real-time stress detection. The hardware is made up of portable, wireless, and low-cost electronics components. . Our findings show that our approach has the potential to be a useful tool for stress monitoring, identification, and prevention in the field.

II.LITERATURE SURVEY:-

1. Personal monitoring systems, according to N.Attaran et al, can provide excellent solutions for human health and performance. Multiple streams of physiological signals must be sampled and processed in these systems. Feature extraction, data fusion, and classification stages are common, and they involve a significant number of digital signal processing and machine learning kernels.

However, in order to be functional, the processing architecture must be low-power and small in size. In this study, we offer such a flexible, multi-modal design for a tailored stress monitoring system. With both SVM and KNN

machine learning classifiers, several physiological and behavioural characteristics were investigated to maximise detection accuracy. Heart rate and accelerometer features

were determined to have the greatest classification accuracy for detecting stress in the given dataset, out of 17 different features from 5 sensors. While the KNN classifier outperforms the SVM classifier by 2% in accuracy, it consumes much more memory and computation. As a result, the SVM classifier was chosen for hardware implementation. The SVM processor occupies 0.2 mm2 and dissipates 20.2 mW at 125 MHz, according to post-layout implementation results in 130 nm CMOS technology. The suggested processor classifies each input in 800 nanoseconds and uses 16.2 nanojoules. This system's total categorization accuracy is 96 percent. [1]

2. J.A. Healey and colleagues The methods for collecting and evaluating physiological data during real-world driving tasks in order to estimate a driver's relative stress level are presented in this study. While drivers followed a predefined course via open highways in the greater Boston area, electrocardiogram, electromyogram, skin conductance, and breathing were continually monitored. For this study, data from 24 drives lasting at least 50 minutes were gathered. The information was examined in two ways. Analysis I distinguished three degrees of driver stress with an accuracy of over 97 percent across several drivers and driving days using characteristics from 5-min intervals of data collected under rest, highway, and city driving circumstances. Analysis II compared continuous characteristics determined at 1-s intervals throughout the journey to a metric of observable stressors derived from videotapes by independent coders.

Skin conductivity and heart rate measures are most closely connected with driver stress level for the majority of drivers evaluated, according to the findings. These findings suggest that in future autos with physiological monitoring, physiological signals could be used to offer a gauge of driver stress. A statistic like this might be used to manage non-critical in-vehicle information systems and offer a constant gauge of how varied road and traffic conditions effect drivers. [2]

3. Y.Shi and colleagues This is the age of the contemporary world. Careers in the age of email, text messaging, Facebook, and Twitter At any time, crisis news can be found from anywhere. We (humans) are bombarded with information disguised as facts, pseudo facts, jibber-jabber, and rumour. We text while strolling down the street and check our email while waiting in line.

When people think they're multitasking, what they're really doing is swiftly switching from one task to another. It has been discovered that it causes an increase in the production of stress hormones, which overstimulate the brain and induce mental fog or jumbled thinking. Stress management, on the other hand, should begin long before the stress begins to cause sickness.This research introduces a real-time

tailored stress detection system based on physiological inputs. It is dependent on the rate of pulse and the temperature of the body. This could be used to keep track of a person's stress levels. [3]

4. J.Zhai and colleagues It has been claimed that accurately identifying a computer user's stress level could assist the computer respond intelligently and help the user relax from negative emotional states during human-computer interaction.Our research focuses on using three physiological signals to automatically monitor the stress condition of computer users: blood volume pulse (BVP), galvanic skin reaction (GSR), and pupil diameter (PD). The creation of hardware and software instrumentation, as well as the signal processing approach utilised to identify changes, are discussed in this work.within the context of a specific experimental task, in the stress level of a person engaging with a computer For this study, a computer game was created based on the 'Stroop Test,' a clinical mental stress test that was customised to make the individual feel two levels of stress His/her BVP, GSR, and PD signals were constantly recorded while he/she was awake. To extract useful features of the subjects"stress' status, several data processing techniques were used. According to the current findings, there is a substantial link between changes in those three signals and changes in emotional states when stress stimuli are introduced into the interaction context. [4].

5 .F.-T.Sun et alContinuous stress monitoring has the potential to aid in the understanding of various mental stress patterns and how clinical intervention can be most effectively applied. Because the electrical conductivity of skin fluctuates with physiological arousal, measuring galvanic skin response (GSR) is a cost-effective technique to identify stress.

We investigated the impact of various activities (sit, stand, and walk) on GSR measurements in this study. A GSR sensor system and an activity recognition system were implemented. We found that utilising two accelerometers (one on each thigh and ankle) improved activity detection accuracy by +27.3 percent when compared to using a single sensor node system. We also showed that using activity data could improve the sensitivity of stress detection in both sitting and standing situations. [5]

6. Krutika Patil and her colleagues This system records all parameters in real time and sends them to the base station using a GPS module and a wireless body area sensor network. The humidity sensor, temperature sensor, and pulse sensor are among the various types of sensors employed in this system, all of which aid in determining the health status of that particular army officer. The most crucial aspect of this concept is the wearable technology. [7]

7. Akshita V. Armarkar and colleagues GPS is utilised to track soldiers, and GSM is employed

to facilitate wireless communication. We use biomedical sensors such as temperature sensors and heart rate sensors to check the health characteristics of soldiers. An oxygen level sensor is used to measure ambient oxygen levels so that soldiers can be properly outfitted in the event of climatic changes. [8]

8. Jasvinder Singh Chhabra and colleagues Soldiers can communicate anywhere utilising RF, DS-SS, and FH-SS, allowing them to communicate with their squad members whenever they need to. Circuit complexity and power consumption are reduced. The use of an ARM processor and low-power peripherals reduces the overall power consumption of the system.

The modules used are compact and lightweight, making them easy to transport. Soldier security and safety: GPS tracks a soldier's whereabouts anywhere on the globe, and a health system monitors the troop's essential health indicators, ensuring soldier security and safety. [9]

III. PROBLEM STATEMENT AND OBJECTIVES:-

PROBLEM STATEMENT:-

Stress is an unavoidable component of today's fast-paced lifestyle. Furthermore, a growing amount of scientific evidence suggests that the elevated, semi-permanent stress levels many of us experience are linked to a number of health issues. Stress is regarded as an epidemic by some.

OBJECTIVES-

- It can be used in medical intelligence.
- It is useful enough to improve people's quality of life.
- It is a useful tool for stress monitoring, detection, and prevention.
- It is beneficial to recognise stress.

IV. PROPOSED SYSTEM BLOCK DIAGRAM:-

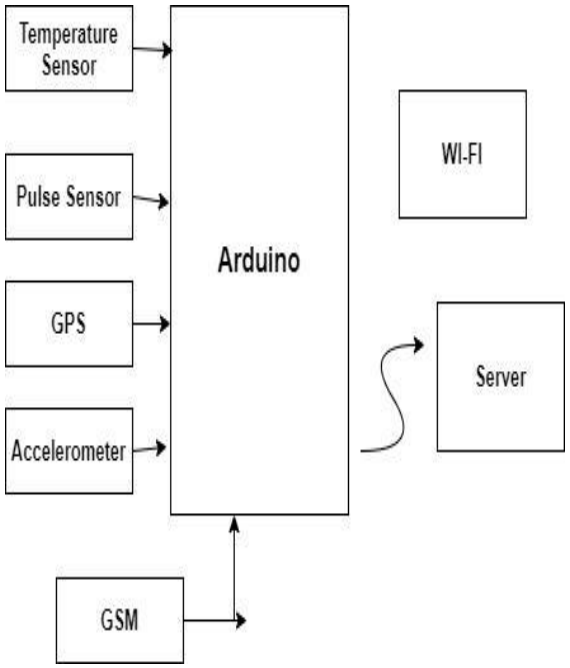

Fig 1 : Proposed Block Diagram

Hardware Requirements

- Accelerometer
- GSM and GPS
- Wifi

• Arduino

• Pulse sensor

• Temperature sensor

System Design

Researchers focused on the activity of alpha-amylase in saliva (salivary amylase) in order to establish a simple quantitative assessment technique for monitoring human stress in the existing system. Which is extremely important to comprehend and use. The proposed system will use a multi-sensor network to monitor a person's stress level.The proposed technology will detect stress levels and alert the control room.

V.**METHODOLOGY:-**

In terms of sensor integration, the applicable methodology differs slightly. In order to prototype the smart wearable jacket design, we use a few specialised components, which are listed below:

Temperature Sensor #1

2. Pulse Detector

3. Accelerometer

4. GPS, GSM, and ESP8266 Wi-Fi Shield

5. Arduino

1. TEMPERATURESENSOR

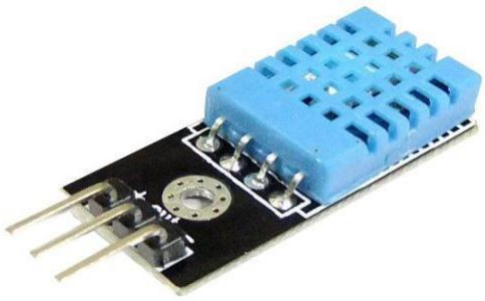

Fig 2

A temperature sensor is an electronic device that records, monitors, or signals temperature changes by measuring the temperature of its surroundings and converting the input data into electronic data. Temperature sensors come in a variety of shapes and sizes.

Some temperature sensors (contact temperature sensors) require direct touch with the actual object being monitored, whereas others measure the temperature of an object indirectly (non-contact temperature sensors).

2. PULSE SENSOR

Fig 3

When a finger is placed on the heart beat sensor, it produces a digital output of heat beat. The beat LED flashes in unison with each heart beat while the heart beat detector is operational. This digital output can be directly connected to the microcontroller to measure the BPM rate. At each pulse, it works on the idea of light modulation by blood flow via the finger.

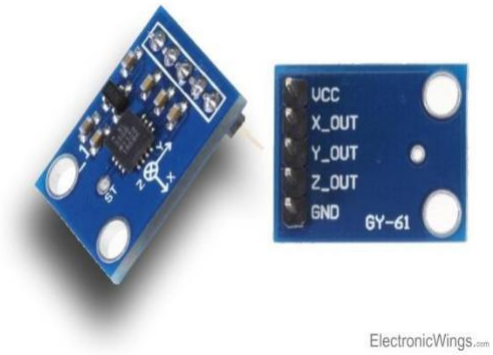

Fig 4

Please see the datasheet for more information.

Features

- SMD design based on a microcontroller
- The heat beat is indicated by an LED.
- Instant digital signal output for direct microcontroller connection
- a small size
- +5V DC Working Voltage

Applications

- Monitor your heart rate with a digital heart rate monitor.
- System for Patient Monitoring
- Robotics and applications with bio-feedback control

3. ACCELEROMETER

An accelerometer is a mechanical instrument that measures the force of acceleration. It only shows acceleration due to gravity, i.e. the g force. The acceleration is measured in g units. On Earth, 1g corresponds to a 9.8 m/s2 acceleration. It is 1/6th of the size of the earth on the moon, and 1/3rd of the size of the earth on Mars.

Tilt-sensing applications as well as dynamic acceleration caused by motion, shock, or vibration can all be done with an accelerometer.

4. GPS

Fig 5

The NEO-6MV2 is a navigation module that uses theThe network is structured into several discrete sections:

GPS (Global Positioning System). The module simply determines its position on the globe and outputs the longitude and latitude of its position.

It's part of a line of standalone GPS receivers that use the u-blox 6 positioning engine for great performance.

These versatile and cost-effective receivers come in a small (16 x 12.2 x 2.4 mm) design with a variety of connecting choices. NEO-6 modules are suited for battery-operated mobile devices with severe cost and space requirements because to their tiny architecture, power, and memory options. Even in the most difficult conditions, the NEO-6MV2's innovative design provides superb navigation performance.

- Base station subsystem – the base stations and the controllers that control them
- Network and Switching Subsystem – the part of the network that most closely resembles a fixed network, sometimes known as the "core network"
- GPRS Core Network the optional part that supports packet-based Internet connections
- Operations support system (OSS) – upkeep of the network

5.GSM STRUCTURE

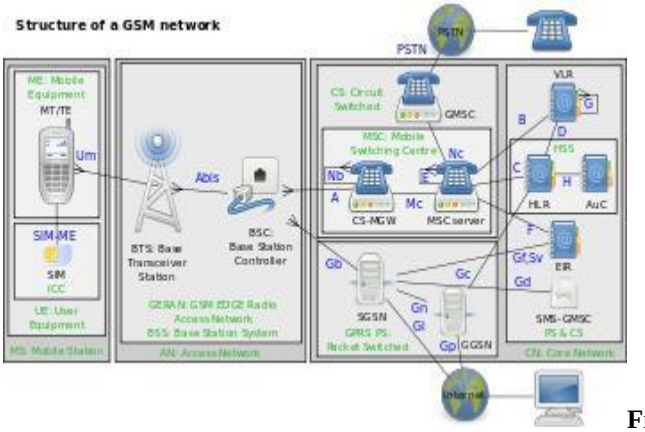

Fig 6

6.Arduino

Fig 7

Arduino Uno is an 8-bit ATmega328P microcontroller-based microcontroller board. It includes extra components to assist the ATmega328P microcontroller, such as a crystal oscillator, serial communication, voltage regulator, and so on. There are 14 digital input/output pins on the Arduino Uno (out of which 6 can be used as PWM outputs),A USB connection, a Power barrel jack, an ICSP header, and a reset button are all included..

How to use Arduino Board

Using the pinMode(), digitalRead(), and digitalWrite() functions in Arduino programming, the 14 digital input/output pins can be used as input or output pins. Each pin operates at 5 volts and may deliver or receive a maximum of 40 milliamperes. It also contains a 20-50 kOhm internal pull-up resistor that is unplugged by default.

VI.OTHER SPECIFICATION

a. ADVANTAGES:

• High levels of dependability

• Power consumption is low Latency is low.

b. LIMITATIONS

• Increased computational difficulty**c. APPLICATIONS:-**

- It may be used in medical intelligence;
- It is powerful enough to improve people's quality of life; and
- It is a useful tool for stress monitoring, detection, and prevention..

VII.RESULT

The circuit design in the proteus software with expected output is shown below.

Circuit design:

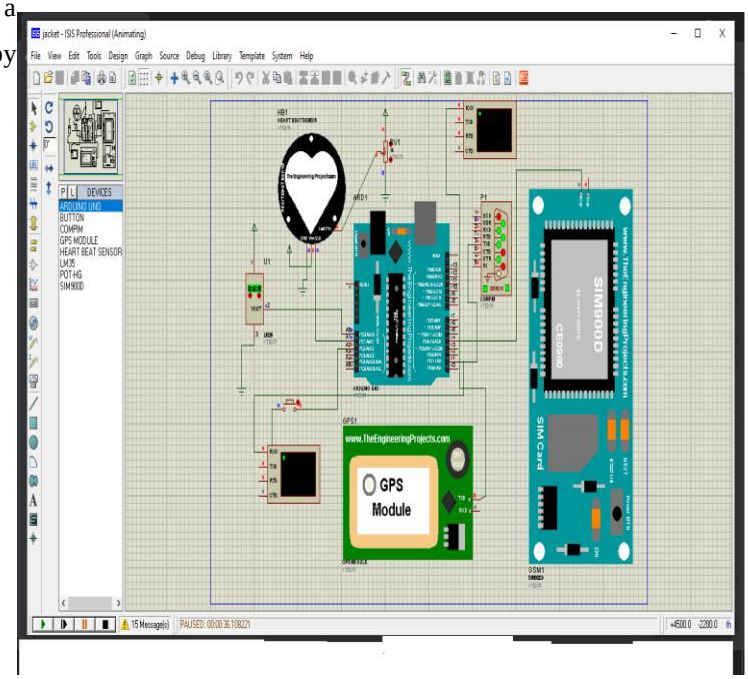

Fig 8

Expected output:

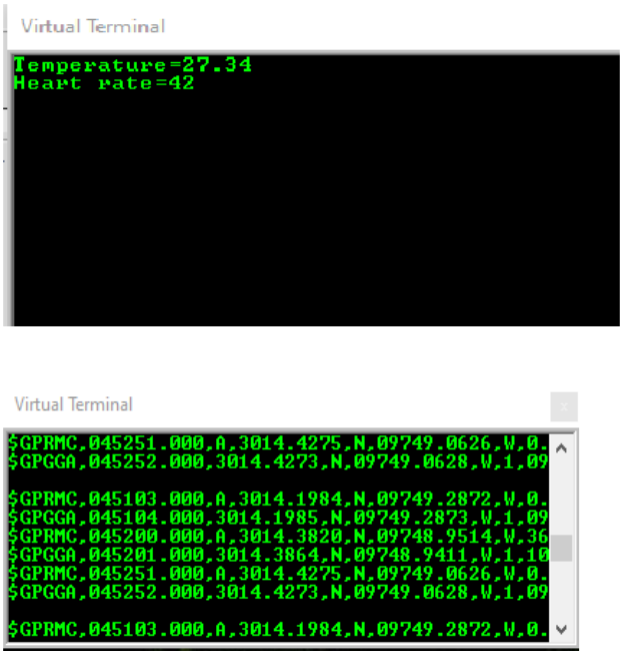

Fig 9

VIII. CONCLUSIONS AND FUTURE WORK

Preprocessing, feature extraction, and machine learning kernels are all required in health monitoring applications, as well as sampling from numerous physiological signals at varied rates. We used several physiological signals to develop an accurate stress monitoring system in this work. . Using heart rate and accelerometer measurements to determine the amount of stress produced the highest accurate classification with both KNN and SVM classifiers, according to our findings.

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Resume classification-based on personality using Machine Learning Algorithm

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Abstract- **This paper describes personality classification experiment by applying k-means clustering machine learning algorithms. Several previous studies have been attempted to predict personality types of human beings automatically by using various machine learning algorithms. However, only few of them have obtained good accuracy results. To classify a person into personality types. With the onset of the epidemic, everything has gone online, and individuals have been compelled to work from home. There is a need to automate the hiring process in order to enhance efficiency and decrease manual labour that may be done electronically. If resume categorization were done online, it would significantly save paperwork a k and human error. The recruiting process has several steps, but the first is resume categorization and verification. Automating the first stage would greatly assist the interview process in terms of speedy applicant selection. Classification of resumes will be performed using Machine Learning Algorithms Random Forest**.

Key Words: **Personality types, machine learning, Jungian, kmeans clustering on personality test resume classification Job seekers, Resume recommendation, Job search, Resume matching, Machine learning,.**

I. INTRODUCTION

Interviews are becoming time-consuming affairs. Employees are required to travel to locations and conduct interviews, and it is difficult to manually remember each and every aspect of a candidate or the interview process. In many instances, the artificial intelligence system assists us in simplifying things. Using the conventional method of recruitment, an organization's HR department invites individuals based on their resumes to an interview for a specific position. This HR department manually evaluates a candidate's skills based on their résumé to determine if he or she is qualified for the position or not. HR's conduct interviews, and the panel plays a significant role in determining who is the best applicant for the post. They examine not just the candidate's talents, but also his or her personality Personality is a combination of a person's characteristics and attitudes in dealing with different social situations as in kindergarten, school, university, family, working team, etc. Humans are addicted to biases and prejudices that might affect their judgmental accuracy

Personality can be taken as assessment in various fields such as selection of staff, choice of profession, relationship and health counseling. There is a great effect of personality on learning capabilities of humans. For instance, in learning performance we may see significant performance we may see significant differences between extroverts and the ones belonging to introverts. Maintaining resumes and profiles of all candidates becomes a very tedious job when it comes to big mass recruitment companies because they provide employment in bulk, and thus maintaining or storing data physically is not possible. Machine Learning enables the path through which a computer can be trained to follow specific instructions again and again to make human life easy. The most common usage of machine learning is for the classification of objects. In machine learning, iteration is important because models are exposed to new data and adapt accordingly. Machine learning models learn from previous results and computation to produce correct and reliable decisions. In statistics, classification is a supervised learning concept in which segregation of data.

1. OBJECTIVE

Today the major problem being faced across the industry and candidate is how to acquire the right talent, using minimal resources over the internet and in minimal time. there are three major challenges that are required to be overcome, to bring efficiencies to the complete process

find the personality candidate.

find the job title for candidate.

The solution would help to find the right CV from the large dumps of CVs; would be agnostic to the format in which CV has been created and would give with the list of CVs which are the best match to the job description provided by the recruiter The proposed solution involves supervised learning to classify the resumes into various categories corresponding

to the various domains of expertise of the candidates. A multi-pronged approach to classification is proposed

2. PROPOSED SYSTEM

Nowadays searching for jobs is a difficult and tedious process for both the employees and the employers. The traditional method for classifying resumes is very time consuming and the concerned authorities need to go through every resume sent by the large number of candidates. This process becomes very complicated because there are millions of engineering graduates passing out every year runs for getting a job. For making the process easier there needs to be match between qualification, experience and many more criteria of candidate and company expectation. In our system, candidates will be sending resume and Classification will be done using Machine Learning such as k-means and random forest

• This project is based on three modules:

1. This Module is used to find the Personality of a person. 2. This module is used to find the Job title of individual.
3. This module is used to classify the resume

3. DATASET AND MODEL DESCRIPTION

This data was collected (2020-2021) through an interactive on-line personality test. The personality test was constructed with the "Big-Five Factor Markers" from the Participants were informed that their responses would be recorded and used for research at the beginning of the test, and asked to confirm their consent at the end of the test. The following items were presented on one page and each was rated on a five-point scale using radio buttons. The order on page was was EXT1, AGR1, CSN1, EST1, OPN1, EXT2, etc. The scale was labelled 1=Disagree, 3=Neutral, 5=Agree

Personality test also known as OCEAN Model analyses personality types of individuals based on five dimensions – Openness(O), Conscientiousness (C), Extraversion (E), Agreeableness (A), Neuroticism(N). With each of the dimensions signifying a different personality type. It uses keywords to identify traits and analysed in which personality a person fit.

Openness: As the word suggests, This quality features characteristics such as openness and imagination and curiosity.

Conscientiousness: Conscientiousness talks about a high amount of thoughtfulness, a goal- oriented attitude and good decision-makers.

Extraversion: Extraversion also means extroversion is identified by excitement, talkativeness and assertiveness.

Agreeableness: Agreeableness refers to features such as trust, affection and social behaviour of an individual.

Neuroticism: Neuroticism includes attributes like sadness, moodiness and sudden burst of emotions.

Fig1 personality question

4. SYSTEM ARCHITECTURE

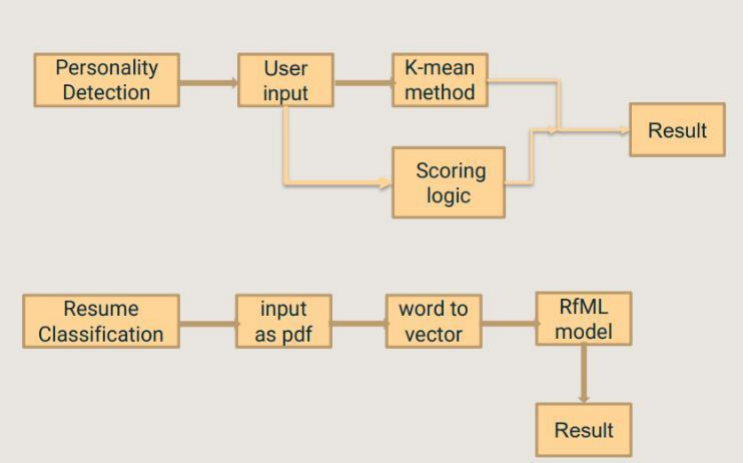


Fig2 SYSTEM ARCHITECTURE

First the dataset needs to be scraped which can be done using various websites. Once the dataset has been scrapped, pre-processing of data is to be done by doing proper stemming and lemmatization, removing stop words and filler words store the relevant words in a separate column for further process. After the pre-processing of data is done, making sure that the relevant data have the words which have occurred the highest amount of times need to be put in a term-frequency document using TFIDF Vectorization. Once the previous steps are done, the cleaned data is now ready to test and form classification models using machine learning algorithms. Analysing the model by their accuracy and the forming confusion matrix for the same is required for better understanding of the results.

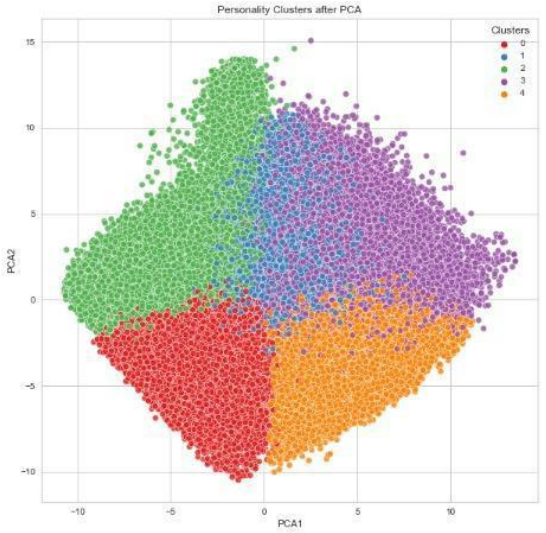
5. ALGORITHM

5.1 k-means Clustering Algorithm

The k-means method is the most popular clustering method. It refers to unsupervised learning part in machine learning field. The most well-known algorithm utilizes an iterative refinement technique. By cause of pervasiveness, it is regularly called the k-means algorithm. The algorithm continues by switching back and forth between two stages Assignment step: Assign every observation to the cluster with mean (average of a set of values), which has the slightest

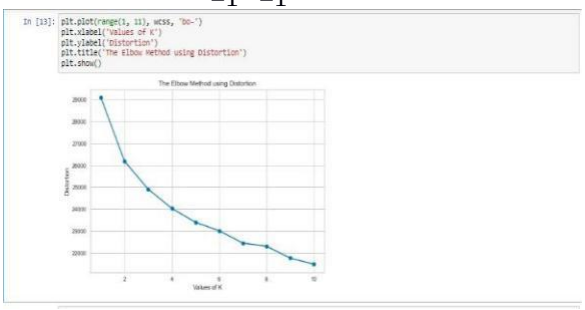
squared Euclidean distance which shows how close or far away two observations from each other [36]. We calculated the distance as follows: where x and y are samples in n-dimensional feature space. Update step: Calculation of values of new means is made of clusters that will become the centroids of observations in the new clusters. If the assignments do not change, the algorithm converges. Generally, we define randomly k clusters in the plane, then we calculate distances of each data point to these k clusters and assign the observation to the closest centroid, after that we move centroids to the mean of assigned values to them. We repeat this process until convergence, when the values of centroids do not change after iteration. Using this algorithm, we cannot be sure that the most optimal result will be found. We can stop the algorithm from converging using other distance functions as Manhattan distance functions for instance. There are other k-means transformations, especially the spherical k-means and k-medoids.

$$\cos(\ ) = \frac{\cdot}{\|\ \|\ \|\ \|} = \frac{\sum_{=1}}{\sqrt{\sum_{=1}^{2}}\ .\ \sqrt{\sum_{=1}^{2}}}$$



the error of each data point

$$= \sum\sum\| \quad - \quad \|^2$$
$$=1 \quad =1$$



5.2 Random Forest Algorithm

Random Forest is a classification algorithm that works on the principle of decision trees. It takes in input of many decision trees and gives the best majority output from all the inputted decision trees. On the RF Classifier the training data is fitted. Then, in the validation dataset labels are being predicted.

Step 1 − First, start with the selection of random samples from a given dataset.

Step 2 − Next, this algorithm will construct a decision tree for every sample. Then it will get the prediction result from every decision tree.
Decision tree

$$= \frac{\Sigma\ :}{\Sigma\in}$$

fi sub(i)= the importance of feature
i ni sub(j)= the importance of node j

Step 3 − In this step, voting will be performed for every predicted result.

Normalized to a value between 0 and 1

$$= \frac{}{\Sigma\in}$$

Step 4 − At last, select the most voted prediction result as the final prediction result.

$$= \frac{\Sigma\in}{}$$

RFfi sub(i)= the importance of feature i calculated from all trees in the Random Forest model
normfi sub(ij)= the normalized feature importance for i in tree j
T = total number of trees

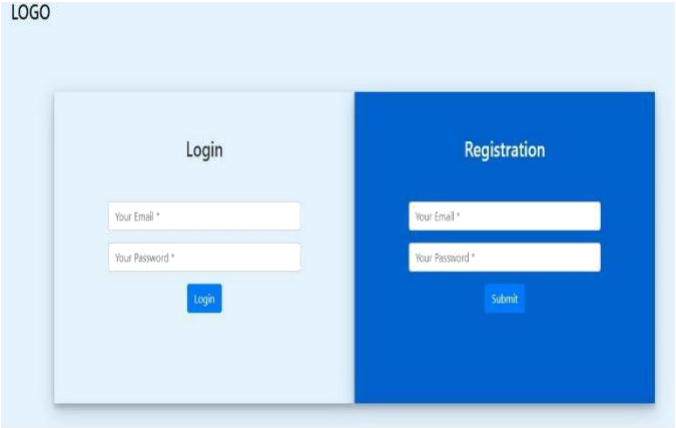
6. EVALUATING THE MODEL& RESULTS

The results obtained from our model are summarized in the following table:

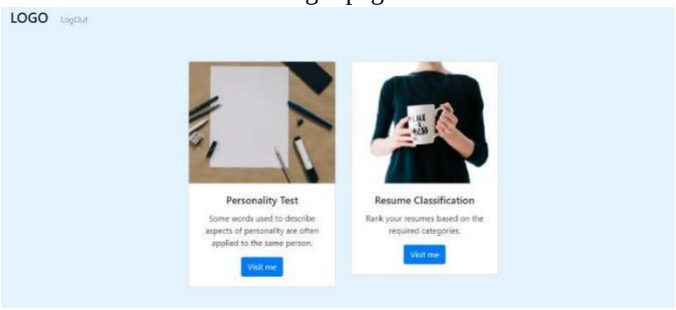
Model Evaluation

Algorithm name	Accuracy
RandomForest	
DecisionTree	

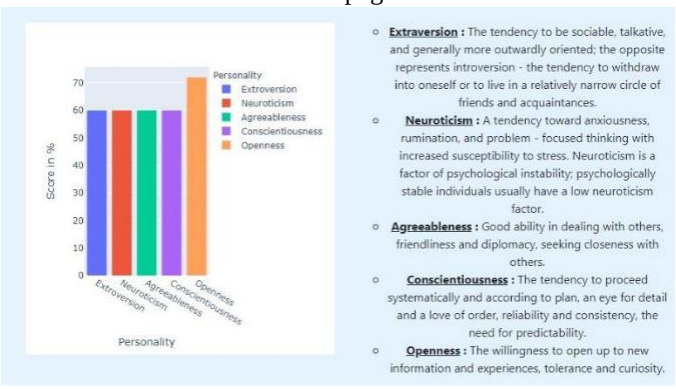
User interface



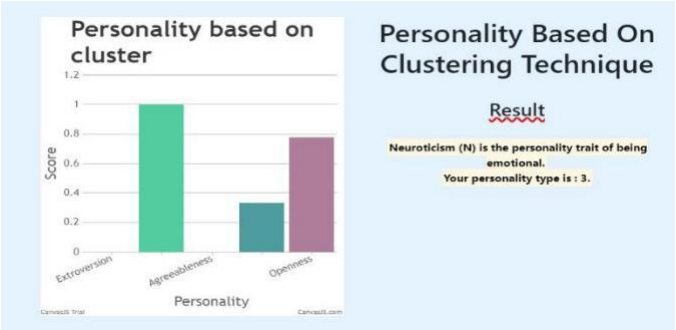
Login page



Home page



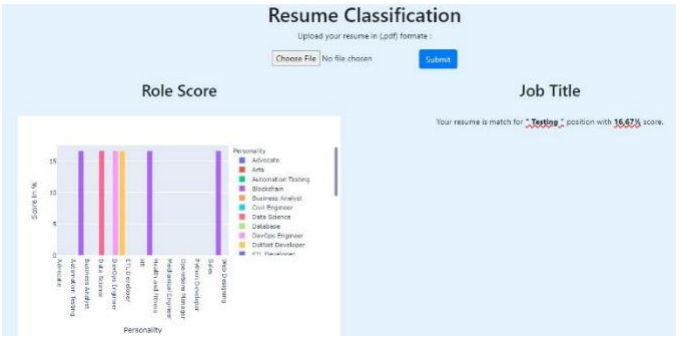
Personality types



Personality result

```
Displaying the distinct categories of resume and the number of records belonging to each category -
Java Developer                84
Testing                       70
DevOps Engineer               55
Python Developer              48
Web Designing                 45
HR                            44
Hadoop                        42
ETL Developer                 40
Operations Manager            40
Data Science                  40
Blockchain                    40
Mechanical Engineer           40
Sales                         40
Arts                          36
Database                      33
PMO                           30
Health and fitness            30
Electrical Engineering        30
DotNet Developer              28
Business Analyst              28
Automation Testing            26
Network Security Engineer     25
Civil Engineer                24
SAP Developer                 24
Advocate                      20
Name: Category, dtype: int64
```

Job title



Resume classification

7. CONCLUSIONS

Two models have been built on the cleansed data: i) Classification - Based on the resume and category the model has been designed to categories the resume in the right category and ii) describes personality classification by applying k-means clustering. We provided explanations of advantages and disadvantages of k-means clustering

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Drowsy Alert System Using Detection Of Drowsiness Using Aurdino Application

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Abstract

For protecting environment and human health water quality monitoring is very essential. In recent years Artificial Intelligence has paved the way to bring a great improvement in the classification and prediction of water quality. Here, for developing a reliable approach to forecast water quality and to to distinguish between Potable and Non-Potable water, we have used various machine learning models in this study. The studied machine learning classifiers and their stacking ensemble models included Logistic Regression, Gaussian Naive Bayes, Bernoulli Naive Bayes, Support Vector Machine(SVM), Kth Nearest Neighbours(KNN), X Gradient Boosting, and Random Forest. In this study, our used dataset has 3277 samples and it's a historical dataset which was collected for over 9 years from various places of Andhra Pradesh, India. It has been taken from Andhra Pradesh Pollution Control Board (APPCB). We have used precision-recall curves to evaluate the performance of the various classifiers. Among our used models, Random Forest provided the highest accuracy with a percentage of 78.96, where SVM provided us the least amount of accuracy with a percentage of 68.29.

Keywords **Water quality, Machine learning, Logistic Regression, Gaussian Naive Bayes, Bernoulli Naive Bayes, Support Vector Machine(SVM), Kth Nearest Neighbours(KNN), X Gradient Boosting, Random Forest**.

1 Introduction

For drinking and domestic use, food production or recreational purposes safe and readily available water is essentially important. Despite having a massive amount of water, the amount of drinkable water is still inadequate [1]. In India, around 70% of surface water is not fit for consumption [2]. In case of poverty reduction better management of water resources, improved water supply and sanitation can favour a country's economic growth.Transmission of contagious disease, such as cholera, diarrhoea, dysentery, hepatitis A, typhoid, and polio etc are directly linked the contaminated water and poor sanitation. Generally, after collecting water samples from various sources, manual water sampling and lab analysis of water quality can not be efficient. At the same time, it can be time consuming and prodigal. Therefore, the use of intelligent systems are increasing exponentially to monitor water quality especially when we need real time data.[3][4]Machine learning is a subset of artificial intelligent which teaches a system to automatically learn and improve from the experience without the manual interference[5] . The procedures that are used in machine learning are trained to capture trends and pursuant to they update themselves [6],

In water studies, Machine learning paves the way to assess, classify and predict water quality indicators. For instance, we can successfully simulate hydro-logical processes subject to the accessibility of bountiful sets data. However, using this water potability dataset of Vijayawada, Andhra Pradesh [8] and applying machine learning to it, we are going to distinguish between

Potable and Non-Potable water using some parameters such as pH value, chloramines, sulfate, conductivity, organic carbon, hardness, solids, conductivity, Trihalomethanes, turbidity, potability.

2 Literary Survey

For classifying the water quality of Chao Phraya river, RivSillberg et al. have developed a ML-based technique integrating attribute-realization (AR) and support vector machine (SVM)[9] . Attribute realization has identified the most significant elements of improving the quality of river, using the linear function. The most availing characteristics were TCB, NH3-N, FCB, DO, BOD, Sal and DO in the assortment, with contributed values in the range of 0.80–0.98. Using SVM linear approach, they got the best classification results, which had an F1-score average of 0.84 ,accuracy of 0.94, a recall average of 0.84 and a precision average of 0.84. With 0.86–0.95 accuracy AR-SVM was a strong and effective method for identifying the quality of the river water. They could find it when they applied to -6 parameters. To simulate the quality index of Akaki river water Yilma et al used ANN [10]. They calculated the index using 12 WQ indicators from 27 different wet & dry season sample locations.Almost all projected findings figured low WQ. The exception was one upstream location. The ANN model was corroborated and trained using the number of hidden layer neurons (5, 10, 15, 20, and 25), hidden layers (2–20), learning functions and transfer training. It was performed through 12 inputs. In their research, ANN with fifteen hidden neurons and eight hidden layers predicted the water quality index with an accuracy of 0.93.

In Malaysia, to calculate the water quality of Kinta River, Gazzaz et al. [11] designed a feed-forward, three layer, fully connected neural ANN model and the IoT . In Iran, to predict water quality index in 47 springs and wells, Sakizadeh [12] used 3 different artificial neural network algorithms, such as, an ensemble of artificial neural network, ANN with early stopping and artificial neural network with Bayesian regularization.

3 Proposed Methodology

We have taken prior actions to prepare the data as input before employing ML models (Logistic Regression, Gaussian Naivd Bayes, Bernoulli Naive Bayes, Support Vector Machine, Kth Nearest Neighbors, X Gradient Boosting, Random Forest). We have divided the data into two sets, training and testing sets to train our 7 machine learning models and assess the performance. In addition, we have cleaned the dataset by removing inexact values and replacing empty cells with the median of the dataset's input variables. The following figure (Fig.1) has demonstrated the framework of the proposed system.

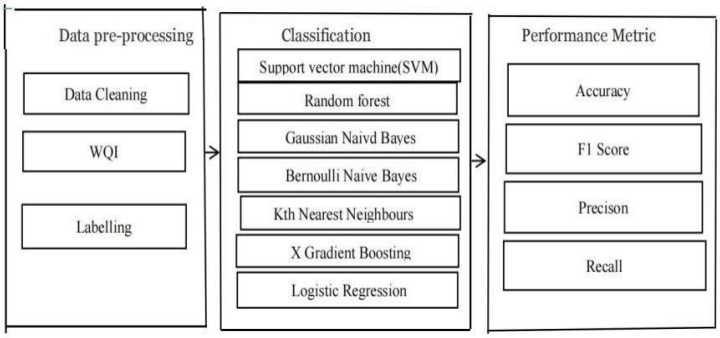

Fig.1 Methodology of the proposed system.

3.1 Data Description

Our dataset contains water quality metrics for 3277 different water bodies and 10 features, such as pH value, chloramines, sulfate, conductivity, organic carbon, hardness, solids, conductivity, Trihalomethanes, turbidity, potability. At first we have imported all the necessary libraries which have been used to train the machine learning models or visualize the data. Then using a Pandas's function read_csv(), we have loaded the data set. Then we have performed Exploratory Data Analysis. In Exploratory Data Analysis, firstly have checked the shape of the data set. Then after handling the null values we have checked the value counts of our target feature Potability. After that, we were able to visualize the potability using a countplot function of seaborn

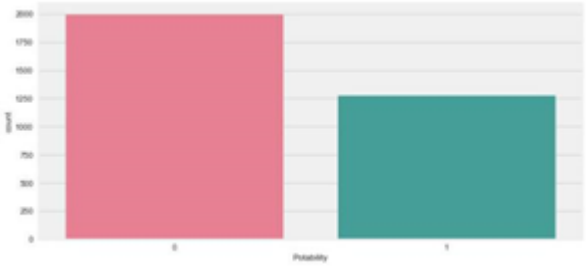

Fig.2 Visualization of the potability

(Fig.2). Then, we have displayed the entire dataset using the hist method (Fig.3). One can explore the dataset through it. We can say, there is no correlation between any feature. Because ,in the visualization of the correlation of all the features using a heat map function of seaborn, we found no relation(Fig.4). So, we can conclude that, the dimension cannot be reduced.

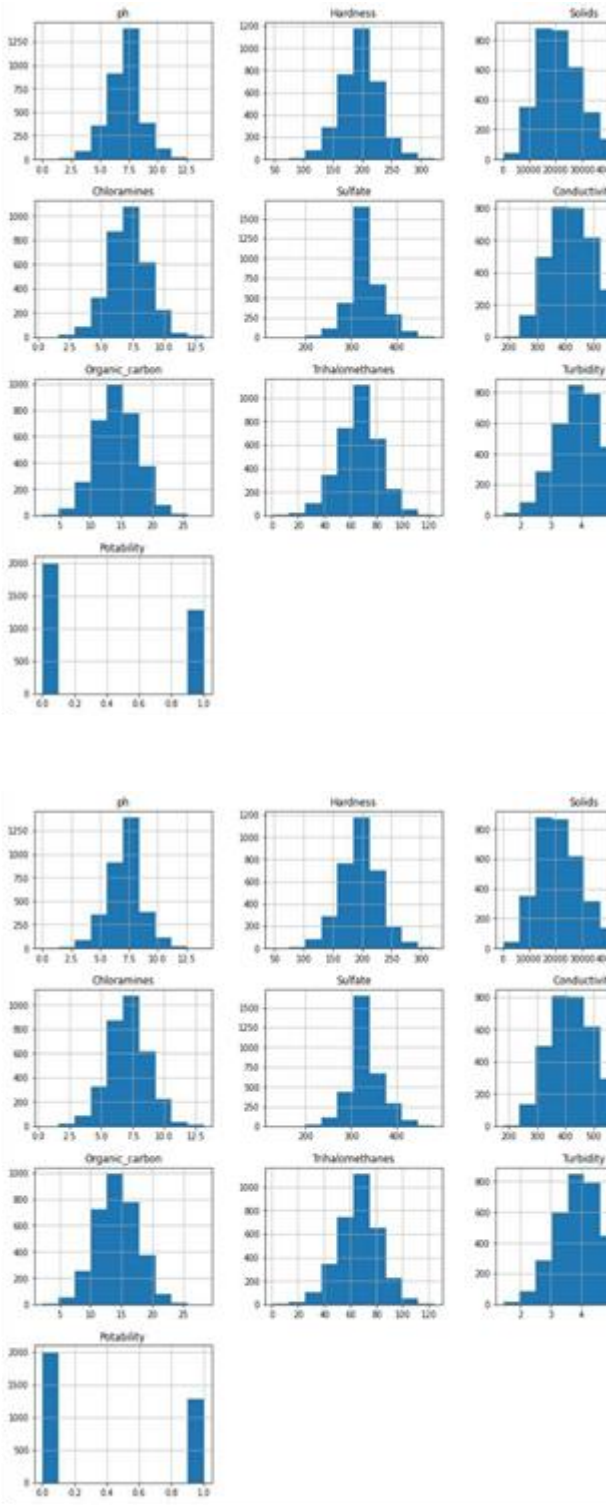

Fig.3 Visualization of the entire dataset using hist method

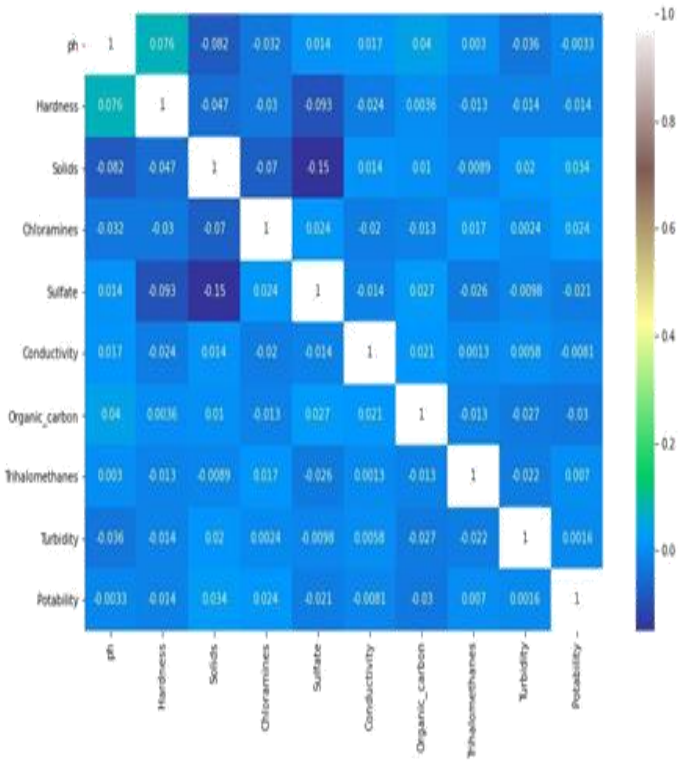

Fig.4 Correlation heatmap

3.2 Data Preparation

In data preparation, we have divided the data into two categories, dependent and independent features. Except potability, all our features are independent. Then using train_test_split function we have split the dataset into testing and training. After that, using the data set (X_train, Y_train), we trained the model and defined the decision tree classifier model. Using the test data set (X_test), we tested the model. Finally using the accuracy score, we have evaluated the model , confusion matrix and classification report. The techniques of evaluation take two parameters; the first one is the predicted data and the second one is actual data. Here we are demonstrating a graph of models vs accuracy (Fig.5)

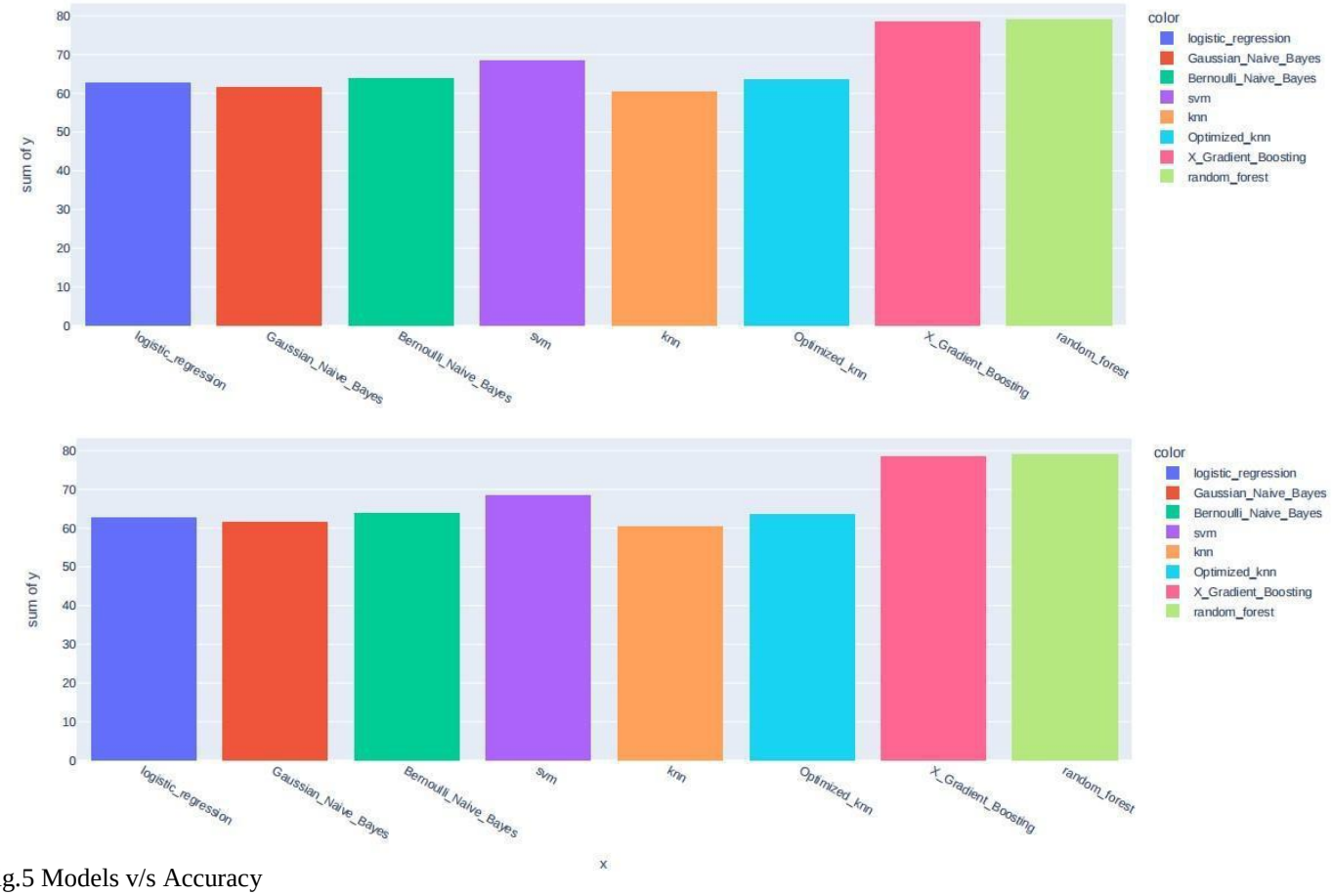

Fig.5 Models v/s Accuracy

4 Experimental Analysis

Using the boxplot function, we can find outliers where these are contained by the solid feature (Fig.9). But these outliers cannot be removed. Point to be noted, the water will be safe to drink if the

Now we are going to see the performances of our used machine learning models (Logistic Regression, Gaussian Naive Bayes, Bernoulli Naive Bayes, Support Vector Machine, Kth Nearest Neighbours, X Gradient Boosting, Random Forest.) through performance metrics, Precision, recall, f1 score and accuracy (Table.1 to Table.8)

outliers are removed from the solid feature. Basically these outliers in solid features make the water impure. Presence of high amount of solid particles make the water unsafe to drink. But we cannot remove this outlier to train the model.

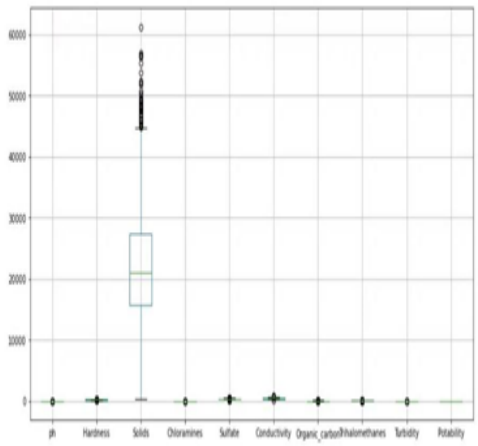

Fig.9 Outliers in the solid feature.

Model Name	Accuracy	Precision	Recall	F1_score
Logistic Regression	0.63	0.63	1	0.77
Gaussian_Naive_Bayes	0.61	0.65	0.85	0.74
Bernoulli Naive Bayes	0.64	0.68	0.8	0.73
Support Vector Machine	0.68	0.68	0.93	0.89
K Nearest Neighbours	0.63	0.68	0.69	0.73
X Gradient Boosting	0.78	0.81	0.86	0.83
Random Forest	0.79	0.8	0.88	0.84

Table.1 performances of our used machine learning models

4.1 Logistic Regression

Logistic regression is one of the regression algorithms of supervised learning. We use it to predict or calculate the probability of a binary (yes/no) event occurring. Its function is a simple S-shaped curve that is generally used to convert data in binary expression (0 or 1).

$$h\Theta(x) = 1/1 + e - (\beta o + \beta 1X)$$

Here, in our study, 0 represents “non-potability”and 1 represents “potability”. We are going to demonstrate its performance metrics.

Precision	Recall	F1 Score	Support	
0	0.63	1.00	0.77	412
1	0.00	0.00	0.00	244
Accuracy			0.63	656
Macro avg	0.31	0.50	0.39	656
Weighted avg	0.39	0.63	0.48	656

Table.2 Performance Metrics of Logistic Regression

4.2 Gaussian Naive Bayes

Naïve Bayes algorithm is one of the supervised learning algorithms based on Bayes theorem. Generally we use it for solving classification problems. Basically it’s used in text classification which includes a high-dimensional training dataset. Gaussian Naive Bayes is an extension of naive Bayes. The following expression is its mathematical expression.

$$P(A \mid B) = \frac{P(B \mid A)\,P(A)}{P(B)}$$

Precision		Recall	F1 Score	Support	
0	0.65	0.85	0.74	412	
1	0.46	0.22	0.30	246	
Accuracy				0.62	656
Macro avg		0.56	0.53	0.52	656
Weighted avg		0.58	0.62	0.57	656

Table.3 Performance Metrics of Gaussian Naive Bayes

4.3 Bernoulli Naive Bayes

Naive Bayes is one of the supervised machine learning algorithms. Based on numerous attributes it can predict the probability of different classes. It indicates the likelihood of occurrence of an event. We also know it as conditional probability. Bernoulli Naive Bayes is an extension of naive Bayes

Precision	Recall	F1 Score	Support	
0	0.68	0.80	0.73	412
1	0.52	0.37	0.43	244
Accuracy			0.64	656
Macro avg	0.60	0.58	0.58	656
Weighted avg	0.62	0.64	0.62	656

Table.4 Performance Metrics of Bernoulli Naive Bayes

4.4 Support Vector Machine (SVM)

Creating the best line or decision boundary which can separate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future. SVM can be used as both classifier and predictor.

Precision	Recall	F1 Score	Support	
0	0.68	0.93	0.79	412
1	0.69	0.27	0.38	244
Accuracy			0.68	656
Macro avg	0.69	0.60	0.59	656
Weighted avg	0.69	0.68	0.64	656

Table.5 Performance Metrics of Support Vector Machine

4.5 Kth Nearest Neighbours(KNN)

Among the simplest machine learning algorithms used for classification is K-Nearest Neighbors. Data points are classified based on their neighbors' classifications. New cases are classified based on similar characteristics based on the stored cases.

Precision	Recall	F1 Score	Support	
0	0.68	0.71	0.69	412
1	0.47	0.43	0.45	244
Accuracy			0.61	656
Macro avg	0.57	0.57	0.57	656
Weighted avg	0.60	0.61	0.60	656

Table 6 Performance Metrics of KNN

4.6 X Gradient Boosting

Gradient boost machines (GBM) are one of the most effective and mention-worthy algorithms of supervised machine learning. a, and X Gradient Boost is one of the implementations of GBM. In addition, it can also be used to solve regression and classification related problems.

Precision		Recall	F1 Score	Support	
0	0.81	0.86	0.83	412	
1	0.74	0.65	0.69	244	
Accuracy				0.79	656
Macro avg		0.77	0.76	0.76	656
Weighted avg		0.78	0.79	0.78	656

Table.7 Performance Metrics of X Gradient Boosting

4.7 Random Forest

Random Forest is one of the well performing algorithms of popular supervised machine learning . We can use it for both, regression problems and classification. Random Forest is based on the notion of ensemble learning.

Precision	Recall	F1 Score	Support	
0	0.80	0.88	0.84	412
1	0.76	0.64	0.69	244
Accuracy			0.79	656
Macro avg	0.78	0.76	0.77	656
Weighted avg	0.79	0.79	0.79	656

Table.8 Performance Metrics of Random Forest

Conclusion

The Bureau of Indian Standards (BIS) declared the upper limit of total dissolved solids (TDS) levels in water is 500 ppm. For having values of TDS on an average of 40 times as much as the upper limit o the safe drinking water, the solid level seem to contain some descripancy. Equal number of basic and acidic pH level water samples are contained in our data. Very less correlation coefficients has been noticed between the features. Among our used models, Random Forest provided the highest accuracy with a percentage of 78.96, where SVM provided us the least amount of accuracy with a percentage of 68.29.

But in case of training the model, XGBoost and Random forest performed the best. Both of the models gave us f1 score (Balanced with recall and precision) around 76%.

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Digivaidya: Digital Medical Record Generation and Management for Rural India

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Abstract- **Rural India faces a lot of problems related to medicines and health checkups. One such issue is related to doctors with fake educational backgrounds, which has led to people not having trust in doctors in rural villages. Also, people from villages migrate to other places for working as laborers or other work. But during covid-period, when everything got locked and we got so dependent on doctors for our medical help, rural areas and some Tier-2 cities faced issues related to prescriptions generated by doctors. Doctors were not having previous health records of labor's who got migrated to other places and now are seeking medical help, which led to difficulties with prescribing them medicines as doctors don't know whether this medicine can give any side effects or not due to the non-availability of previous health data. Along with this, since they have migrated to other states for work, there are certain workers who face language barriers, they don't know the local language and are also not acquainted with the English language. So, when a doctor gives them a prescription in the local language, they can't understand the content written in the prescription. Our project Digivaidya focuses on solving such a problem by having a doctor with verified degrees use our platform and giving doctors such a platform where we remove language barriers and prescribe their patients prescription in languages used by people in their state locally. With your Aadhaar card being considered a valid legal identity for you to be recognized as an Indian citizen, we are using an Aadhaar-based login system since Aadhaar is available to almost everyone. Such a login system provides a secure way through which doctors can access patient records only when the patient willingly shares the OTP received on a registered phone number. All data stored on a central database system will help doctors all around India, to easily prescribe medicines by looking at their past medical records digitally and this will help in creating a safer medical environment around India and making everyone safer and healthier.**

Keywords- **Rural India, spaCy, speech-to-text, Aadhaar Authentication, speech recognition, report, extraction, OTP, Digitalization, prescription, NER, EHR, NLP**

I. INTRODUCTION

The rapid growth in the field of Machine Learning (ML) & Deep Learning (DL) in urban healthcare sector has been tremendous in the past decade, but this potential growth mostly goes untapped in rural India healthcare digitization. The ground-breaking research and advancements in healthcare has not reached the rural borders. Migration of current digitized healthcare infrastructure is difficult to setup due to appropriate health infrastructure and lack of manpower to facilitate and maintain the usage of such technologies. Due to ignorance of healthcare on such scale the mortality rate in such regions is on a dramatical rise. The rural areas of India have had a tough time receiving basic healthcare needs from the govt. These areas have had to struggle to even receive the basic care from healthcare professionals. The individuals must travel far to getting a chance to get proper medical care and for consulting to a doctor.

The situation of such rural areas has been witnessed in these recent pandemic times where the actual might of India's healthcare sector was tested. And with no hard speculation the healthcare system in such rural areas was seen to be compromised. The lack of timely response to appeals from the rural areas. These issues can be fixed with the help of modern standards of teleconsultations with doctors as well as electronic health records that help counter such discrepancies in current rural healthcare infrastructure available. NLP being one of them that can help address issues in healthcare like parsing medicinal information, semantic identification of medical conversations, tagging of required information, and extraction of condign terms.

NEED OF NATURAL LANGUAGE PROCESSING

Natural language processing (NLP) can be used to improve patient health records, according to a recent study published in the Journal of Medical Internet Research. NLP can be employed judiciously, with considerations for suboptimal term linking and algorithmic pitfalls, to support electronic health record usage. NLP is an emerging field for supporting patient health management systems. EHR's, gives patients glimpses into their medical records and clinical notes, aim to better engage patients with more information about their own health. Though there really are no limits to how NLP can support the healthcare industry, here are three primary use cases:

Improving Clinical Documentation: Rather than waste valuable time manually reviewing complex EHR, NLP uses speech-to-text dictation and formulated data entry to extract critical data from EHR at the point of care. This not only enables physicians to focus on providing patients with the essential care they need, but it also ensures that clinical documentation is accurate and kept up to date.

Accelerating Clinical Trial Matching: Using NLP, healthcare providers can automatically review massive quantities of unstructured clinical and patient data and identify eligible candidates for clinical trials. Not only does this enable patients to access experimental care that could dramatically improve their condition — and their lives — it also supports innovation in the medical field.

Supporting Clinical Decisions: NLP makes it fast, easy, and efficient for physicians to access health-related information exactly when they need it, enabling them to make more informed decisions at the point of care.

Usage of NER in analysis of clinical notes, patient-doctor conversations, past medical records while extracting keywords and assigning them to specific entities such as Symptoms, Medicine, Duration, Basic info are the standard practices that are adopted using NER. NER plays the most crucial role by giving out the first meaningful chunks of a clinical note, and then feeding them as an input to the subsequent downstream tasks such as clinical assertion status, clinical entity resolvers, and de-identification of the sensitive data. However, segmentation of clinical and drug entities is a difficult task in biomedical NER systems because of complex orthographic structures of named entities.

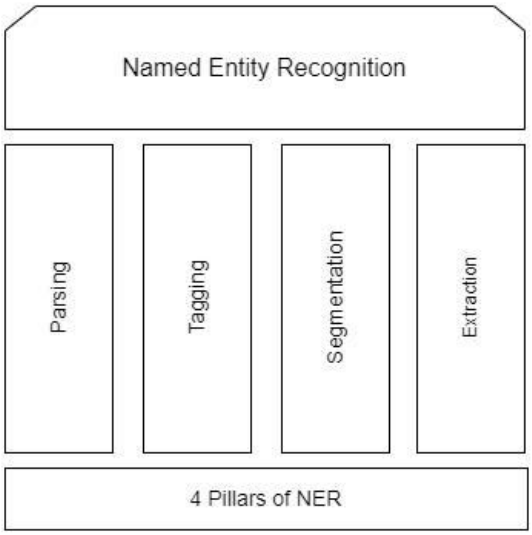

Fig 1: Four pillars of NER

II. LITERATURE SURVEY

Around 64.61% of India's population of 1.39 billion people live in rural areas. To address the health problems of this population, the government has set up various healthcare centres at rural locations, including Sub Centres, Primary Health Centres (PHC), and Community Health Centres, under a program called the National Rural Health Mission (NHRM), which is a sub-mission of the National Health Mission. NRHM seeks to provide equitable, affordable, and quality health care to the rural population, especially the vulnerable groups. In rural India, regional languages are used majorly. It is difficult to enter text in Indian languages on computers, so it is better to ask questions using voice mode. Usually, 60 seconds is enough time to describe the problem completely.[1]

Achieving health equity and enhancing healthcare quality for vulnerable communities is a

critical societal responsibility, particularly in developing nations. Some government agencies, groups, and academic institutions have been monitoring the situation and seeking answers. Rural populations in underdeveloped nations have lower life expectancies and health difficulties than urban residents. Poverty is a significant socioeconomic predictor of healthcare. The direct cause of ill health is a lack of access to quality healthcare. The doctor-to-population ratio in India was 1.71 physicians per 1000 people in urban areas and 0.45 doctors per 1000 people in rural regions. Medical AI technology has the potential to both improve the availability of healthcare access and healthcare quality within rural areas of developing countries. The application of AI technology in primary health settings, many AI-driven systems have been developed for special diseases in rural areas. For example, a low-cost swallowable endoscopic capsule with AI analysis technology can be used to screen for upper gastrointestinal cancers, thus replacing expensive or difficult traditional screening equipment.[02]

The healthcare system in rural India is managing patient data in a traditional paper-based system. Most of the rural hospitals in India are lacking in resources to maintain and manage the patient health data. As India moves towards digitization, one of the main challenges in developing countries like India is in making the healthcare data accessible from rural to urban in digital form. Advancement in IT technology in healthcare sector has made it possible to maintain and manage the patient data in digital form in all levels of healthcare system.[03]

The EHR system allows healthcare professionals to capture and maintain patient's past medical history and present symptoms. This allows for a better diagnosis of the current illness as details of past illnesses such as hypertension, diabetes, kidney disease, heart disease, asthma, tuberculosis, and other needs are recorded. The various lab tests and multimedia images need to be presented to the doctor along with the EHR contents. The drug history mainly captures the list of drugs that the patient was taking prior to admission to the hospital. In addition to this, the EHR system has provisions to provide details of drug allergies, dosage, duration, and recently stopped medicine. Addiction history such as smoking, tobacco, and alcohol details need to be recorded. The health history of the patient and the patient's family helps to address acute health problems and minimize the chronic condition of the patient. [04-05]

The increasing use of network technology in the medical field has led to the accumulation of a large amount of personal information in Electronic Health Records (EHRs). Therefore, research on how to effectively share EHR data is of great significance for countries, EHR institutions, and individuals. At the national level, EHR data can be used as a good indicator of the overall health of the population; at the institutional level, EHR data sharing can help doctors effectively assess patients' conditions and make correct diagnoses; and at the individual level, having complete EHR data can improve the quality of EHR service.[06]

There are two main reasons why speech processing is so important. The first is that it can be used to convert speech into text using speech-to-text technology, which can then be analysed using Natural Language Processing to glean a lot of relevant information, such as sentiment analysis, quality of speech, vocabulary, and other important clues that can be valuable for rehabilitation or diagnostic purposes. The second, more analytical reason, is that speech can be processed and analysed iteratively to identify speech patterns such as slurred speech, or to identify the symptoms that are mentioned in a patient-doctor conversation, to name just a few possibilities.[07]

Information sharing is a key factor that influences the way connections are created and data is interpreted in making decisions. However, the process is very complex due to the variety of actors involved and the diversity of medical data. This can lead to ineffective medical treatment and decreased quality of life. Resolving the issue of interoperability between systems containing medical information would lead to an estimated $77.8 trillion in US alone.[08]

Aadhaar cards serve as digital identities. The Unique Identification Authority of India (UIDAI) issues an Aadhaar card to every resident of India which contains a 12-digit unique identification number. This number can be used as an identity proof for availing all services of government and non-government organizations. Each person is only allotted one Aadhaar number, which is linked to their voter card. Having one identity proof for every resident of India would be the best authentication method to be used for verifying, identifying, and storing the personal medical record. With the advent of high-speed network in India, this system becomes feasible and would save time in comparison to maintaining data in physical paper formats. [09-10]

The most important aspects of a human being, such as health records, must be added to the smart

card to maintain and conduct research on demographic areas and countries. The user details are stored in the form of a QR code along with a 12-digit Aadhar card number. Scanning the QR code will retrieve and display all coded information. [12-13]

As AI has been shown to be useful in healthcare, researchers are now suggesting that it may also be helpful in fighting COVID-19. Recent research on COVID-19 using AI suggests that it can be helpful in detecting COVID-19 infection and infected populations, predicting the next outbreak, finding the attack pattern, and even finding a cure. Some recent research has shown the implications of AI like biological data mining and machine learning (ML) algorithms in the detection, diagnosis, classification of COVID-19, and vaccine development. Researchers assessed these techniques in machine learning-induced healthcare selected studies focusing on reliability and acceptability. In this, the authors evaluated and benchmarked the AI techniques used in the image data and presented a set of future guidelines for the evaluation metrics. In contrast, our research explores the works on a broader spectrum including but not limited to the application of AI in detection, diagnosis, epidemic forecasting, and performance evaluation.[14]

The goal of electronic medical record (EMR) systems is to improve patient care management and support clinical and transitional research. In the past decade, the amount of patient health-related data stored in EMR systems has increased massively. Patients' clinical data are stored in EMR systems in either a structured format (which is easy to query and mine) or an unstructured, free-text format report (which requires tools to extract terms of interest). Natural language processing (NLP) methods are used to transform the text into computable data. Some of these methods are used in the clinical field to extract concepts from free-text clinical reports. Some open-source clinical NLP tools are Clamp, cTakes, and MedLEE. Most NLP software tools rely on medical dictionaries such as the Unified Medical Language System (UMLS) or the Systematized Nomenclature of Human and Veterinary Medicine (SNOMED) to match concepts to text vocabularies and follow either a rule-based approach or a machine learning approach. The rule-based approach consists of manually created rules to map words and phrases within free-text to categories. The machine learning approach uses a training set of large, pre-annotated reports to extract named entities. The NLP process is complex and challenging to NLP solution designers as they must consider clinical abbreviations, temporal events, and the context to design and implement an efficient and well-performing NLP product.[19]

III. ARCHITECTURE

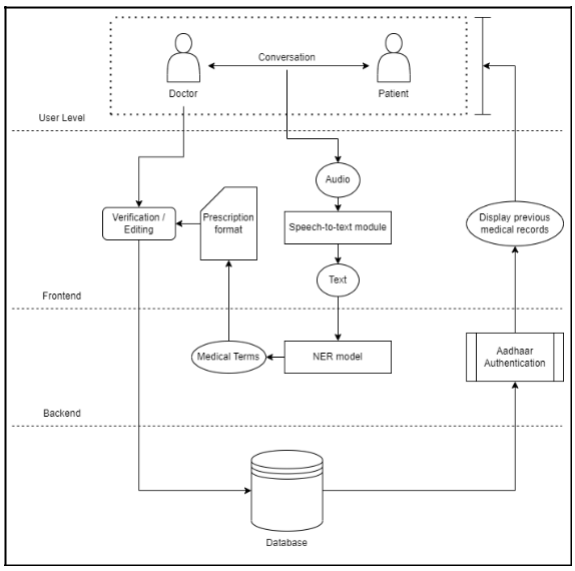

Fig 2: Architecture

The system tackles the problem experienced during consultations, as well as how the use of smart technology may not only change, but potentially revolutionize, how we experience medical meetings. The system is designed to record audio between a doctor and a patient and process it to give the intended output i.e., prescriptions in our case. The architecture of the system can be well explained by breaking it into 3 parts namely:

1. USER LEVEL:

This is the topmost layer in the architecture of our system, which is responsible for recording of conversation depending on which whole system is intended to work and provide output. The doctor is given access to a portal where he/she can migrate to the record page and then record the conversation that is going to take place between them.

2. SYSTEM LEVEL:

This layer is the second layer of architecture and is further divided into 2 parts that are frontend and backend. Both have their own architecture on which they are doing all required tasks.

A. Frontend:

The audio that was recorded is passed to speech to text module, from which text is extracted and passed on to Named Entity Recognition (NER) model which is at the Backend. NER model extracts all clinical terms that it gets from the text that was passed to it, and then the generated output of NER is

moved to prescription format where it is displayed to the user at the front-end side. Later, at the final stage there is an option provided for doctors to verify and make any changes if they want before saving it to the database and sending it to the patient. Frontend is also responsible for displaying the previous medical record to the doctor after getting verification approval from backend.

B. Backend:

It consists of a NER model which extracts medical terms. Along with that, it consists of Aadhaar authentication, which we use to display previous medical record of a patient to doctor only if correct One Time Password (OTP) is provided by that patient to doctor as One Time Password is only sent to the patient registered mobile number as per Aadhaar records.

3. DATABASE LEVEL:

This is the bottom most layer, yet the most important one, as it handles all the records of doctors and prescriptions. When a new prescription is generated, it is stored in the database as a new document having a unique identity. Also, when a new doctor joins the portal, the data related to the doctor is also stored under a new document having a unique identity. Both User level and System level takes help of the database level in some of their functioning to achieve the target.

IV. USER FLOW DIAGRAM

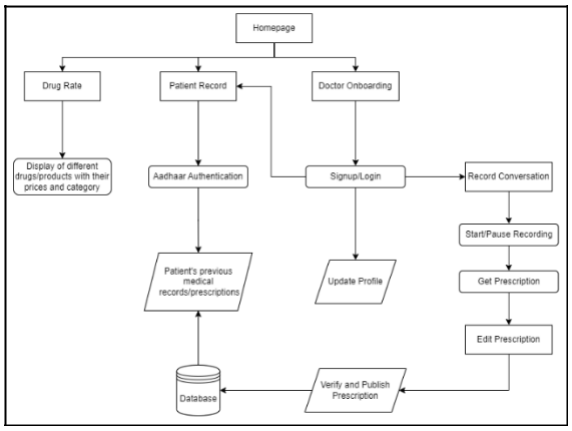

Fig 3: User Flow Diagram

The system is comprising of a webapp for user interaction. The user intended to work on the webapp is a doctor. The doctor lands on the homepage where several options are given for access.

The drug rates portal can be used for checking the verified drug rates of about 8000 drugs/products. These rates can be used to compare the different complementary drugs to get the best option among them. These drug rates are authorized by the govt. The drugs are displayed along with their composition for a detailed comparison.

The patient record section is used to access previous medical records of patients. The records can be accessed via proper authentication using Aadhaar OAuth. After which, the records are fetched from the centralized database.

The doctor onboarding section is where the doctor can signup/login to access his/her profile and to work with the recording section of the portal.

The record conversation section provides functionality for recording the conversation of the patient and the doctor. The doctor can start or pause the recording at any point in time. The record text can then be used to generate the prescription.

The edit prescription section provides functionality to make changes to the medical record/prescription. After verification the records can be published onto the central database.

V. FLOWCHART

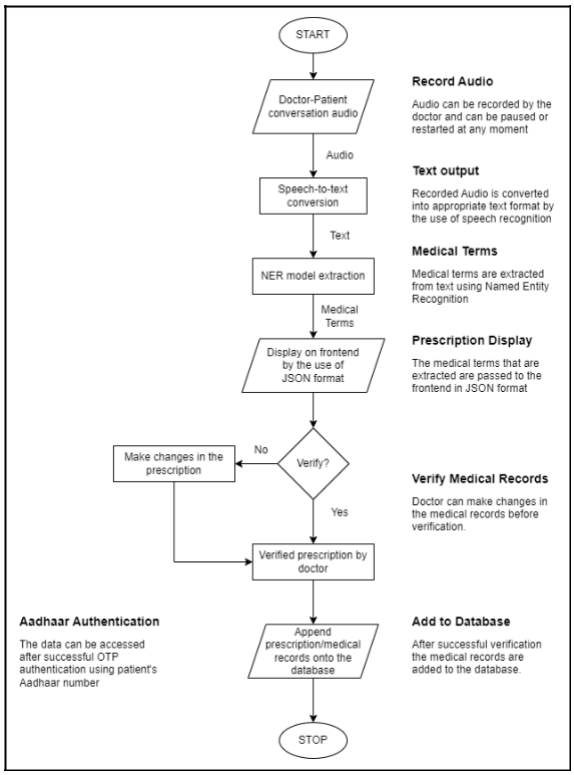

Fig 4: Flowchart

The idea of creating the system is to digitize the consultation process i.e., the process of interaction between a doctor and his/her patient. To automate this process the conversation between the doctor and

patient is used to provide a digital copy of a prescription to the users i.e., doctor and patient.

The system passes through a series of phases before the appropriate prescription can be modelled and be displayed to the end user.

The system provides a web app for interaction and is mainly focused on providing an interface for the doctors. The doctors are the main users and hence have to login to work with the system.

The doctors initiate the process by using the record privilege that is provided. The doctors can pause, start, or restart the recording anytime. The conversation is converted into text in real time using speech recognition models and can be seen virtually on the portal provided.

After successful capture of audio and conversion of text, the text that is acquired is passed to the backend where the extraction takes place. Named Entity Recognition is used for processing the text and for obtaining all important medical terms. The text is passed through the SciSpaCy model which is used to extract medical terms like drug name, dosage, strength, frequency as well as the symptoms spoken of in the conversation.

After successful extraction of all the terms spoken of in the conversation, the terms are saved in a JSON format and passed further for formulating an appropriate representation for displaying it to the end user i.e., the doctor. The doctor then has the option to check all the terms and verify any discrepancies in the medical record that is displayed. If there are any issues identified, then the doctor can make changes and correct the issues there itself with the edit option that is provided.

So, after proper verification from the doctor's side, the document/prescription can be published onto the database. This step makes it a permanent entry on the database along with all the diseases identified and the medicines prescribed, symptoms diagnosed and so on. This creates a proper medical record for that visit with the doctor.

For accessing these medical records there is an option to see the patient's medical records where the system asks for the patient's Aadhaar number. After entering the Aadhaar number, an OTP is sent on the patient's registered email ID, this OTP is then used for authentication. This allows the user to see all previous medical records linked to that patient's history. Hence, allowing for a quick access to the health records.

VI. WORKING METHODOLOGY

Digi-वैद्यis developed using modern technology stack used in web development i.e. MERN stack which consist of technologies like MongoDB which acts as a database and responsible for storing of data, ExpressJS which enables routing functionality between front-end and back-end of the application and also responsible for data flow between frontend and backend, ReactJS is the frontend module that is used to creating the design and working of front-end part of the project, and lastly we have NodeJS which is back-end JavaScript runtime environment which is responsible for executing of JavaScript code outside a web browser. Along with these technologies, we also used Flask where our Machine Learning code lies that helps in extraction and generation of prescriptions. Talking about the flow of the project i.e., how it is working let's look at it step by step.

1. Doctor onboarding:

As the name suggests, it is where doctors will be creating their account and filling up all basic details related to their education, previous work experiences, expertise, and similar other details. After getting all the details, the system will save doctor's credentials and basic details into the database for future usage.

2. Getting patient's previous medical record:

After the doctor is logged in into the system, the first thing that he/she needs to do is to check the previous medical history of the patient. Since we are trying to make everything paperless, here we are expecting that the patient has not come with previous health related data and previous prescriptions, so the doctor will be viewing it directly through the central library that is being created along the way to store patient records. The doctor will ask the patient for their Aadhaar card number and then the system checks whether the Aadhaar card is avoided or not and after validation it sends the One Time Password (OTP) to the registered mobile number that patient needs to give to the doctor so that doctor can view his/her data. The concept of OTP was introduced to protect patient privacy and it will require OTP to access any patient's medical record without which the doctor won't be able to see any record. After successful One Time Password verification, the doctor can now see what all illness has been registered for the patient and prescribe the medicines accordingly.

3. Generation of prescription:

The system takes voice as an input, the voice comes in the form of communication that takes place between doctor and patients. The system keeps recording the whole conversation and after that it generates the prescriptions according to whatever insight the Machine Learning model has received in the form of speech. We are using the Named Entity Recognition [NER] technique to detect clinical terms from the speech which is first converted to text and later passed to the model for detection of named entities. After detection, it is segregated into categories such as drug name, duration, frequency basically all the categories that a prescription needs to have. Along with these it also gives out all the symptoms that were detected from the conversation. Since the project works with Machine Learning, it is not always hundred percent accurate in getting details, there might be some error in detections, so to prevent these we have a double-check mechanism that let doctors have a final edit advantage to make sure everything is correct and later print the prescription and give it to patient. One additional feature that the project offers is that prescriptions can be generated in almost all possible languages that each state in India speaks locally which helps the patient in understanding such prescriptions in a more detailed manner.

4. Medicine price rates:

The Government of India (GoI) releases the price rate of medicines with chemical names on their website, but very few people read them. We also aim at increasing awareness regarding the real prices of the medicines that GoI has attached, and it can be directly viewed on our website without the need of having an account, and the patient can buy the medicines based on chemical name which will helps in getting generic medicines from certain medical shops at lower price, which will indirectly help in improving the health infrastructure of the country.

This was all about the working of various components that are involved in Digi-वैद्य.Since each and everything involved here is connected to back-end database that keeps track of everything happening in the portal provided to the doctor, we can easily keep track of which medicines are prescribed by which doctor, whether the educational background provided by doctor is correct or not, or the location of doctor's clinic where this prescription was generated. These all will help in making a safer medical environment for people of India.

VII. RESULT & DISCUSSION

Digitalization in rural India, elimination of language barriers, faster backtracking in case of any error or frauds, central medical health library is some of the advantages that we can create with the help of this mechanism. We can achieve this by use of existing technologies available, understanding them, and integrating them to solve a larger problem i.e. In our case, it is betterment of the medical health industry in rural parts of India. The model that we are using for detection and extraction of clinical entities from the conversation is implemented using SciSpaCy, a model that is trained over a big corpus of data of clinical texts. When a doctor starts the portal, the system first asks for their preferred language in which they want to use and based on their language selection the whole system works and displays content.

Although as of now the prototype of our system accepts the voice in the English language only to work efficiently. But it can display and generate prescriptions i.e., the final output in the language preferred by the doctor at start or based on patient required language can be updated and the prescription will be modified accordingly. Everything related to data is stored in the database in English language only as we are also focussing on collection of data that will help medical researchers improve their research and testing medicines on certain people and later identity what would be the side effects on others based on the data that our system will collect over the period. So, to have consistency and increase usability the data is stored in the English text.

As the system will scale up in future, we will be prioritizing availability over consistency. The reason behind that is during a medical emergency, if our certain part of the system stops working, we should have some sort of data related to the patient available in the database for usage by doctors. But if we would have focussed on keeping consistency as our priority, it would have some serious consequences such as non-availability of data during medical emergencies. If such an issue arises then our system fails to solve the root cause of the problem that it was made to solve. Hence, we focussed on availability by compromising consistency.

The prescription that is generated by our system is in tabular format having each row with columns as drug name, strength, frequency, duration. There is another table attached immediately after the prescription table which tells about all the symptoms that were mentioned by the patient. The purpose

behind having symptoms is also displayed so that when the patient visits the clinic next time, the doctor would be able to determine easily why so and so medicines were prescribed to the patient. As the system works on Natural Language Processing (NLP) which is a part of Machine Learning (ML), there are chances of error during detection of clinical terms from the conversation that takes place between doctor and patient. Wrong prescription will have serious consequences for both i.e., patient and doctor. In order to solve this particular and major issue, we added a double-check mechanism which only comes up after the prescription is generated based on the initial conversation that occurred between them, so in case any mistakes system has made during detection can be rectified by doctor, also if any new additional information patient has given that got missed out during the recording can be updated by doctor while making corrections (if any). Any additional feedback that the doctor wants to mention can also be mentioned which will be stored in the database for future reference.

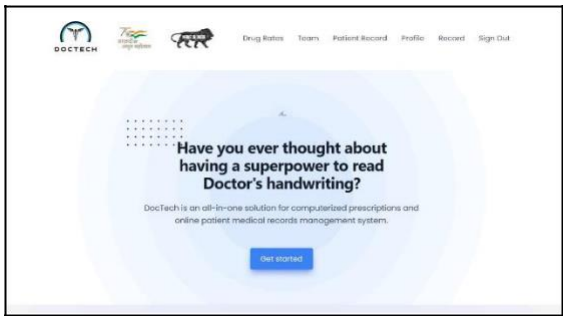

Fig 5: Home Page

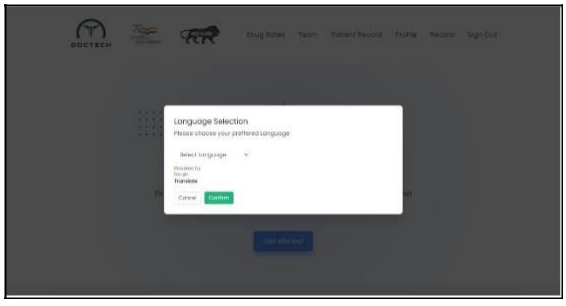

Fig 6: Language Selection

Fig 7: Doctor Onboarding

Fig 8: Aadhaar Authentication Mail

Fig 9: Patient Data

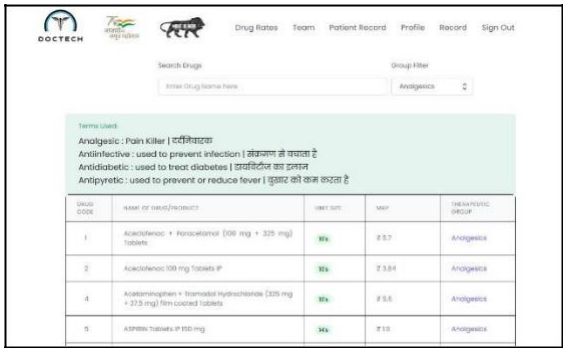

Fig 10: Drug Rates

Fig 11: Record Page

Fig 12: Prescription Display/Download

VIII. FUTURE SCOPE

Every Institution, business and economies around the world are moving towards use of data science extensively. Data helps in generating greater valuable information regarding a problem and helps in getting faster solutions. Talking about Covid times, there were certain companies who wanted to sell their covid vaccines in India, but they were not able to guarantee the safety of people due to less availability of data regarding people of India. Our project ultimately will be generating good chunks of data that will be stored centrally, and when covid like situation arises or if any medical researcher wants to test certain medicines, it can be done by testing on few people and then matching its trait with help of data and getting insights on how this will affect the health of other individuals. The future usage of Deep Learning (DL) and Natural Language Understanding (NLU) in the healthcare industry seems to be very promising.

1. The system will be having a vast range of improvements from design perspective to performance perspective. Some of them includes:
2. Storing voice (with consent of doctor and patient) that is being recorded during the conversation which will help in improving the architecture of speech-to-text models in the medical as well as other fields.
3. Time to Time re-training of data, based on new data that is being collected to keep the model trained with new entities and terms used or introduced in recent times.
4. Creating a progressive web application (PWA) for doctor's so that they can quickly access it from their laptop or computer screens instead of searching it on the web.
5. Making our system take voice input in other local languages as well.

IX. ACKNOWLEDGEMENT

We would express our gratitude towards the Department of Electronics Engineering (THAKUR COLLEGE OF ENGINEERING AND TECHNOLOGY).

X. CONCLUSION

The healthcare sector has ever been an important sector for the well being of the society. The situation of healthcare professionals has been well witnessed in the recent pandemic times where the whole world crumbled upon the issues faced by the healthcare system. The healthcare system failed as a vast majority of patients could not be addressed at the time of need.

The rural areas moreover were at the worst possible position as they had to travel far to just get to see a doctor for once. The rural areas have been suffering for a long time when it comes to the basic healthcare needs, whether it be fast and convenient consultations, proper doctors, or access to drugs and medical products.

The proposed system considers the need of digitalization of this process of consultation between the doctor and the patient to provide an option for a convenient and easily accessible medical record.

The automation mentioned in the proposed system takes the conversation between a doctor and a patient and provides a digital prescription / health record which is generated using the audio recorded while conversing. This recorded audio is converted into a text and worked upon to capture all important medical terms like drug name, strength, frequency, dosage, etc.

These medical terms are used to prepare a medical prescription/record which can be stored into a centralized database for future access.

This makes it possible for a frequent and convenient facility for accessing the previous medical records at any place anytime. Also, the process of automating the consultation process makes it fast and improves the condition of no human errors in handwriting or recording as such.

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Decision Making for Driver Assistant Systems using Computer Vision

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Abstract- Advance Driver Assistant Systems (ADAS) are a group of electronic technologies that assist drivers in driving and parking systems, bringing safer, easier transportation. ADAS systems use advanced technologies to assist the driver by using a combination of sensor technologies, Artificial Intelligence (AI), radars, and cameras to perceive the world around the vehicle. Computer vision is the core of AI to decode and understand the visual data acquired from cameras. The decoded data from the camera helps in activating driver assistant systems such as Adaptive Cruise Control (ACC), Collision Warning Systems (CWS), Intelligent Speed Adaption (ISA), and automatic windshield wiper activation. These driver assistant systems are activated based on the weather condition predicted by computer vision models. In adverse weather conditions, the camera output becomes noisy and becomes challenging for computer vision algorithms to decode the visual data.

Multiple computer vision algorithms are proposed by many research institutes and leading automakers for a faster and more accurate classification of images. Decision-making for activating the driver assistant systems using various image classification algorithms are dependent mainly on Frames processed Per Second (FPS) and the accuracy of image classification models on streaming data. A comparative study of these algorithms on the benchmark DAWN dataset was conducted in this research.

Keywords: Autonomous cars, Safety systems, ADAS, Image classification, DAWN dataset

1 Introduction

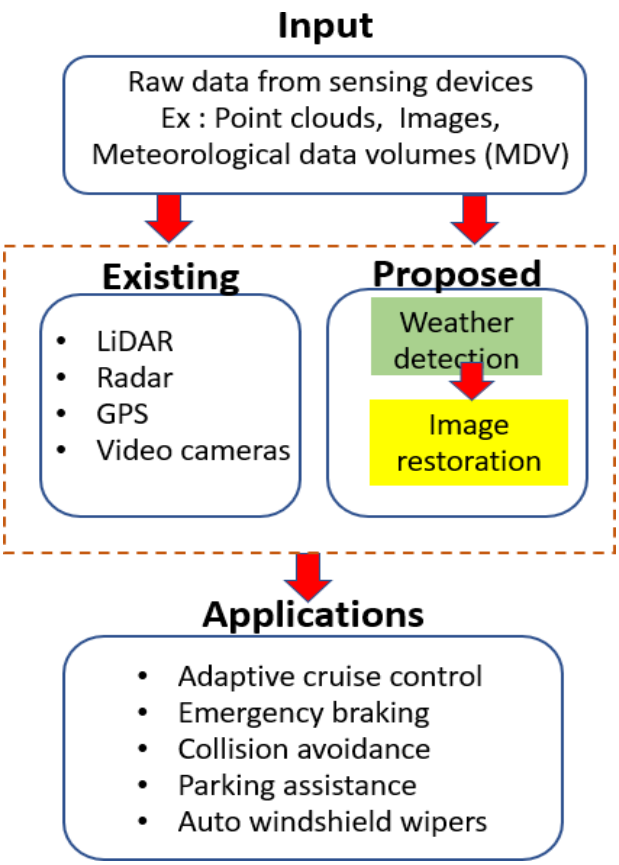
ADAS is a group of electronic technologies that assist drivers during driving and parking functions. ADAS are developed to automate, adapt and enhance vehicle technology for safer and better driving comfort. ADAS functions can be taken as two main groups mainly, custom functions and safety functions. Custom functions mainly include giving a warning trigger to the driver such as a flashing light, or vibration alert. Safety functions take care of the vehicle control in case the driver is not responding to the potential warning alerts. Some of the custom and safety functions are Forward Collision Warning (FCW), Lane Departure Warning (LDW), Automatic high beam assist, pedestrian detection, Automatic Emergency Braking (AEB).

Computer vision algorithms play a crucial role in the development of ADAS. These algorithms are responsible to deliver accurate and clear image data by processing the raw data from edge devices so that ADAS systems can better understand the environment around the car. The raw data from the camera may not be clear always due to blur, dust on the camera, and also due to harsh weather conditions. Some of the applications of computer vision in ADAS are:

- Emergency brake systems
- Automatic windshield wiper activation
- Pedestrian detection
- Rear camera parking assistance

2 Literature Review

Computer vision-based driver assistant systems are blooming with a wide range of application and being a promising technology for solving real-world problems such as driver monitoring [1,2], speed adaptation [3,4], parking [5,6], lane departure warning [7], intelligent headlamp control [8]. For driver monitoring, the AdaBoost algorithm is used to extract the potential features from a large set of available features in [1]. For detection and recognition of road signs, and alerting the driver an integrated approach is designed using neural networks in [2]. For 360-degree parking assistant systems, a unique brightness balance algorithm is proposed in [6] that can adjust the brightness between input data streaming from 4 fisheye cameras around the vehicle. Various approaches for utilizing visual sensors in ADAS are discussed in [7] explaining the overall architecture for computer vision applications.



These assistant systems need to operate on any occurring environmental conditions such as heavy rain, bad lighting conditions, tunnels, highway, intercity, etc. Some of the studies are conducted for analyzing the effect of adverse weather conditions on primary sensors such as LiDAR, cameras, and radar by using simulation. In various studies, it is demonstrated that in adverse weather conditions the ADAS sensors fail regardless of vehicle speed [9]. In some of these studies, it is proved that LiDAR visibility and intensity is severely affected by bad weather condition [13- 15]. For example, in Lane Detection Warning System (LDWS) image detection, it is analyzed that environmental factors affect the performance of sensors [10,12] and it is proved there is a need for complex sensors and regional factors considered for better performance. A systematic view of faults and corresponding measures to avoid them is discussed in detail in [16]. Faults related to adverse weather conditions are discussed majorly in this research and these faults are highlighted as the primary issues in extracting the features. In addition to this, in some of the studies, it is proved rain is the main source of radar signal abrasion [16]. Radars are also affected by snow or mist in the form of abrasion and backscatter [17].

In this aspect, there is a need to build an accurate and faster image classification technique for weather detection. FPS of 4.4 is achieved by ResNet15 on a normal CPU setup in [18]. On the weather data considered in this study, the number of layers is reduced from 50 to 15 for ResNet architecture. This resulted in faster FPS without reducing the model accuracy. The present study is focused on applying computer vision algorithms for weather detection and comparing the speed and accuracy of the results. VGG16 [20], ResNet50 [21], EfficientNet [22], and InceptionNet [23] architectures are proposed by various researchers for image classification problems.

3 Research methodology

As an alternate approach to the conventional way of using sensing technologies such as LiDAR and radar, a new workflow is designed by using cameras for some of the decision-making requirements in ADAS. This can benefit in cost, time, and computational power. With advancements in machine learning and deep learning techniques, this study helps in understanding the applicability of various image classification algorithms. This helps in predicting the weather for each frame in the streaming video data on a real-time basis.

Fig. 3.1. Traditional approach and proposed methodology

The present study is limited to some of the decision-making requirements such as emergency braking, traffic sign recognition, and obstruction detection. The proposed methodology as shown in Figure 3.1 is a novel approach for weather detection to most of the decision-making requirements, where the prediction result can be helpful in applying the appropriate denoising algorithms on the input data and also helps in faster decision-making for autonomous driving conditions.

The new approach can be stated as a pre-processing step before applying any denoising algorithm. This approach of using vision cameras is planned to eliminate high-cost sensing technologies in some of the applications where performance degrades in adverse weather conditions. This approach is also targeted for faster decision-making skills with minimal time for weather detection.

In the proposed methodology, computer vision models are trained on the benchmark dataset DAWN for detecting four types of weather conditions where the vision becomes noisy. The benchmark dataset is used in training various image classification algorithms such as VGG16, ResNet, InceptionNet, and EfficientNet. The trained models are fine-tuned for better accuracy and FPS using various hyperparameters such as learning rate, number of epochs, and dropout ratio.

4 Data Generation and Understanding

For deep learning applications to real-time in-stream video data, a higher system configuration is preferred for faster execution. In this study, Google Colaboratory (GC) is chosen for running different image classification models. GPU runtime with specifications mentioned in the table is used for faster runtime execution and FPS comparison. The runtime configurations used in this study are shown in Table 4.1.

Runtime source	**Specification**
GPU	Up to Tesla K80 with 12 GB of GDDR5 VRAM, Intel(R) Xeon(R) CPU with 2 cores @ 2.20 GHz, and 13 GB RAM

Table 4.1. Runtime configuration

Runtime source Specification

Table 4.2. : Classes in DAWN dataset

Class	Rain	Fog	Snow	Sandstorm
Samples	250	250	250	250

For image classification algorithm training DAWN dataset is used. This contains 4 different classes of weather such as rain, snow, fog, and sandstorm with 250 images for each class as shown in Table 4.2. This dataset also contains images captured during dawn, day, dusk, and night. Images in each class of this dataset are re-sized to 224* 224 pixels before passing to the image classification models. The DAWN dataset chosen for this study covers all the lighting conditions and weather conditions on a high level from the dashboard camera [19]. The dataset also contains object bounding boxes for autonomous driving and video surveillance scenarios.

5 Implementation

Tensorflow framework and Keras library are used in the present study. As discussed in the earlier section, original dataset contains 4 folders containing images captured in different weather conditions and bounding boxes for object detection. In the present study, bounding boxes are ignored as they are not relevant for the image classification tasks. Implementation steps for this study are shown in Figure 5.1.

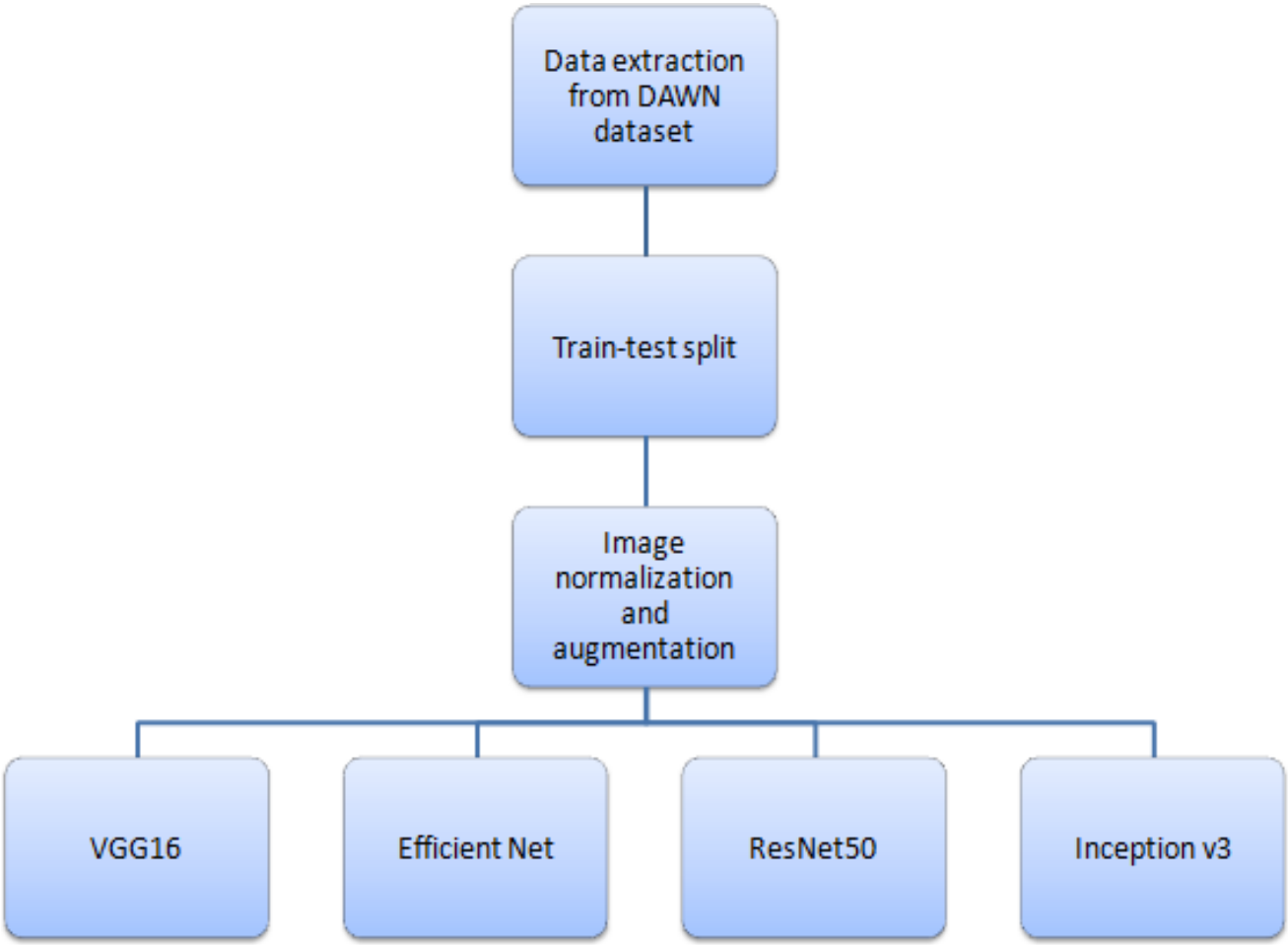
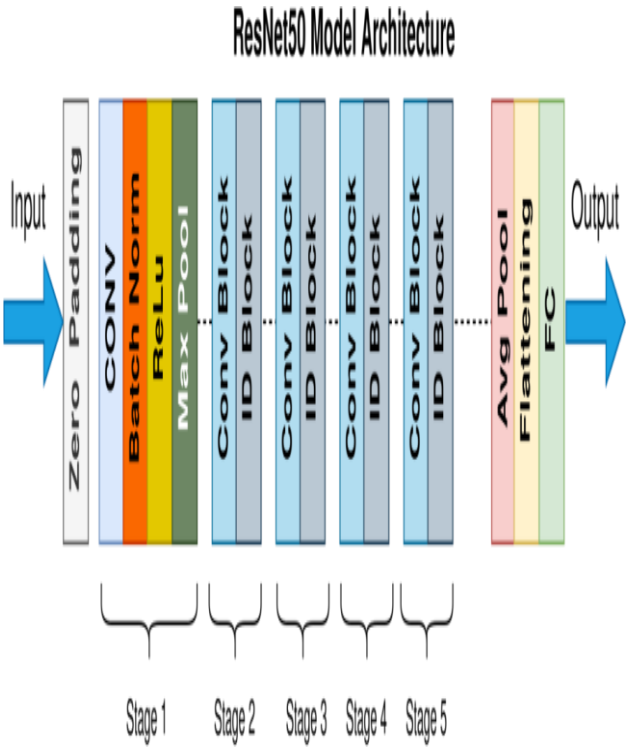


Figure 5.1: Implementation flowchart

5.1 VGG16



This algorithm is one of the popular algorithms for object detection and image classification tasks. Transfer learning technique makes this algorithm adopted in an easy and faster way for computer vision tasks. This architecture contains 21 layers including pooling. The number 16 in the algorithm name represents the number of layers with weights. The architecture consists of 13 convolutional layers, 5 pooling layers, and 3 dense layers at the end. This algorithm takes input tensor size as 224*224 pixel with RGB data. The base network is trained on the 'ImageNet' dataset containing more than 14 million high-quality images with 1000 target classes. Using the transfer learning techniques, the weights for the hidden layers are adopted making the learning process faster and simpler. For the last dense layer, the target classes are set to 4 based on the DAWN dataset.

5.2 Inception-v3

Inception-v3 is a CNN architecture for image classification and it is a superior version of Inception-v1. Compared to the VGG-16, inception architectures like GoogleNet, and InceptionNet are computationally efficient both in terms of economical cost and the number of parameters generated. The major changes done to Inception-v3 compared to predecessors are the utility of auxiliary classifiers, factorization into smaller convolutions, spatial factorization into asymmetric convolutions, and efficient grid size reduction. The architecture contains a total of 42 layers with 24 M parameters. The default input image size is 299*299, and that can be changed to 224*224 for the present study. The ImageNet pre-trained weights are used for the transfer learning technique.

5.3 ResNet50

ResNet50 is convolutional neural network architecture with 50 layers and it is a variant of residual networks. In previous CNN models, deep networks are adopted for increasing the accuracy scores. This approach leads to training huge neural networks and vanishing gradients. In ResNet architecture, skip-connections are used to solve the vanishing gradient problem. This network can be easily scalable for a different number of layers such as ResNet18, and ResNet34. ResNet101, ResNet110, ResNet154. The network has an input image size of 224*224 pixels as shown in Figure 5.2.

Figure 5.2 : ResNet50 Architecture

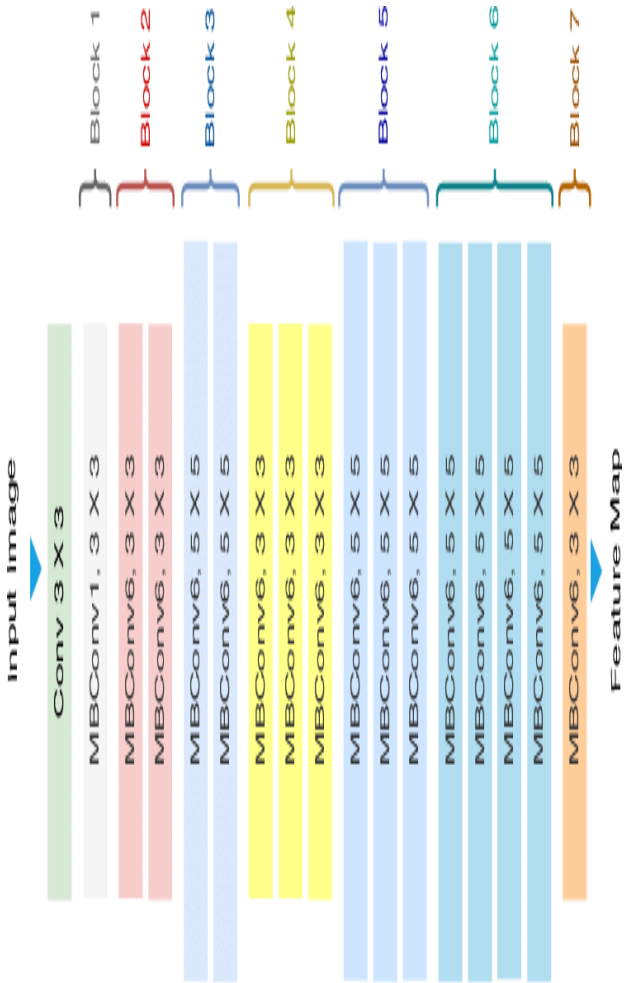


Figure 5.3 : EfficientNet Architecture

5.4 EfficientNet

Efficientnet is a CNN architecture and scaling method that uniformly scales all the dimensions of width, depth, and resolution using a compound coefficient. Before EfficientNet architecture is proposed, the most common way of improving the convolutional networks is scaling in one of the 3 dimensions i.e., the depth of the network, the width of the network, and the resolution of the image. But in EfficientNet, compound scaling is performed. This compound scaling takes care of balancing all the 3 dimensions of the network. Different scaling architectures are shown in Figure 5.3. There are several architectures ranging from EfficientNet-B0 to EfficientNet-B7.

Architecture	VGG16	ResNet50	InceptionV3	EfficientNet
Parameters (Millions)	14.7	23.5	21.8	64

Table 5.1: Number of parameters for each architecture

The number of parameters increases with each variant of the architecture. The base architecture EfficientNet-B0 contains 5.3 million parameters and EfficientNet-B7 contains 66M parameters. EfficientNet-B7 achieved state-of-the-art accuracy scores compared to other CNNs on ImageNet data as shown in fig. Compared to other CNN models, EfficientNet-B7 is lightweight and the accuracy score is high. In the present study, EfficientNet-B7 is used. Total number of parameters in each architecture is shown in the Table 5.1.

6 Testing and Validation

In this study for comparing the different architectures, "accuracy score" and FPS are considered performance metrics for evaluation. From the original data, 20% of the data is used for model testing. Test data is randomly selected from the original data ensuring the proper class distribution. Test data is augmented using the "ImageDataGenerator" utility from the Keras library. FPS is calculated using 10 unseen images. These unseen images are resized to 224*224 pixel size, preprocessed similar to the training dataset, and then fed to the trained CNN architecture. FPS for a single image is calculated by taking the average time taken for 10 unseen images.

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In the first iteration (i1), a dropout ratio of 0.2 and a learning rate of 0.00005 with 20 epochs are chosen as parameters. The accuracy scores and FPS values are shown in Table 8.1. In the second iteration (i2), a dropout ratio of 0.2 and a learning rate of 0.0001 with 20 epochs are chosen as parameters. For this iteration, the accuracy scores and FPS are shown in Table 6.1

Architecture	Train (%)		Test (%)		Time (in sec for 10 Frames)		FPS (f/s)	
	i1	i2	i1	i2	i1	i2	i1	i2
VGG16	76	70	73	74	614	608	16	16
ResNet50	87	85	79	75	883	623	11	16
Inception	83	83	80	77	681	661	14	15
EfficientNetB7	86	88	74	66	1000	1004	10	9

Table 6.1: Accuracy and FPS for Iteration 1 and 2

Architecture	Train (%)		Test (%)		Time (in sec for 10 Frames)		FPS (f/s)	
	i3	i4	i3	i4	i3	i4	i3	i4
VGG16	74	68	75	70	70	618	16	16
ResNet50	86	85	78	78	78	655	15	15
Inception	81	82	78	78	78	691	14	14
EfficientNetB7	86	86	37	64	64	1009	9	9

Table 6.2: Accuracy and FPS for Iteration 3 and 4

In the third iteration (i3), a dropout ratio of 0.1 and a learning rate of 0.00005 with 20 epochs are chosen as parameters. The accuracy scores shown in Table 8.2.

In the fourth iteration (i4), a dropout ratio of 0.25 and a learning rate of 0.00005 with 20 epochs are chosen as parameters. The accuracy scores are shown in Table 6.2.

7 Analysis and Results

Various experiments were conducted by changing the hyperparameters such as learning rate, dropout ratio, and the number of epochs. Results from these experiments are noted and compared for all 4 architectures chosen.

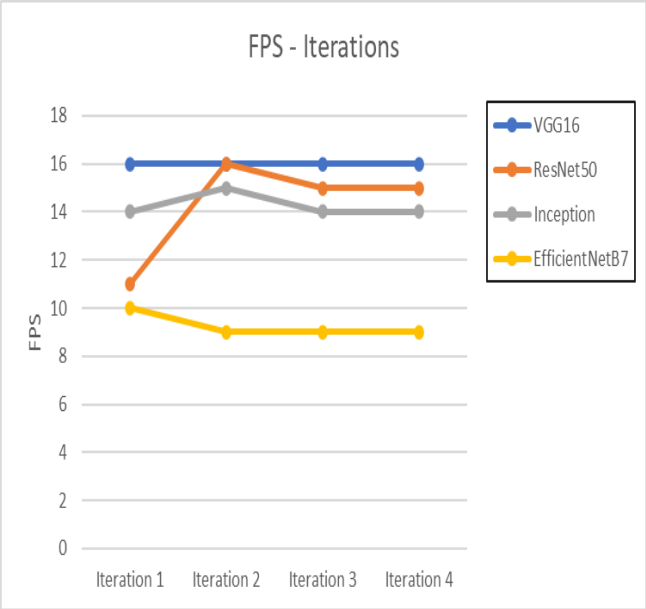
In first iteration, VGG16 network proved to give higher FPS due to less number of parameters, but the accuracy scores are less. Based on accuracy scores and FPS, Inception v3 architecture is giving better results in comparison to other architectures. With EfficientNet architecture, accuracy can be tuned and overfitting can be avoided, but the FPS value is lower than the industrial standards.

In second iteration, VGG16, ResNet50, and Inception v3 proved to deliver higher FPS scores. In terms of model accuracy, model overfitting and underfitting Inception v3 proved to deliver the best scores. EfficientNet model delivered a very low FPS

score and the model is overfitting for the DAWN dataset. Model training and testing accuracy score comparison is shown in Figure 6.1, 6.2. FPS comparison for all 4 iterations is shown in Figure 7.1.

Figure 7.1: Training set accuracy scores comparison

Figure 7.2: Test set accuracy scores comparison



In third iteration, VGG16, ResNet50, and Inception v3 proved to deliver higher and similar FPS scores. In terms of model accuracy, model overfitting and underfitting Inception v3 are proved to deliver the best scores.

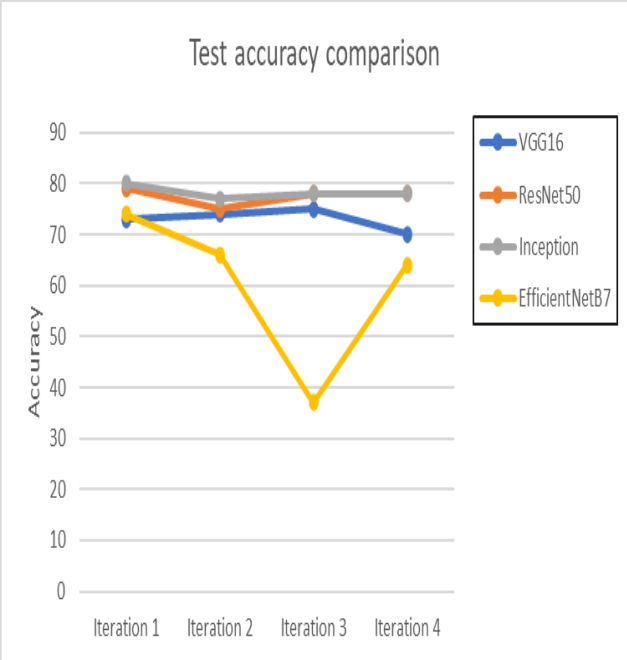
In fourth iteration, similar to the previous iterations, Inception v3 architecture delivered higher FPS and accuracy scores.

Figure 7.3: FPS comparison

8 Conclusion and Future scope

The above-discussed results are compared in terms of accuracy scores and also FPS values. In all 4 architectures, EfficientNet B7 with 64 million parameters is overfitting and delivered lower FPS for the DAWN dataset. VGG16 and ResNet50 architectures delivered higher FPS, but the model accuracy is low. Inception v3 architecture with

21.8 million parameters is proved to deliver higher accuracy scores and FPS. With the different experiments in this study, it can be concluded that inception v3 architecture with transfer learning technique is the best fit for deep learning architecture in comparison to VGG16, ResNet50, and EfficientNet B7.



The study can be extended by developing image restoration architectures under adverse weather conditions. As the DAWN dataset contains only 250 images per class, a new dataset with more images per class taken from the car dashboard cameras will help to achieve higher accuracy scores. Also, deep learning architectures in this study are limited to 4, and this study can be taken forward with more lightweight architectures for real-time edge devices.

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Comprehensive Review of Lie Detection in Subject based Deceit Identification

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Abstract— **Nowadays rate of crimes are increasing. Considering legal and security aspects, analysing deceit behaviour of human is an extremely vital issue. Various strategies have been developed in past to classify EEG data, deep belief nets are rarely used. Our work will propose the techniques to perform analysis on EFG data. First, apply a preprocessing technique to utilize only a small fragment of the EEG image instead of the whole image. The model describes a temporal feature map of the EEG signals measured during the lie detection test. The visual-temporal model of the proposed method shows that optimized balance between prediction accuracy and time efficiency. It will improve the performance by providing smaller size input data.**

Keywords— *deceit deception, subject based identification, Lie detection; EEG image; deep learning; machine learning.*

I. INTRODUCTION

Over the past few years, numerous deception detection tests have been created. One of them is the Concealed Information Test (CIT), which uses a series of questions to determine whether or not a subject is telling the truth. Both pertinent and irrelevant inquiries about crime are included in these queries. The inspected person's response is then noted. In earlier polygraph tests, the subject's bodily characteristics, such as heart rate, blood pressure, perspiration, etc., were recorded. The same is true because masculine motives can govern extrinsic behaviours. [1] New techniques have therefore been created to read brain signals and assess the conduct of guilty and innocent persons. The non-invasive method of electroencephalography (EEG) is used to collect brain signals for later analysis.

Event Related Potential (ERP) is created. When a subject respond to the stimuli, such as when lying, he or she must focus on the questions, which causes ERP. The P300 wave is the ERP that is produced when a subject is exposed to a meaningful or relevant stimulus. This wave is produced 300 milliseconds after the stimulus' start. The individual is exposed to three different types of stimuli: irrelevant, probe, and target. Target is the stimulus that is offered to both innocent and guilty subjects and is primarily concerned with keeping the subjects' attention. Test stimuli. [2]

The individual is exposed to three different types of stimuli: irrelevant, probe, and target. Target is the stimulus that is offered to both innocent and guilty subjects and is primarily concerned with keeping the subjects' attention. Only guilty subjects respond to the probe's crime-related stimuli, which causes a P300 response; the probe's irrelevant stimuli do not cause a P300 response. Significant research aimed at enhancing the interface between humans and robots has been published over the years. Bootstrapping is a statistical method for comparing how similarly different subjects' brains respond to the same stimuli.

[3].

The untruth seriously undermines the deceitful actions of numerous victims of fraud. The general populace frequently tells lies. Some limbs that automatically exhibit a distinct reaction when someone is lying can be used to uncover a lie.

II. RELATED WORK

Annushree Bablani, Damodar Reddy Edla, Diwakar Tripathi, Venkatanareshbabu K have proposed Empirical Mode Decomposition (EMD). Since polygraph tests for deception detection are regulated by humans, EEG-based lie detectors are gaining popularity these days. These devices examine any subject's covert behaviour using ERP EEG components. Empirical Mode Decomposition (EMD), which provides information about a signal's temporal and frequency domains, has been used in this paper to extract EEG features. The EEG data has also been subjected to a variety of classifiers to determine if the patient is guilty or innocent. On subject-specific EEG data, classifiers like SVM, QDA, KNN, and decision trees are utilised. With a variety of subjects, an innovative series of experiments is run to determine if the participants are telling the truth or lying. As part of an experiment, individuals are shown particular visuals as stimuli, and their reactions are recorded and subsequently examined. According to the results, SVM outperformed other methods on the recorded EEG dataset for the majority of the participants. [1]

Abootalebi, Moradi, and Khalilzadeh have designed approach for eeg feature extraction in p300-based lie

detection. It has been proposed to use the P300-based Guilty Knowledge Test (GKT) as an alternative to traditional polygraphy. The goal of this study was to improve a pattern recognition technique that has already been used for this application's ERP assessment. This enhancement was accomplished by both expanding the feature set further and using a mechanism for choosing the best features. Several volunteers completed the planned GKT paradigm, and their corresponding brain signals were captured as part of the method's evaluation. The P300 detection method was then put into practise using a few characteristics and a statistical classifier. From a primary feature set that included some morphological, frequency, and wavelet properties, the best feature set was chosen using a genetic algorithm and utilised to classify the data. 86% of guilty and innocent subjects were correctly identified, which was a higher rate than other previously employed techniques.

Arasteh, Moradi, and Janghorbani have proposed a novel method on empirical mode decomposition for P300-Based detection of deception. They are using alternatives for conventional polygraphy such P300based guilty knowledge test. EMD technique is used to extract features from EFG signal. Features are extracted from Pz channel for synergistic incorporation of channel information. Using genetic algorithm features are selected and this is challenging for input space dimension increase. Using this approach, accuracy of guilty and innocent subjects was 92.73 %.
[3]

Annushree Bablani, Damodar Reddy Edla, Venkatanareshbabu Kuppili have proposed deep learning technique using the restricted Boltzmann machine with wavelet to obtain the time and frequency domain information of signals. Stacking four RBMs results in the development of a deep belief network. At the output layer, softmax regression is used to categorise EEG data into guilty and innocent. By carrying out a "Concealed Information Test," an experiment has been carried out on EEG data that was captured. In the test, subjects are shown some important and irrelevant photographs as part of a simulated crime scene. After flashing these visuals, the
EEG signals produced are captured and examined. [4]

Junfeng Gao, Lingyun Gu, Xiangde Min, Pan Lin have proposed a method for analysing the underlying cognitive process and mechanism in deception. They are using the guilty knowledge test protocol for categorising guilty and innocent group of people. They have taken randomly 30 subjects for identifying the subjects based on functional connectivity patterns. Authors has proposed FTRPS technique to avoid false synchronization. The results show that four intuitive brain fingerprinting graphs (BFG) on delta, theta, alpha and beta bands were generated. Deception behaviour is identified with FTRPS technique in real application.
[5]

Andrew Chadwick and James Stanyer have proposed a method for enhancing the study of information, disinformation and misperceptions. Research that acknowledges the existence of erroneous and misleading information but stops short of describing their influence will benefit from an emphasis on deception. Additionally, by concentrating on how actors' deceptive tactics are crucial in their attempts to wield authority, it helps advance research on the cognitive and attitudinal biases that make people prone to error in perception. We outline the key concepts in the study of deception: media-systemic informational distortions; relational interactions that both create and activate cognitive biases; and the characteristics, tactics, and strategies of deceitful entities. The summary typology of the 10 primary factors and their
57 focal indicators serves as their conclusion [6]

Annushree Bablani, Damodar Reddy Edla, Venkatanareshbabu K, Shubham dedia have proposed novel Deceit Identification Test based on the Electroencephalogram signals to identify and analyze the human behaviour. This test is done with the help of P300 signals. It helps to get results in term of good classification accuracy using P300 signals. Using “symlet” Wavelet Packet Transform (WPT) technique, features can be extracted. EFG signals are recorded and analysed using BrainVision recorder and analyser. At the end they got 95% accuracy. [7]

Jennifer Tehan Stanley, Britney A, Webster have write review paper on deceit deception. They compared the efficacy of two training techniques to help older persons become more adept at spotting deception: valid face clues to deception and valid verbal cues to deception. 150 senior citizens were randomly assigned to a control condition, verbal training, or facial training. The participants finished their allocated training, a pre-test deceit detection task, and a post-test deceit detection task. Following training, both training groups greatly improved at identifying their respective trained cues. The control group showed increased deceit detection accuracy from pre-test to post-test while the facial cue training group showed decreased deceit detection accuracy post-test compared to pretest. These findings are in line with the body of deception research that indicates people still operate at about chance accuracy even after training. Training can enhance older persons' ability to recognise facial and verbal cues, but these enhancements did not lead to more accurate deception detection and even hindered performance in the facial condition. Perhaps because this condition encouraged implicit rather than explicit assessments of dishonesty, older persons demonstrated the greatest advantage from simple practise at detecting
deception (in the control condition). [8]

Abeer Abdulaziz AlArfaj and Hanan Ahmed Hosni Mahmoud have proposed a model that describes an analysis of the temporal features of the EEG data obtained during the lie detector test. During the learning phase, a deep learning attention model (VTAM) retrieves the temporal map vector. Through the use of this method, overfitting in Deep Learning architectures is lessened and computation time is decreased. We

provide a deep learning convolutional neural network-based model of cascading attention (CNN). Local and global features are extracted by the V-TAM model via distinct spatial and temporal routes. In addition, a novel Visual-Temporal Attention Model (V-TAM) is suggested to improve the EEG segmentation accuracy. [9]

D. Barsever and E. Neftci have proposed BERT's classification to develop examples of misleading and true writing that further illustrated the distinctions between the two, highlighting the fundamental similarities of deceptive text in terms of the part-ofspeech composition. Knowing how to spot lies or misleading statements in text is an important ability. This is partially due to the lack of knowledge surrounding the patterns underlying deceptive writing. The purpose of this research is to find patterns that describe misleading text. Training a classifier using the BERT (Bidirectional Encoder Representations from Transformers) network is an important step in this method. On the Ott Deceptive Opinion Spam corpus, BERT outperforms the state-of-the-art in terms of deception classification accuracy. [10]

Respatyadi Hari Nugroho; Muhammad Nasrun; Casi Setianingsih have proposed a method for lie detection. Every person is unique in their characteristics and habits. There are many persons in our world who frequently tell lies. The falsehood must create comprehension in other people, but the understanding it creates is incorrect. Pupils can be a good indicator of whether a person is lying or not since, in accordance with psychological science, dilated pupils are a sign of depression, which includes lying. The frequency of eye blinks might also be a clue as to whether or not someone is lying. By employing the circular hough transform method to observe changes in the dilated pupil and the frame difference approach to count the number of blinks, accuracy is reached. According to the study, a person who lies will have their pupils dilated by 4% to 8% of their initial diameter and will blink their eyes more frequently—up to 8 times—than they did before the question was posed. The lie detector system's accuracy in this study is 84%. [11]

Hannah Shaw & Minna Lyons have proposed a method for accuracy of deception detection has been the subject of conflicting results in the literature, and the majority of experiments have relied on small-scale lying. It's not yet apparent whether being aware of these indicators actually helps people detect lies, despite recent studies suggesting that high-stakes scenarios can provide reliable cues to dishonesty. Prior to seeing the film, participants were randomly assigned to either the cue condition (where they were shown previously recognised cues to deceit) or the no cue condition (where they were told to rely only on their gut feelings). Participants were asked if they were familiar with the case, whether they believed the appealer was telling the truth or lying, and how sure they were in their judgement. Participants recorded qualitative comments on the cues they employed during lie detection at the conclusion of the experiment. There was a positive correlation between accuracy and age, despite the fact that cue knowledge and confidence did not significantly predict accuracy scores. The ability to spot deception was dramatically improved among those who used emotion-based clues.
The findings are examined in light of the existence of trustworthy cues. [12]

Sinead v. Fernandes and Muhammad s. Ullah have proposed Levenberg-Marquardt classification method and the long short-term memory classification method. Based on the nine different training and testing combinations from the three separate sessions and their derived cestrum and spectral energy features, to assess the efficacy of deception detection. To lower the dimensionality of the retrieved features for further optimization, the principal component analysis is used. The four types of characteristics' projected main components exhibited increased precision in their ability to discern between honest and dishonest speech patterns. [13]

Z. Labibah, M. Nasrun, and C. Setianingsih have proposed lie detection method. The eyes are used to identify lies in this final task, specifically eye tracking and changes in pupil size using the Wavelet Transform to Gabor Image Processing technique, followed by classification to assess whether or not someone is lying using a Decision Tree. It is anticipated that having access to this lie detector will be beneficial for those who need to spot lying. The last test's outcomes are precise. The precision, recall, and accuracy values for this study are 97%, 94%, and 95% respectively. [14]

Y. Xie, R. Liang, H. Tao, Y. Zhu, and L. Zhao have designed convolutional bidirectional long short-term memory for deception detection. To maintain the temporal information in the original voice, the method extracts frame-level acoustic features whose dimension dynamically vary with the length of speech. To learn the context dependences in speech, bidirectional LSTM was performed to match temporal features with changing dimension. Additionally, in the conventional LSTM, which is used to extract time-frequency mixed data, the convolution operation takes the place of multiplication. The experiment's average accuracy on the Columbia-SRI-Colorado corpus is 70.3%, which is higher than it was in earlier works using noncontacting modalities. [15]

Jun-Teng Yang, Guei-Ming Liu, Scott C.-H. Huang have proposed several data preparation techniques for contaminated data and useless frames in the ground truth data. Visual and aural modality information can be extracted using a multimodal deception detection system. To analyse deception detection tasks, they present a novel emotional state-based feature called the EST feature. The change in emotional state in frames and audio segments is represented spatially and temporally by the EST feature. The video's deception detection accuracy and ROC-AUC are increased to

92.78% and 0.9265, respectively. [16]

Harun Bingol and Bilal Alatas have proposed methodology for detecting deceptive contents in social networks using text mining and machine learning algorithms is proposed, and the problem of deception detection in online social networks is modelled as a classification problem. This approach performs text mining operations and transforms unstructured data sets into structured data sets because the content is text-based. The structured data sets are then subjected to customised applications of supervised machine learning algorithms. The structured data sets are then subjected to customised applications of supervised machine learning algorithms. This study compares a variety of algorithms using real public data sets, including Support Vector Machine, k-Nearest Neighbor (k-NN), Naive Bayes (NB), Random Forest, Decision Trees, Gradient Boosted Trees (GBT), and Logistic Regression. The GBT algorithm produced the highest average accuracy value in Dataset 1, at 74.4%, while the NB algorithm produced the highest average accuracy value in Dataset 2, at 71.2%. [17].

Junfeng Gao, Xiangde Min, Qianruo Kang have proposed investigated the most significant information flows (MIIFs) that occur during deception among several brain cortices. First, the guilty knowledge test protocol was used, and electroencephalogram (EEG) signals from 30 subjects were recorded on 64 electrodes (15 guilty and 15 innocent). On the 24 regions of interest, cortical current density waveforms were then estimated (ROIs). After that, the cortical waveforms were subjected to a partial directed coherence (PDC) analysis and an effective connectivity (EC) analysis to determine the brain's EC networks for the four bands of delta (1-4 Hz), theta (4-8 Hz), alpha (8-13 Hz), and beta (13–30 Hz). The network parameters in the EC network with significant differences were extracted as features to distinguish the two groups using the graph theoretical analysis. The four bands' high classification accuracy showed that the suggested method was appropriate for lie detection. The "hub" regions of the brain were also identified based on the classification mode's best features, and the MIIFs between the guilty and innocent groups differed significantly. Furthermore, among all MIIFs at the four bands, the fronto-parietal network was discovered to be the most dominant. The roles of all MIIFs were further examined by combining the neurophysiology significance of the four frequency bands, which may aid in elucidating the underlying cognitive processes and mechanisms of deception. [18]

According to Merylin Monaro, Stephanie Maldera research, facial micro expressions can be used to reliably spot deception. Microexpressions are recognised using machine learning (ML) techniques, which have been trained to discern between truthful and dishonest claims. More encouraging outcomes recently emerged from the artificial intelligence (AI) discipline, where machine learning (ML) techniques are utilised to recognise microexpressions and are trained to differentiate between truthful and dishonest comments. It demonstrates that artificial intelligence outperforms humans at lie detection tasks, even when people have access to more data. The best performing approach was demonstrated by the results, which showed that support vector machines (SVMs) and OpenFace were responsible (AUC = 0.72 for videos without cognitive load; AUC = 0.78 for videos with cognitive burden). All of the evaluated classifiers performed better when the interviewee was subjected to an increased cognitive burden, demonstrating that this technique makes it easier to detect deceit. Human judges achieved an accuracy of 57% in the identical
task. [19]

Nidhi Srivastava, Sipi Dubey have propsed strategies for questioning. It is used in lie detection, also known as deception detection, to determine truth and untruth in responses. In this essay, truth and falsehood are determined using physical characteristics and voice traits. The linear detector model is modelled using the Mel Frequency Cepstrum Coefficient, Energy, Zero Crossing Rate, Fundamental Frequency, frame function of speech signal, and physiological parameters like heart rate, blood pressure, and respiration rate. Support vector machines and artificial neural networks are used to validate the outcomes. [20]

III. METHODOLOGY

Bablani A. has used the concept of Deep Belief Network using Restricted Boltzmann Machine.
Following test will be performed on EFG data.

1) Pre-processing is performed on raw EFG data.
2) Wavelet transformation is applied on Concealed Information Test (CIT)

At the end result with 4 RBM will be found. [1]

Different classifiers are used for feature extraction and accuracy is calculated.

Table 1: Different Classifiers used for features extraction

Classifiers	**Feature extraction**	**Data Set**	**Channel**	**Accuracy**
QDA	Various (Power, wavelet, Hjorth parameter, etc)	Emotion dataset	64	35.9
LDA	EMD	CIT Datasets	3 channels (Cz, Fz, Pz)	80.0
FDBN	Wavelet Transform	Motor Imagery	3 channels (C3, Cz, C4)	75.0
Deep Belief Network	Wavelet Transform	CIT Data	16	81.03

R. Nugroho; M. Nasrun has designed fuzzy logic algorithm for lie detection There are some sample questions to be asked to subjects. Based on answers given by subjects, lie detection test can be decided

whether the person is telling truth or not. According to survey they are asking the following question

1. You study at Telkom University, is that your choice or your parents
2. You enter Telkom University, is your choice or as a backup? Why?
3. Do you still have love for your ex-boyfriend or girlfriend?

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4. Are you currently confident when dealing with someone you like?
5. What do you with your current body size that is bigger than before?

Based on above question, response will be taken from set of respondent in terms of Eye movement, recognition of respondent. Eve movement can be right and left. Algorithm will capture eve movement and calculate enlargement of pupil and they will recognize whether the person is telling truth or not.

Taufiq Ari Wibowo, Muhammad Nasrun, C. Setianingsih [11] have done processing on training dataset. Eyes can detect someone is lying or not. They get following observation on datasets. They are checking for enlargement of pupils. If it is greater than 8 then person is honest otherwise telling lie. The following table shows results based on 2 respondents.

Table 2: Observations based on datasets

Sr. No	File Name	Early Pupils	Average Pupil	Pupil Enlargement	Total Blinks	Respondent
1	Respondent 1	2.65	3.25	0.6	28	Honest
2	Respondent 2	2.12	3.32	1.2	7	Lie

S. V. Fernandes, M. S. Ullah [13] have given comparison of different features classification method resulting with Recognition time. He invented their own classification methods such as Levenberg-Marquardt and LSTM. This algorithm extracts the features such as Time Difference Enery, Delta Energy, Time Difference Cepstrum, Delta Cepstrum. By using this algorithm during their experiments, and they repeatedly trained and evaluated it using LSTM and Levenberg-
Marquardt. The time-difference energy feature yielded the identical results (i.e. 100%) each time it was run. Overfitting might have happened as a result of the amount of the data used. The recognition rate, however, can alter from 100% if we increase the size of the corpus for additional study and verification of the test results of our suggested extracted feature using the same procedure and the classifier methods. Levenberg-Marquardt and LSTM methods are used for high accuracy and speed for feed-forward neural networks.

IV. PROPOSED WORK

The following are the key objectives should be considered during my work.

1) To design enhanced classification algorithm for the subjects such as target, irrelevant and probe using lie deception.

2) To design enhanced classification algorithm for EFG data recorded for lie detection based on innocent and guilty

3) To design enhanced classification algorithm to categorise the gender for predicting deception, predicting lie for females and truth for males. 4) To design enhanced classification algorithm for Lie Detector with Analysis Pupil Dilation and Eye Blinks Analysis.

5) To design a series of data collection mechanisms for extending the diversity of data for the deception detection tasks.

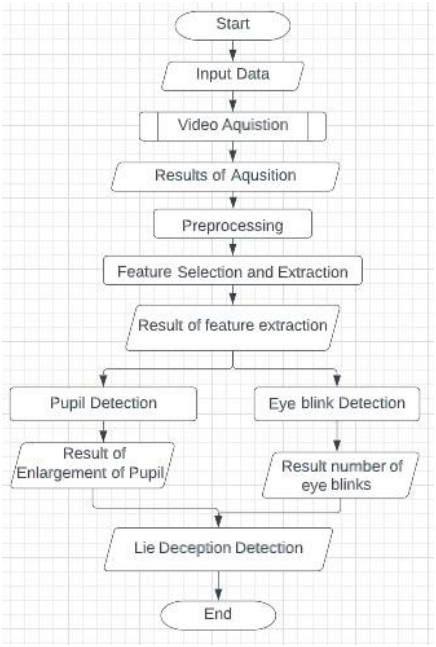

Fig: Process of Deception Detection

V. CONCLUSION

The lie is very detrimental to the fraudulent acts of many people who were cheated. The lies are common in the general population. To be able to reveal a lie we can detect through some limbs that unconsciously will show a different reaction when someone is lying. Among them, through organs of our eyes can detect someone is lying or not.

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A Study on Self-Configuring Intrusion Detection Model Based on Hybridized Deep Learning Models

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Abstract—**In order to achieve the necessary security guarantee, intrusion detection systems (IDSs) play a vital role in all networks and information systems worldwide. One of the best ways to prevent malicious assaults is to use an ID. In order to keep up with attacker's constant evolution of attack strategies and discovery of new attack vectors, IDS must likewise advance by implementing more advanced detection techniques. New research in the deep learning sector, including intrusion detection, has been made possible by the enormous rise in data as well as the considerable advancements in computer hardware technology. Machine learning (ML) techniques that are adapted on data learning representations include deep learning as a subfield. In this survey, we will examine 25 research papers about machine learning techniques and linked to detection models for intrusion detection, highlighting the numerous drawbacks of the current methodologies. This case shows different way to explore the journals, publication years, metrics, achievements of numerical evaluation techniques, and a number of variables support other factors. On the other hand, a technique analysis that considers the benefits and drawbacks of the methods is also presented. When upcoming projects and refine the sentiment analysis accuracy is estimate as more difficult for this paper. The relative assessment of the methodologies provides a thorough clarification of the research's motivation.**

Keywords— **Machine learning, Intrusion detection, journals, motivation, malicious attacks**

I. INTRODUCTION

Due to the information technology industry's rapid growth over the past decade, security is now one of the highest priorities for practically all organizations and businesses. Security systems must be able to handle a variety of threats since intruders are always trying to access network traffic [1][2]. The secured data transmits through an internet is not the easiest task. It has always been challenging to send secure data over a network [3]. The security of network traffic is becoming more crucial in particular situations, such as banking transactions, communications related to the military, and traffic on networks used by the government. In order to safeguard a network from malicious attacks, having a secure network monitoring and detection system that can quickly spot different types of attacks is crucial [4][5]. Fire-walls are designed to safeguard networks; however they cannot immediately identify intruders. Destructive cyber attacks
consequently present serious security challenges, making it necessary for adaptable and trustworthy IDS that can monitor malicious activity, policy violations, and illegal access. ML algorithms can be used to detect intrusions more effectively since they are capable of identifying patterns using statistical modeling based on past data [6].Intrusion detection is used to recognize all attack as positive and all fakers as negatively [7]. The requirements for the IDS policy are provided by the IDS goals. Potential objectives include [8] [5] gathering evidence [9][10], detecting attacks, preventing attacks, detecting policy violations, enforcing usage policies, enforcing connection policies, and detecting policy violations. There are five different classifications of IDS, including Network IDS, Host IDS, Protocol-adapted IDS, Application Protocol- adapted IDS, and Hybrid IDS. Network- adapted IDS can identify malicious network traffic. NIDS often need open access to the network to evaluate all data, including network traffic. Because they are passive, NIDS don't disrupt the traffic they are monitoring [11]. An intrusion detection system known as host-based IDS keeps track on the computer infrastructure on which it is placed, analyzing traffic and logging malicious behavior. PIDS, which is frequently installed on a web server, is used for the monitoring and analysis of the protocol utilized by the computing system [12]. An IDS that bases it's monitoring and analysis on a specific application or group of protocols utilized by the computer system is referred to as an application protocolbased IDS. A hybrid IDS is developed by combining more IDS methods. Hybrid IDS is combining the system data and network data in support of the view of network system [13]. In comparison to other IDS, hybrid IDS are more effective. There are two main classifications for intrusion detection systems such as behavior and signature-based IDS. The realtime behavior of the system is compared to known protection attacks via signature-based IDS [14][15]. Signature IDS are unable to identify unidentified attacks [6]. Given that CPS operates automatic for extended certain period of time and are thus challenging to interrupt for patching or updating in the field, this is critically crucial. In contrast, behavior-based systems are capable of spotting both known and unidentified attacks by monitoring a dynamic execution to detect suspicious performance [16]. Creating effective and adaptable IDS for unidentified future assaults has basically two issues. The

challenging task for anomaly detection is selecting correct features from the traffic dataset. Because of changing the evolving attack circumstances, the features chosen for one class of attack might not be suitable for another. Second, there is no labeled traffic dataset from actual networks available for IDS development [17] [18]. The development of anomaly detection-based IDS has made use of a variety of machine learning approaches [19]. To distinguish between regular traffic and anomalous traffic, IDSs are developed as classifiers. The difficulties of creating an effective IDS can be overcome with the aid of deep learning-based techniques [20]][21].

II. LITERATURE REVIEW

A. Intrusion detection based on deep neural network

A hybrid system for ID known as the sparse auto encoderdeep neural network was developed by K. Narayana Rao et al (SAE-DNN). The model developed a compressed method for extracting features based on sparsity regularization of the weights using three datasets, and it had the highest detection rate. Secure data transfer over networks has become a difficult undertaking as a result of the Internet's phenomenal growth in usage. In order to train deep neural networks for accurate network intrusion detection, Aqsa Saeed Qureshi et al. [5] used a DNN and an adaptive based transfer learning technique. Despite changing the network that has been taught to do tasks linked to regression, this strategy produced better results. Using a deep neural network (DNN) machine learning (ML) method, Sharuka Promodya Thirimanne et al. [6] described the technical aspects of a real time IDS. This technique recorded live network traffic and located malicious intrusions. The technique was hosted on a web server that made it possible for private and public sector networks to use it on their networks using an application programming interface for representational state transfer. The technique proved very useful for quickly identifying intrusions by examining inbound and outgoing network traffic. Je-Won Kang and Min-Joo Kang [22] created a powerful IDS adapted on a DNN for the security network. The parameter used to train of DNN involving some methods such as pre-training method of deep belief networks, the traditional stochastic gradient descent method which can pursue the in-vehicle network packets derivative through the probability-based feature vectors. The computational complexity was lowered by this technique.

B. Intrusion detection based on Recurrent Neural Networks

Modern malware, from planned botnets to more straight forward polymorphic worms, threatens the information transferred over the internet. RNNs were used in ID, which was developed by Soroush M. Sohi et al. [2] to uncover complicated model in attacks and create the similar ones. The usage of RNNs in this process helps to increase the intrusion detection rate by producing previously undiscovered attack variants and synthetic signatures from the most sophisticated malware. The key benefit of this strategy is that it is not dependent on a protocol or server data.

C. Intrusion detection based on Reinforcement learning

Due to the increasing number of numerous innovative attacks and varied network applications, developing effective IDS is a difficult challenge. In order to address these problems, Kamalakanta Sethi et al. [8] devised a revolutionary deep reinforcement learning-adapted IDS that made use of attention mechanisms and Deep Network logic in a number of scattered agents. The technique successfully identified and categorizes sophisticated network attacks. The distributed attack detection platform known as the multi-agent IDS was created with the goal of providing a security driven system, fault tolerant and scalable systems. This model produced greater accuracy while enhancing robustness. A approach that is strengthened by clustering and reinforcement learning was presented by Tripti Sharma et al. [23]. Clustering-based techniques have been widely utilized to create energyefficient protocols. Previously, it was believed that reinforcement learning was a set of algorithms drawn from animal behavior's operant conditioning. By using this technique, sensor node energy loss was decreased and power consumption efficiency was raised. The protocol ensures that the sensor network has a longer lifespan and reduces the energy consumption of sensor nodes.

D. Intrusion detection based on machine learning

System administrators can find network security problems in their businesses with the help of a Network IDS. However, there are numerous obstacles to overcome when creating a versatile and effective NIDS for unanticipated and unpredictable attacks. Quamar Niyaz et al. [21] created a deep learning-adapted method for creating such an efficient and adaptable NIDS to meet these problems. This method produced significantly lower false alarm rates and very high accuracy. K.G. Mukesh et al. [24] created IDS employing optimization and machine learning algorithms that successfully detected the invaders. In order to extract the traits that decreased the computational cost, a genetic algorithm (GA) was applied. In order to identify intruders in mobile ad hoc networks, Support Vector Machine (SVM) was used. Due to their high generalize ability and capacity to resolve dimensionality difficulties; SVM was the most widely used technique for anomaly intrusion detection. By simultaneously learning tiny training samples, traditional MLadapted ID approaches frequently produce prediction models. This approach is not always appropriate since industrial control systems must process regulated commands continuously while operating with limited computational resources. Guangxia Li et al. [25] designed an online learning technique that assisted in learning the prediction models from the data stream. The class-imbalance issue that plagues industrial intrusion detection systems was resolved by this approach. Initiating a self-recovery of a Virtual Machine under assault, Linda Joseph and Rajeswari Mukesh [26] used machine learning techniques to categories and recognize the attacks in various infection scenarios. Using the metasploit penetration tool, some files were mixed in among the malware-infected files as innocent, straightforward.exe files.

The API calls features were taken from the snapshot delta file samples and input for the SVM, naive bayes, and random forests algorithms. This technique speeds up performance and actually reduces on recovery time.

Fewer DL adapted ID preventing system suitable for IoT contexts are available. In recent years, many DL-based models for IDPS have been presented. A comparison between particular deep auto encoding models and traditional IDS and NIDS datasets was developed by Sirajuddin Qureshi et al. [27]. This technique had a high accuracy rate. The retrieval of linked devices has gradually

more important in current years due to the merging of standard networking equipment with a variety of IoT devices. Because there are so many different types of existing and developing connected devices, efficient and accurate categorization and type identification represent a very challenging task. Considering this issue, Fatima Zahra Fagroud et al. [28] evaluated the outcomes of feature selection in ML for effective connected devices for the precise categorization and identification of attacks. In terms of categorization, this approach delivered great performance and high accuracy. A ML-adapted model for identifying DDoS in IoT was created by Gafarou O. Coli et al. [9] while taking into account its unique characteristics. A DBM was used to create the initial deep learning-based model because of its capacity to handle data in real time, which is frequent in the IoT network, and its ability to learn high-level features from input using an unsupervised approach. This technique performed well in terms of recall and accuracy then they extracted high-level characteristics.

E. ID based on convolutional neural network

Shayan Taheri et al. [29] developed an ML-based botnet detection engine for usage in the IoT and wearable devices. Before being fed into the DenseNet deep CNN with or without taking transfer learning into account, the system converts the normal and botnet traffic data into images. This technique delivered better results. The self-management characteristics were described in the context of autonomous cloud computing by Sukhpal Singh Gill et al. [30]. The solution performs better in terms of security attack, resource contention, service agreement violations, execution time and cost.

F. Others

Sukhpal Singh Gill and Rajkumar Buyya [31] discussed the self-management of Cloud resources for the execution of clustering workloads, and it has the potential to operate automatically without human interaction. With no consideration for execution time, this strategy increased performance and decreased resource execution costs. A novel method of identifying attacks on Software Defined Networks (SDNs) was introduced by Ahmed AlErouda and Izzat Alsmadib [32]. It makes advantage of parallels with recent attacks that target networks, uses an inference technique to prevent negatives and false positives during the prediction process, and uses aggregation package to provide attack signatures that can be used to anticipate attacks on SDNs. When more non-Open Flow are utilized for guidance, the attack detection rate increases since this method detected different types of attacks on SDNs.

III. ANALYSIS BASED ON LITERATURE REVIEW

In this section, the detection model for machine learningbased intrusion detection is examined. The analysis based on the parameter measurements employed, dataset made available, software, publication year, and published journals are examined in the sections below.

A. Analysis based on metrics

The analysis is conducted through the parameter measurements that have been employed by numerous academics to demonstrate the model efficiency. Accuracy, precision, recall, f1 measure, Receiver operating characteristic (ROC), Area under curve (AUC), False positive rate (FPR), False negative rate (FNR), Positive predictive value (PPV), Negative predictive value (NPV), and other measures are noticed. According to the observations, researchers regularly use the metrics accuracy, precision, recall, and f1 measure, and they also frequently use the metrics sensitivity, as shown in table 1. The metrics used by the reviewers are interpreted in Figure 1.

Metrics	Papers
Sensitivity	[2][8][5][6][22][21][33][32][25][29][27][9]
Specificity	[2][18][5][25]
PPV	[2][18]
NPV	[2]
Accuracy	[18][8][5][20][34][6][21][26][29][27] [28]
DR	[18][5][34] [22][24][30]
FPR	[18][8][34][22][24][33][32][26][30][27]
FNR	[32][26]
F1 score	[18][8][6][21][32][29][27][9]
ROC	[18]
AUC	[18][27]
Precision	[8][5][6][21][32][29][27][28][9]
False Alarm Rate	[5]
Overhead	[20]
Detection Delay	[34] [24]
Packet Delivery Ratio	[34] [24]
Throughput	[34][31]
Energy Consumption	[34][31][30][23]
Average time	[35]
Total time	[35]
Cumulative error rate	[25]
Execution cost	[31][30]

execution time	[34][30]
Energy efficiency	[23]

Table 1: Tabular representation based on the metrics

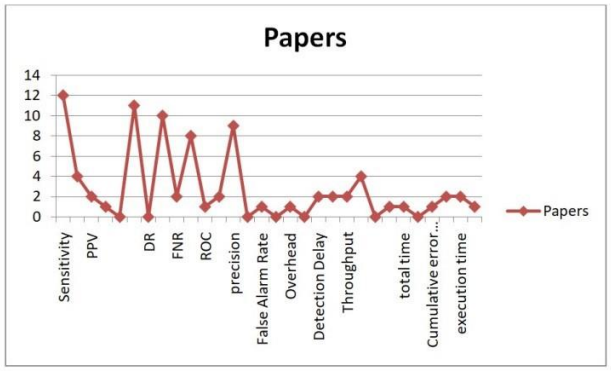

Figure 1: Graphical representation based on metrics

B. Analysis based on publication years

Based on the year the journal was published, the analysis is done in this section. Table 2 reviews the works from the years 2015 to 2022 and displays it. The majority of 2022-era literary works that are relevant to sentimental analysis are represented in figure 2, which provides thorough information.

Table 2: Tabular representation based on published Years

Year of publication	papers
2022	[6][23][27][28][9]
2021	[2][18][8][20][35]
2020	[5][34]
2019	[25][31]
2018	[26][29][30]
2017	[33][32]
2016	[22][21]
2015	[24]

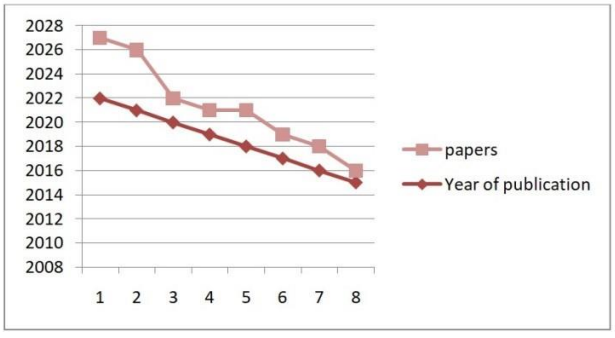

Figure 2: Graphical representation based on years

C. Analysis based on the journals

This section examines the research papers on ID that have been published in the journals indicated. Downloads of articles related to intrusion detection and classification can be made from journals published by Springer, ResearchGate, ArXiV, Elsevier, and other publishers. Figure 3 provides an interpretation of the full analysis and reviews of the majority of papers from the journal Springer and Elsevier.

Table 3: Tabular representation based on journals

Journal names	papers
Arxiv	[2][25][9]
Elsevier	[18][8][20][33][32]
Springer	[5][34][35][6][30]
Plos one	[22]
Association for computing machinery (ACM)	[21][26]
Aensiweb	[24]
Research gate	[31]
MDPI	[29]
Hindawi	[23]
Jalaxy	[27]
International journal of computer science	[28]

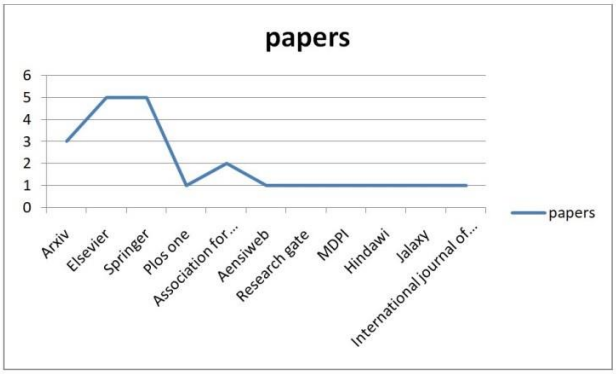

Figure 3: Graphical representation based on journals

D. Analysis based on dataset

Table 4 provides an interpretation of the analysis adapted on the datasets utilized by the different researchers. Various datasets, including KDDCup99, NSL-KDD, Network Traffic Dataset, CTU-13 Dataset, and others, are evaluated. Figure 4 afford to exploit an interpretation of the datasets by the reviewer.

Table 4: Tabular representation based on the dataset

Datasets	Papers
Malicious dataset	[2]
KDDCup99	[18][34][27]
NSL-KDD	[18][8][5][34][6][21][9]
UNSW-NB15	[18]

CICIDS2017	[8]
Network traffic dataset	[35][24][33]
Open Car Test-bed and Network Experiments (OCTANE)	[22]
CAIDA dataset	[32]
Power System Dataset	[25]
Gas Pipeline Dataset	[25]
Real data	[31][28]
Wider dataset	[26]
CTU-13 Dataset	[29]
Solely botnet dataset	[29]
In-house live normal dataset	[29]
SNORT database	[30]
Not mentioned	[20][23]

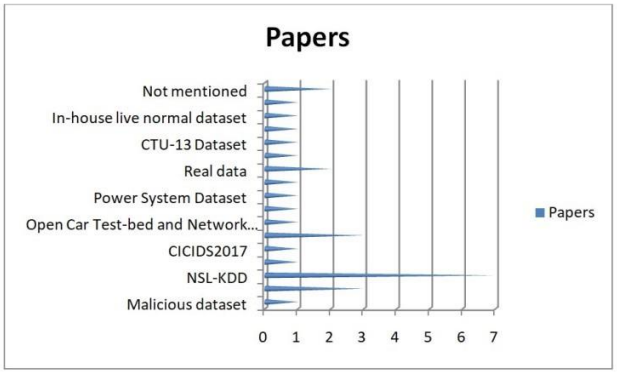

Figure 4: Graphical representation based on dataset

IV. RESEARCH GAP AND CHALLENGES

- Sub-network and gateway routers are impenetrable. Because routers have fewer potentially vulnerable services than hosts, it is frequently difficult to corrupt them [18].
- The Q-learning RL algorithm trains the agent the optimal action to take as it moves from one state to another. An estimated reward is measured iteratively in Q-learning and tabulated for each state and each feasible action inside that state. As the number of states and actions increases, the table will grow in size, making it difficult for us to keep and update the table [8].
- Deploying appropriate adversarial mitigation measures is crucial but difficult because it is frequently very difficult to detect and fix adversarial assaults [36].
- An occurrence in a labeled intrusion detection dataset may be classified as normal or intrusive. A trained model can automatically identify invasive instances by utilizing machine learning algorithms. Zero-day attacks, however, are challenging for signature-based IDS to identify [5].
- In order to reduce security attacks in Mobile Ad Hoc Networks (MANET), IDS techniques have been proposed. These techniques help to attain accurate results of attack detection. Although, it doesn't have the high speed of detection. MANET faced some difficulties obtained as a result of security threats like packet delivery and ratio energy consumption.
- Several issues were increase in the design of IDPS in MANET, including the inability to detect routing attacks with a high alarm rate, the impossibility to scale and implement in real-time, the inadequacy of the collection of current evidence, the inability to be message loss tolerant, the high message and computation overheads, and the lack of automatic and real-time routing recovery [34].
- Each client would be installed at a different company in a real-world scenario, creating the network connection between them more difficult [35].

V. CONCLUSION

All networks and information systems throughout the world depend on intrusion detection systems (IDSs) to provide the necessary security guarantee. One method used to lessen harmful attacks is an ID. As attackers constantly adapt their attack strategies and discover new attack vectors, IDS must also advance by implementing more complex detection mechanisms. New studies in the deep learning sector, including intrusion detection, are now available as a result of the enormous rise in data and the major improvements in computer hardware technology. To have a deeper understanding of the intrusion detection techniques available, the articles are carefully examined. The thorough analysis of the methodologies opens the path for future improvements in intrusion detection, and in the future, more publications relevant to intrusion detection may be studied in organize to develop new, more effective detection methods.

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Study of NLP applications in software engineering

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Abstract—**NLP (Natural language processing has wide range of application and is used to identify semantics from natural languages. Software engineering is the field in which the process of software development is considered. There are various challenges in Software engineering which can be solved by using NLP and machine learning. This paper follows the various processes in software engineering product building and identifies the various documents, case studies generated during each phase. Then a study is done to identify how Natural language processing and software engineering can be combined and can be applied to the documents generated for partial or fully automation of the process. There are various tools which are capable of generating code from class diagram, generating UML diagrams from requirement specification and tools which can be used for bug severity and prediction. There has been use of machine learning algorithms e.g. supervised along with NLP.**

Keywords— ***NLP, SE, NLP assisted software testing, bug triage, requirement engineering,***

I. NATURAL LANGUAGE PROCESSING

Natural language processing is a field of Artificial intelligence that makes machine understand human language. It focuses on the interaction between human language and computers. NLP involves the use of algorithms and statistical models to analyze, understand, and generate human language.NLP has a wide range of applications, including machine translation, sentiment analysis, text classification, information retrieval, and speech recognition. The common examples of NLP in everyday life include virtual assistants like Siri and Alexa, translators e.g Google translator, search engines e.g auto suggestion, to correct the grammar using Gramerly spam filters in email services, and language translation tools. NLP is a rapidly developing field with many exciting opportunities for research and application. NLP can be used in various fields like fake news detection, video label identification, machine or language translation, Model to model transformation in software engineering, speech recognition etc.

II APPLICATIONS OF NLP IN SOFTWARE ENGINEERING

Software engineering is field that encompasses the process of software requirement identification and development. NLP can be applied in the phases of software engineering. There are various documents generated during the phases of software engineering,

1. Requirement specifications
2. DFD, UML diagrams
3. Code
4. Test cases, test scripts, documents related to bugs generated
5. Documentation

The various phases of software engineering are as given below

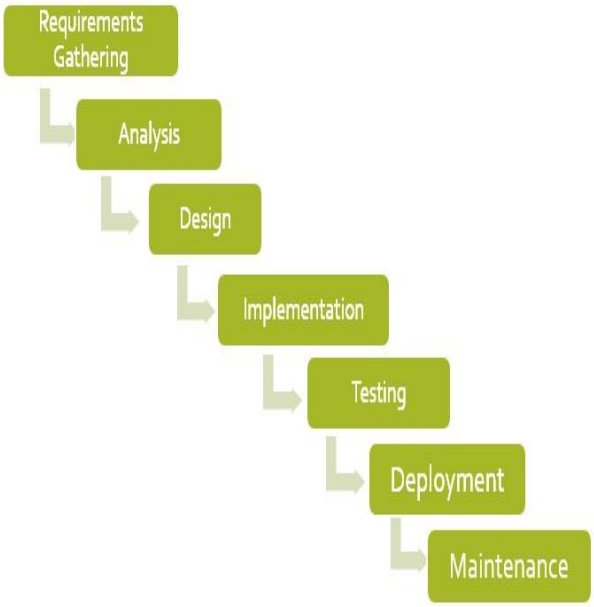

Figure 1: Phases of Software engineering

During each phase, Natural language processing can be applied

1. Requirements Engineering:this is the first phase of SDLC, where the customer gives their requirements, which are documented into business specifications. Natural language processing can be used to extract information from natural language requirements or business specification documents, such as user stories, use cases, and requirements specifications [1]. NLP algorithms can identify the key concepts and requirements from the text, and map them to specific system features and functions. This involves using techniques such as named entity recognition, part-of-speech tagging, and semantic parsing to identify key concepts, entities, and relationships.

It can be used to analyze stakeholder feedback and customer support requests to identify common issues and user requirements. By analyzing the language used in customer

feedback and support requests, NLP algorithms can help to identify patterns and trends that can be used to improve the system's functionality and user experience.
NLP can be used to identify inconsistencies, ambiguities, and contradictions in the requirements documentation. By analyzing the language used in the requirements documents, NLP algorithms can help to identify conflicts and inconsistencies that can be addressed before the system is developed.
NLP can be used to generate test cases from natural language requirements documents. By analyzing the language used in the requirements, NLP algorithms can help to generate test cases that cover all the requirements and ensure that the system meets the user's needs.

Sentiment Analysis: NLP can be used to analyze the sentiment of stakeholders towards different features and requirements of the system. This can help to identify areas where there are conflicts or differences in opinion.

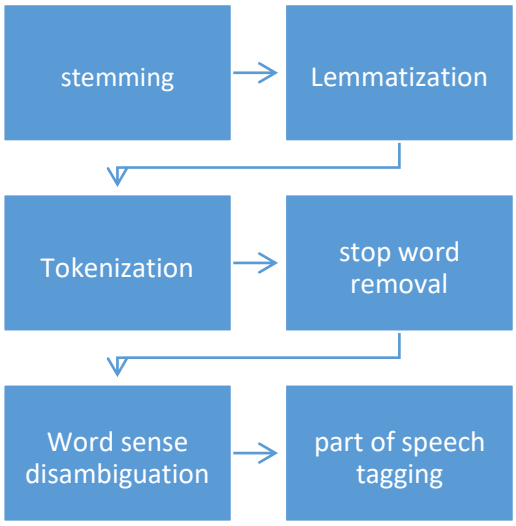

Figure 2: Steps of NLP

Summarization: NLP can be used to summarize large requirements documents, making it easier for stakeholders to understand the key features and functionality of the system.
Summarization is of two types abstractive and extractive [2]

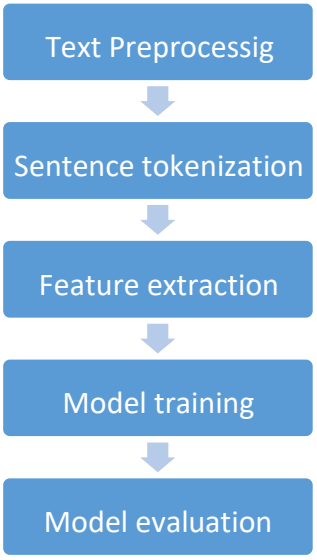

Figure 3: Steps of Summarization

Requirements Generation: NLP can be used to automatically generate requirements based on natural language inputs from stakeholders. This involves using techniques such as sentiment analysis, chatbots, entity recognition etc.

Requirements Prioritization: some requirements can be of high priority based on the time to market and their importance to the stakeholders NLP can be used to prioritize requirements This involves using techniques such as classifying the data as customer feedback, user stories, topic modeling and clustering to identify related requirements, and then using machine learning algorithms to assign priorities based on stakeholder feedback. e.g. EMR data, bug
/requirements prioritization. [4]

2. NLP in design process
NLP can be used in design to improve the efficiency and accuracy of the design process, and to ensure that the final product meets the user's needs and expectations. The requirements can be often complex, ambiguous, uncertain, incomplete, inconsistent, and incoherent. [3] It can be used to generate natural language descriptions of the product's features and functions. NLP can be used to generate the UML designs from the requirement documents, user stories etc. tools have been generated that are used to capture software requirements, and then the analysts analyze and generate the UML diagrams such as class, use case diagrams etc. it can be used to analyze the software designs and identify potential issues, such as usability problems, security vulnerabilities, or compatibility issues with other software.

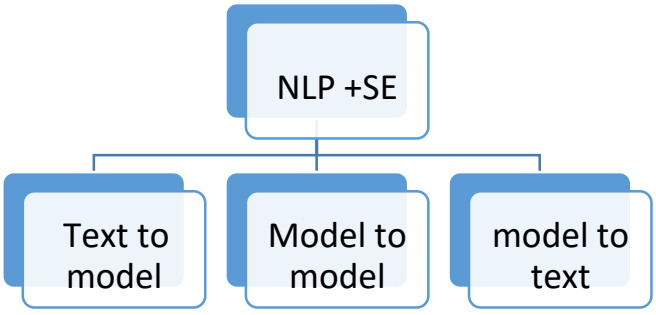

Figure 4: NLP in software design

In [5], it discusses the generation of requirements from UML's class diagram. The paper describes techniques to get NL specification from class diagrams. The paper uses WordNet to clarify the structure of UML string names and generating the semantically sound sentences. In [6], class diagrams are generated from controlled requirements specification.

In [7] paper, the issue of relation extraction from graphical models focused on the detection of semantic relationships within the given text is addressed based on using machine learning techniques.

The other applications of NLP in SE are,

Template Generation: NLP can be used to generate document templates based on the requirements of a given document. This involves using techniques such as NLG and machine learning to generate templates that are appropriate for the type of document being generated.

Machine Translation: NLP can be used to do machine translation that automatically translate documents between different languages. This involves using techniques such as machine translation and language models to generate accurate translations of the original document. Following are the approaches to machine translation Direct, Rule based, Corpus based and knowledge based[8].

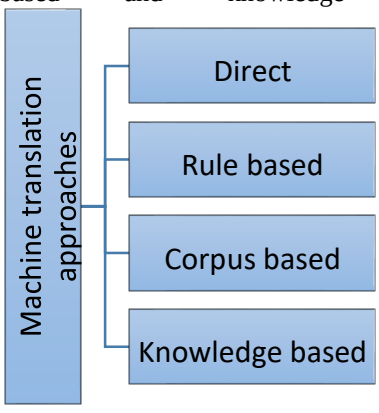

Figure 5: Machine translation approaches

Personalization: In order to increase and retain customers, nowadays personalized shopping experience is used. NLP can be also in marketing by analyzing the user sentiments on social media and providing them with targeted advertisements. People use text, photos, music, emoticons and video to express their emotions or their points of view which is accounting large unstructured data. It can be used to personalize the content of a document based on the preferences and interests of the intended audience. This involves using techniques such as user modeling and recommendation systems to tailor the content.

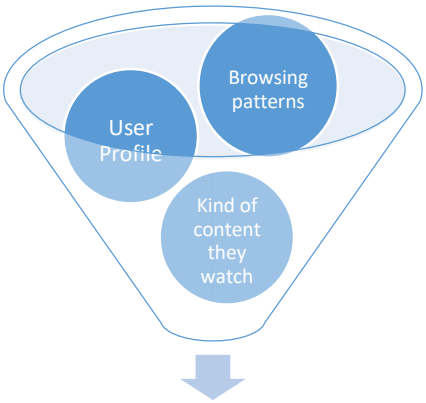

Figure 6: Personalization The next step is the implementation, where code has to be generated.

2.Code Generation: During code generation, NLP can be used to automatically generate code based on natural language text. This can help in automating the process of creating new software systems or modifying existing ones. It can be used to generate code from natural language commands and queries. The developer can give a sentence e.g." get two inputs and generate sum of two numbers". Using NLP model to parse the sentence and generate code for the same. The process is known as natural language programming, which helps the non-technical stakeholders to communicate requirements to developers.

This involves using techniques such as program synthesis and code templates to generate code that fulfills the intent of the natural language input.

Also NLP can be used to analyze code and generate comments for the code automatically. this will help reduce the developer time to write comments.

The other applications are

Code Summarization: NLP can be used to generate natural language summaries of code, making it easier for developers to understand and review the code. This involves using techniques such as summarization and paraphrasing to generate a human-readable summary of the code.

Code Completion: NLP can be used to predict and generate the next lines of code based on natural language input. This involves using techniques such as language models and machine learning algorithms to predict the most likely code completion given the natural language input.

Refactoring: Refactoring is a technique where the code is restructured without changing the logic e.g. a big method can be broken into smaller methods [11]. NLP can be used to suggest improvements and refactoring's to existing code.e.g the names of the classes ,methods, and atrributes which are inconsistent and can pass was it does not affect the output. This involves using techniques such as code similarity and pattern matching to identify areas of the code that can be refactored for better maintainability and readability

The method used in the paper [11] is

1. Tokenization of all names
2. Then classification of words into syntactic and semantic synonyms
3. Apply proposed rules to detect inconsistent names

Code Translation: It consist of translating code in different programming language. NLP can be used to automatically translate code between programming languages. This can help to improve software maintenance by allowing developers to work with code written in different programming languages. e.g. Transcode is a tool which can translate code between in programming languages Java, C++ and Python3[12]. It is useful when the legacy codebases need to be translated into modern languages.

NLP can be used in testing phase as follows, Testing is an important part in software Nowadays research is going on for NLP assisted software testing. the various field in software testing where NLP can be applied are as follows

Bug Detection: There are many bug reports generated which needs to be triaged. NLP can be used to detect bugs in software systems by analyzing natural language descriptions of the system. This helps to identify duplicate bugs and thus they don't get assigned to developers [14] This can help in improving the accuracy and speed of bug detection, as well identification of similar bugs, leading to more robust and reliable software systems.

ID	Name
3091	Mouse Hover not showing data on images
3082	unable to get text over image

Figure 6: Example of duplicate bugs

Bug Classification: there are lots of bug reports generated and they need to be resolved on time in order to improve performance. The time for fixing the bugs can be reduced by quick bug classification and assignment. Manually assigning the bugs can be a time consuming task . This paper [15] classifies the bugs using various classification algorithms e.g. Naïve Bayes, Random forest, decision trees and regression. NLP can be used to classify bugs into different categories based on the natural language descriptions of the bugs from the bug reports. This involves using techniques such as text classification and clustering to group similar bugs together and assign them to the appropriate category.

Bug Severity Prediction: the bug which has high impact and cause performance issues can be of high priority and hence need to be resolved before next release. While the bugs with low priority can be resolved in next versions. NLP can be used to predict the likelihood of bugs based on natural language inputs. Various techniques such as machine learning and deep learning is used to analyze the natural language descriptions of the software system and predict where bugs are likely to occur as well as the severity of the bugs.

Bug Triage: Bug triaging means to select a suitable developer to resolve the bug. Incorrect assignment of bug reports to developers can be very expensive in large software projects as the bugs can be tossed between the resolvers. A bug report is something that stores all the information needed to document, report and fix issues(bugs) in software. The summary of the bug report is used for both bug triage assistance and severity prediction [16]. NLP can be used to triage bugs and prioritize them based on their severity and impact. There are various techniques such as topic modeling and clustering to group similar bugs together and assign them to the appropriate team for resolution.in paper [17] a Triage assisting technique known as MLtriage has been suggested which is a supervised ML algorithm. In paper [18] they have focused on prediction of severity of bugs by using reports from Bugzilla as their input. They have done pre-processing by tokenization and stemming and have trained the datasets with various classification algorithms.

Bug Localization: NLP can be used to identify the location of bugs in the software system. This involves using techniques such as natural language processing and program analysis to identify the code segments that are most likely to contain the bug. In paper [18] they used a decision tree for predicting the location of bugs using eclipse jdk bug reports

In paper [20], a method DeepLoc is proposed which uses an enhanced convolutional neural network (CNN) that considers bug-fixing recency and frequency, together with wordembedding and feature-detecting techniques.

6.Documentation Generation: NLP can be used to automatically generate documentation for software systems based on natural language descriptions of the system. This can help in reducing the time and effort required for creating and maintaining software documentation.

Text Generation: NLP can be used to automatically generate text for documents such as reports, summaries, and emails.

ACKNOWLEDGMENTS

"Acknowledgment(s)" is spelled without an "e" after the "g" in American English.

As you can see, the formatting ensures that the text ends in two equal-sized columns rather than only displaying one column on the last page.

This template was adapted from those provided by the IEEE on their own website.

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Synthetic Audio and Video Generation for Language Translation using GANs

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Abstract—**There is a digital divide of language due to which people are missing out on taking advantage of immense content being produced in today's world. In addition to that even the content producers have tough time to make their content in every language and gain wider reach. We also validated the same by conducting survey. Hence to solve this problem we have proposed a solution which leverages advanced technologies like Generative Adversarial Networks, Natural Language Processing and Computer Vision. The developed solution has the capability to generate close to real synthesized videos.**

Keywords—Generative Adversarial Networks, Natural Language Processing, Computer Vision.

I. INTRODUCTION

The rise in consumption of digital content i.e., MOOCs, videos. Content creators want their content to be available for everyone. Digital divide of language, people are missing out to take benefit of the rise in digital content being produced. The divide varies from entertainment to education sector. There are about 14.18 % people in India that understand and speak English language [1]. While we understand majority of the content is provided in English. The language barrier is not only in terms of India it affects majority of the population around the world. Out of the world's approximately 7.8 billion inhabitants, 1.35 billion speak English [2]. Of the top 250 YouTube channels, 66% of the content is in English [3]. We do understand through these statics that people who don't understand English are at a disadvantage when it comes to content availability, also the native creators are failing to get traction from this huge English-speaking market since most people can't understand the produced content. Our solution wants to make the content available to every person irrespective of their language by leveraging technologies like deep learning. The aim of the solution is to provide the video content that was originally in foreign language to the people in their native languages while taking care of the quality of the video. Our solution translates the audio, synthesizes the translated audio like the speaker's voice and synthesizes the speaker's lip so that it looks like he is speaking the translated words.

II. LITERATURE SURVEY

This [4] article tries to implement dubs using Artificial Intelligence. The implementation attempts to translate the speech of one language to another. The translated speech has a robotic voice and doesn't include lip sync.

Impressive results in picture production [5, 6], image editing [7], and representation learning [6, 8, 9] have been attained using Generative Adversarial Networks (GANs) [10, 11, 12]. For conditional image creation applications, such as text2image [13], image inpainting [14], and future prediction [15], as well as for other domains including movies [16] and 3D data [17], recent algorithms have used the same concept. The concept of an adversarial loss, which causes the generated images to be, in theory, indistinguishable from real photos, is essential to the success of GANs. Given that this is precisely the goal that much of computer graphics attempts to accomplish, this loss is particularly potent for jobs involving the creation of images

In this [18] paper they have used cyclic GANS to translate the audio/speech of X to a target domain Y thereby synthesizing the audio of the person X speech to person Y's voice. The implementation requires a person to recite a script and doesn't also provide translation.

In this [19] paper they try to lip sync a video to match the target speech segment of the audio provided. This implementation doesn't have features that we are trying to provide such as no synthetic audio generation and no language translation.

This [20] article gives that speech to text is a software that lets the user control computer functions and dictates text by voice. The system consists of two components, first component is for processing acoustic signal which is captured by a microphone and second component is to interpret the processed signal, then mapping of the signal to words. Is not able to detect accents and cannot comprehend multiple people talking.

III. SURVEY ANALYSIS

Survey Questions:

Q1. Do you think people miss out on digital media produced in different languages? Suppose you want to watch a video in different language (say Korean) but you cannot watch it since you don't understand that language?

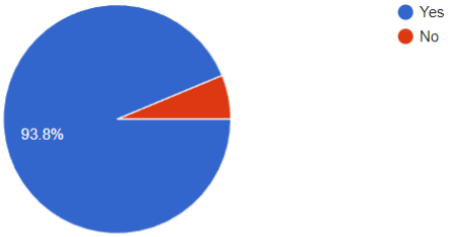

Figure 1. Question 1

Q2. If provided a service, where you can convert any video to desired language while preserving vocal features of the original speaker with proper lip sync. Would it enhance your viewing experience or wider your reach to larger audience?

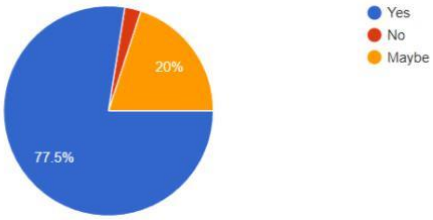

Figure 2. Question 2

Q3. There is a surge of MOOCs and Video Tutorials being produced (primarily in English). Do you think the people living in rural parts are missing to take advantage of it?

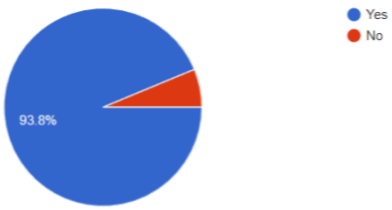

Figure 3. Question 3

Based on these survey results some of the conclusions are: Question 1 appeals that there is a problem due to digital divide people miss out on digital media because of the language barrier. Question 3 was asked to reinforce the fact the people in rural areas couldn't capitalize on the education content out there as we saw majority of the content present, is in English. Question 2 being more relevant to our solution this question asks the relevancy of our project whether there is a market where its required. Question 2 survey results gave our project a positive affirmation that our solution had a market or need.

IV. PROPOSED SOLUTION

From the above analysis and research, we are aiming to build a solution which will solve the aforementioned problem. Our proposed solution consists of many components which contribute to form a service. Following figure demonstrates the flow chart and different components that will be required to build such a solution.

When a user uploads a video to be synthesized, the video goes through the components mentioned in Fig 4.

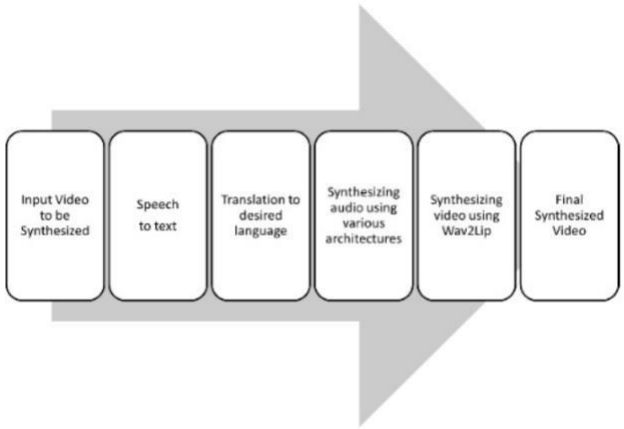

Figure 4. Solution Components

The first component is speech to text, where the transcripts of the video will be obtained which will be given to the next component that is translation to desired language, where the obtained transcripts will be translated to user specified language. Afterwards, this translated transcripts are passed to speech synthesis component where the algorithm clones the users voice in translated speech. This synthesized audio will be passed to video synthesis component where it syncs the lip movement to make it realistic.

For speech to text and text translation components, we will be using advanced encoder decoder algorithms. And for speech synthesis and video synthesis, we will be leveraging Generative Adversarial Networks.

Wav2Lip is a more advanced lip sync model that the authors have developed since the "Towards Automatic Face-to-Face Translation" study [19]. The discriminator is the key distinction between the two.

A visual quality discriminator and a pre-trained lip-sync expert are both used by Wav2Lip.

A updated, deeper SyncNet with residual connections trained on colour images serves as the expert lip-sync

discriminator. It calculates the dot product of the voice and video embeddings with ReLU activation. The likelihood that the input audio-video pair will be synchronised results from this.

In Wav2Lip, the generator is taught to reduce the expert sync-loss as well as the L1 reconstruction loss. In the visual quality discriminator, convolutional blocks are stacked one on top of the other. A leaky ReLU activation is followed by a convolutional layer in each block.

It is trained to minimize the following objective function:

The generator reduces the weighted total of the reconstruction (L1) loss, the synchronization loss (expert sync-loss), and the adversarial loss (Lgen) by adding all of the individual losses together.
Tortoise received special instruction to become a multi-speaker model. It achieves this by using reference videos.

These reference clips which are recordings of a speaker you supply serve as a manual for creating speeches. These samples are used to assess the output's many characteristics, including the voice's pitch and tone, speaking rate, and even speaking flaws like a lisp or stutter. The reference clip is also used to assess elements of the audio output that are unrelated to voice, such as volume, background noise, recording quality, and reverb.

V. METHODOLOGY

1. Audio Extraction from Input Video

When a request to the application will be made, the first process the input video will go through is the extraction of audio from the video for further processing.
Using moviepy [20], we process the input video with the help of this library methods for audio extraction. Using librosa [21] library, we set the sample rate of the extracted audio as mentioned in the open-source models.

2. Speech to Text (For Language Translation)

After the audio is being extracted, we use the fine-tuned open-source version of Wav2Vec2.0 [22] model from hugging face [23] for generating text from the audio.

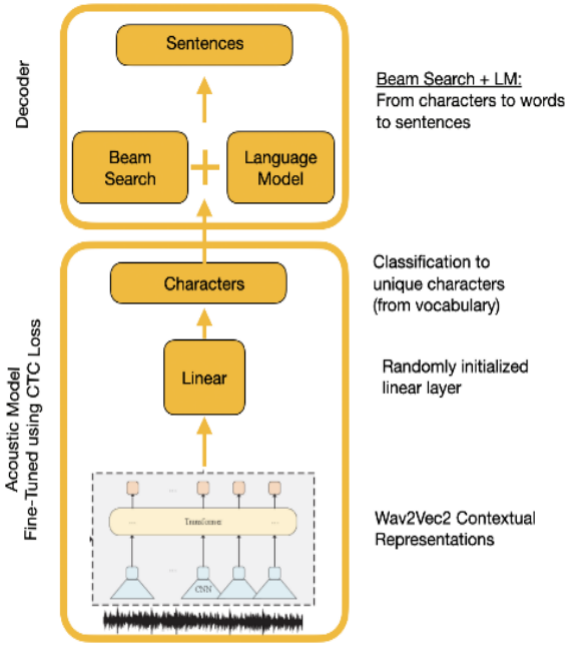

Figure 5. Speech To Text (Wav2Vec2) [24]

3. Text Translation

Once the speech-to-text process is completed, we now translate the obtained text to the language selected by the user using google trans [25] library which uses google translate to generate translation in desired language.

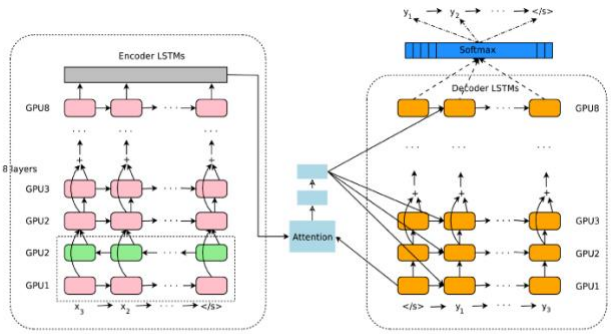

Figure 6. Text Translation [25]

4. Synthetic Audio Generation

Now, the translated text and the original extracted audio from step one is passed to a generative adversarial network model which generates an artificial voice for the given text which has similar vocal features as of original voice. For this, we are using an open-source implementation called TorToise [26].

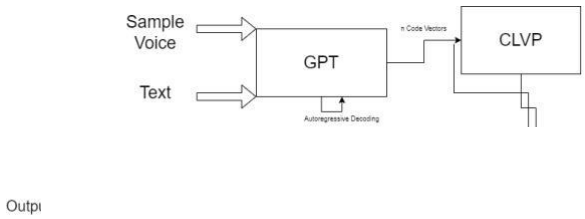

Figure 7. Synthetic Audio Generation [26]

5. Synthetic Video Generation

The separated video content is synthesized so that the lip movement of the person in the video matches the new translated audio vocabulary. The utilization of the Wav2lip model helps in achieving this feat. Give our video and the text as the input wav2lip will generate the matching lip movement [27].

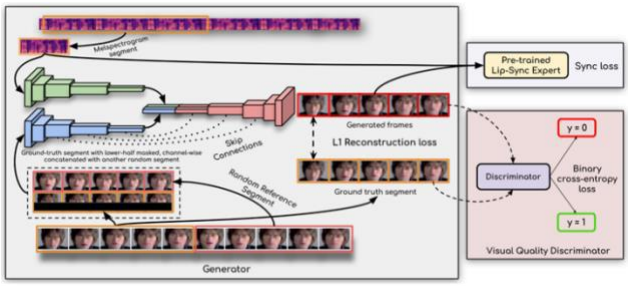

Figure 8. Synthetic Video Generation [27]

VI. IMPLEMENTATION DETAILS

To make the proposed solution accessible to people, all the above-mentioned components are modularized and connected to each other in backend by referring to the system design created and serve it as an Application Programming Interface (API). To make this service accessible a web-app has been developed.

1. Server-Side Development

For developing the backend logic, we have used Python programming language with libraries like Pandas and PyTorch. To serve this as an API we have used FastAPI framework. Its flexibility in organizing the project structure as per our preference and the ability to write async code makes it a better choice than other frameworks.

As an outcome, our proposed solution can be served on a server and can be accessed by calling the API.

2. Client-Side Development

To make our solution to general public, a Web-App needs to be developed which connects to the API developed. The web-app is developed using front-end technologies like HTML5, CSS & JavaScript. The designing part is handled using HTML and CSS and JavaScript is added to provide various functionalities to make user experience better. Here user provides the input and an API call is made with user given data and parameters, which in response returns the synthesized video.

Therefore, by leveraging Client-Server Architecture, we served our proposed solution as a web-app.

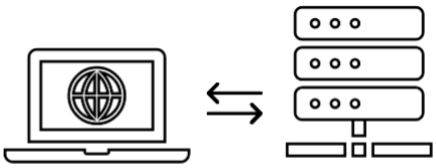

Figure 9. Client-Server Architecture

VII. RESULT AND DISCUSSION

Based on the survey carried out, we performed One Sample Proportion Hypothesis Testing from the obtained responses which validates our identified problem and the proposed idea.

1. Problem Validation

H0: Problem is not valid.: p <= 0.5
H1: Problem is valid.: p > 0.5
No. of samples = n = 110
p_hat = yes / no = 68 / 110 = 0.61
Z-Score = 2.48
p-value = 0.00657
Therefore, Null Hypothesis is rejected.

2. Idea Validation

H0: Idea is not valid.: p <= 0.5
H1: Idea is valid.: p > 0.5
No. of samples = n = 110
p_hat = yes / no = 64 / 110 = 0.581
Z-Score = 1.72
p-value = 0.04272
Therefore, Null Hypothesis is rejected.

Therefore, the developed solution, which is built by combining various techniques which are state of the art (SOTA) solutions, produces synthesized media capped at maximum video length of 1 minute.

The performance of the SOTA techniques used are as follows:

1. Wav2Vec 2.0 (for Speech Recognition) [22]

It has word error rate (number of errors divided by total words) of 5.7 which is fine tuned using only 10 minutes of labeled data from open source Librispeech corpus. On a 100-hour subset of Librispeech, the same model managed a word error rate of 2.3, 45% lower than the previous state of the art trained with 100 times less labeled data and 1.9 when fine-tuned on even more data.

2. Wav2Lip (for Lip Sync) [27]

To evaluate this model, the authors proposed a technique which is “LSED” (Lip Sync Error Distance) (lower is better) on which the model achieved score of 6.7 LSED; whereas, LipGAN achieved 10.05 LSED and Speech2Vid achieved 13.14 LSED [27].

The authors also reported that the output of Wav2Lip was preferred over existing methods or the actual un-synced videos over 90% of the time.

VIII. CONCLUSION

The problem statement and facts supporting it makes sense that this problem is apparent and does require a necessary solution. The survey results yet confirm the problem statement and the need of our solution. There are some existing solutions but aren't specifically targeted to this problem statement. These existing solutions are incomplete and need additional requirements and features to address the problem. We have made an attempt to make a unified, complete solution to address the problem statement in such a way such that there is no further language divide in the future.

IX. FUTURE SCOPE

Natural Language Processing (NLP) activities that rely on audio data, such as speech or music, rather than written text as input are referred to as textless NLP. Speech-to-text conversion is one instance of this, in which an algorithm converts spoken language into written text. Another illustration is audio-to-text creation, in which an algorithm creates text based on the information in an audio clip without the use of a formal transcript. The drawbacks of models like Bert, Roberta, and others are that they rely largely on transcripts or huge text inputs that are more laborious to create. The Generative Spoken Language Model (GSLM), however, eliminates this reliance and enables direct manipulation of unprocessed audio signals and their conversions [29]. As a result, there is no longer a need for languages without access to such data to rely on having vast text collections.

Since managing various languages from around the world is a huge challenge that must be handled, the availability of each language's data set for audio and video is crucial for this. How bias is addressed is a crucial problem as well. The language models should properly address issues like gender, toxicity, and prejudice. Therefore, iterative strategies and intrusive testing should be employed.

The TPU and GPU are essential components of the process. Up to a minute of speech may now be produced with good output from the tortoise text to speech. To complete the operation more quickly and effectively, more hardware resources are required.

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Video Analytics for optimizing Bank Services

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Abstract: Due to the intense competition in the worldwide market, businesses are focusing on building solid client relationships and increasing consumer satisfaction. With the development of information and communication technology, it is projected that the application of video analytics would considerably enhance customer happiness and experience in service settings. to evaluate client satisfaction throughout the service cycle. Research in this field is currently challenging when attempting to recognize emotions in videos. The utilization of the audio and visual components of the video data as two sources for a thorough evaluation of emotion is one of the finest approaches to get around this challenge. With the use of deep learning models, we seek to identify a variety of solutions for consumer sentiment analysis in this article. We also investigate additional options for improving bank services, such as counting customers inside a bank or looking for theft inside a bank atm.

Keywords Deep learning, Face recognition, openCv, Cuda, video analytics, Yolo, tensorflow

I. INTRODUCTION

Banks can increase promotional acceptability and service speed with the aid of video analytics. Like other businesses, banks have customer service objectives. Don't wait in line for longer than four minutes, for instance. The Intelligent Video People Counting System counts the number of people waiting in line at any given time, the time it took for the most recent person to join the line, the average length of the line, the average wait time, and the number of people who left the line before the next person joined it. Indicates how many front desks there are, how many available counters there are, how frequently there are 3 or more people in line (for example), and how many people there are each day. For instance, 95% of people spend less than 4 minutes in line. You can compare store performance using these figures and take corrective action at underperforming sites. Enhance branch network performance through analysis, action, measurement, and iteration. The bank also keeps track of dwell time, or the amount of time consumers spend at the checkout desk. Retail shoppers are more likely to make a purchase the longer they stay in a certain area. Banks are unique. A quick turnaround time denotes effective service. Banks can compare the use of self-service ATMs and manned counters using video technology. Do you frequently use the ATM or do you pass it by to let someone else use it? All problems are revealed via data analysis. Banks can assess and improve their services for various processes by analyzing video counts.

II. LITERATURE SURVEY

Maintenance To engage with clients, offer a range of services, and learn more about personal beliefs and ideas, many businesses use social media networks. The detection of the polarity of positive or negative thoughts in text, full documents, paragraphs, lines, or subsections is done using the machine learning technique known as sentiment analysis. A multidisciplinary field called machine learning (ML) combines statistics and computer science techniques that are frequently utilized in prediction and classification analysis. In this article, general machine learning methods for sentiment analysis are presented. By conducting rigorous industry and community assessments and evaluations of white papers, academic research papers, journals, and reports, this literature analyses and discusses the concept of sentiment analysis. This paper major goal is to analytically categories and examine how research and machine learning approaches for sentiment analysis are being used in a variety of applications. This approach has the drawback of only considering the application side and leaving out hardware and theoretical exposures. The focus on applications rather than technology and theoretical parts of the topic means that this study has several limitations. This paper concludes with a research proposal for a sentiment analysis machine learning environment in e-commerce.

Current System	Objective	Study Outcome
Enhanced Video Analytics for Sentiment Analysis Based on Fusing Textual, Auditory and Visual Information. [Received June 5, 2020, accepted July 15, 2020, date of publication July 27, 2020, date of current version August 5, 2020. Digital Object Identifier 10.1109/ACCESS.2020.3011977]	to check the contribution of video modalities and how they are correlated to video analytics for sentiment analysis in Arabic language.	used multi-dialect multimodal video analytic process for sentiment analysis of customers, implement various fusion techniques at a single hybrid levels for evaluation of datasets with multiple models. models tested on audio, text and visual expressions of customers.

Video Analytics for Face Detection and Tracking.	to implement system for detecting human faces from video in real time	viola-jones algorithm used for facial feature detection and klalgorithm
[2020 2nd International Conference on Advances in Computing, Communication Control and Networking (ICACCCN)]	system also studying multiple research done on deep learning fields for video analytics	to extract feature point from images. all system runs on real time video data generated from cctv.
Social Media Analysis for Investigating Consumer Sentiment on Mobile Banking. [(JICP) Vol. 4 No. 2, 241-253, November, 2021 P-ISSN: 2622-0989/E-ISSN: 2621-993X Https://www.ejournal.aibpm.org/index.php/JIC]	This white paper intends to give Indonesian banks additional information about how social media users feel about mobile banking services.	The most popular tweets are ranked according to the ratio of negative and positive tweets. The following mobile banking capabilities are available: Logged in are Payments, Transaction Report, Lock, Balance, Top Up, and Last. Since every feature has been gathered.
A Simple AI-Powered Video Analytics Framework for Human Motion Imitation. [978-1-7281-9136-2/20/$31.00 © 2020 IEEE]	the field is introduced Developing human motion detection using deep learning and the motion primitives. This study gives a high-level overview of the data processing pipeline, starting with human observations in movies, deep learning-based video analytics for motion analysis.	They suggested a service-oriented, pluggable, multi-layer, strong, lightweight Framework for DL video analytics. For motion detection and detecting human activity, hybrid deep learning techniques are applied. Utilizing the suggested hybrid deep model, motion in the input micro-video was found.
Multimodal Video Sentiment Analysis Using Deep Learning Approaches, a Survey. [https://doi.org/10.1016/j.inffus.2021.06.003 Received 1 March 2021; Received in revised form 30 May 2021; Accepted 6 June 2021 Available online 12 June 2021 1566-2535/© 2021 Elsevier B.V. A]	This paper aims a thorough rundown of the most recent developments in this field. Based on the architecture of each model, they presented a detailed classification of his 35 cutting-edge models that have recently been proposed in the field of video sentiment analysis into his eight categories.	The most effective multimodal sentiment analysis architecture the multimodal multi-utterance architecture is the challenge. second outcomes showed that the bimodal the foundation for attention is more reliable than the Cross-view dynamics are modelled using the self-attention
Automatic Video surveillance for theft detection in ATM machines: An enhanced approach. [Proceedings of the 10th INDIACom; INDIACom-2016; IEEE Conference ID: 37465 2016 3rd International Conference on "Computing for Sustainable Global Development", 16th - 18th March, 2016 Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi (INDIA)]	The goal is to automate ATM video surveillance and create a application that looks for any potential illicit activity that might take place within the system. This significantly lowers overall system inefficiency.	The technology will analyse the video and show the user's actions, whether they were stealing or security-related. He is first captured in the original video frame using screenshots. You will then see his portion of this video frame. The trained data set is compared to this segmented frame.

An Entanglement-driven Fusion Neural Network for Video Sentiment Analysis. [Proceedings of the Thirtieth International Joint Conference on Artificial Intelligence (IJCAI-21)]	The trick is to successfully combining many modalities for emotion detection in video emotion analysis. solution offers a transparent quantum stochastic neural model as a result	constructing a shared and open quantum probabilistic neural model for sentiment analysis of videos. The model can represent both classical and non-classical correlations between modalities thanks to the idea and formalization of non-separability as quantum entanglement merging bimodalities.
CUDA-Self-Organizing feature map based visual sentiment analysis of bank customer complaints for Analytical CRM. [https://arxiv.org/ published on 2019]	A paradigm for self-organizing functional map (SOM) descriptive analysis of customer complaints is proposed. The network can also be shown using a variety of methods and automatically learns various groups of complaints.	A self-organizing card structure for sentiment analysis that examines consumer complaints. We contrasted the model's performance with that of the term frequency representation and the TF-IDF representation, two vector space model representations he used in the document.

iii. Problem Statement

Bank is using video cameras for the purpose of surveillance at many branches, ATMs and digital lobbies. Getting video analytics of different parameters from the video recording will help the bank to resolve many operational issues at the branches. The bank wants to explore video analytics for understand the customer sentiments, understand the patterns

/behaviors/actions in certain branches for proactive surveillance and provide better services to customers.

Key issues

- Analysis of sentiment of banks customers using cctv video footage.
- Building a video surveillance for checking the Tampering with the cameras / sensitive or high priority area within banks premises.
- Real-time Counting the number of people detected in cctv camera in particular frame.
- Tracking any activity with smart video surveillance system that needs any attention.
- To analyze the total time duration for any activity that needs to happen with video analytics.

III. DATA COLLECTION AND VISUALIZATION

Given the dearth of video datasets for consumer sentiment analysis in banking, a dataset was built using YouTube videos with pertinent opinions. The Banking Services Sentiment Analysis Dataset is the name of this dataset (SADBS).

- SADBS Dataset description

Statistical measure	Value
Total no. videos	63
Total no. videos expressed by male	37
Total no. videos expressed by female	26
Total no. distinct speakers	59
Total no. opinion segments	524
Total no. positive segments	274
Total no. negative segments	250
Average no. opinion segments in video	8.32
Average length of opinion segments (seconds)	5.29
Average no. of video frames	137.24
Average word count per opinion segments	12.52
Total no. words in segments	6562
Total no. unique words in opinion segments	2774
Total no. words appears in segments at least 5 times in the dataset	491

Fig 1

- SADBS Dataset statistics

Sentiment		Gender		Age-group				Dialect			
		Female	Male	AGA	AGB	AGC	AGD	Egyptian	Gulf	Levantine	Maghrebi
Positive	274	134	140	103	113	47	11	106	106	33	16
Negative	250	82	168	25	46	95	84	143	61	46	13
Total	524	216	308	128	159	142	95	249	167	79	29

- Classified sentiments of customers into final decision.

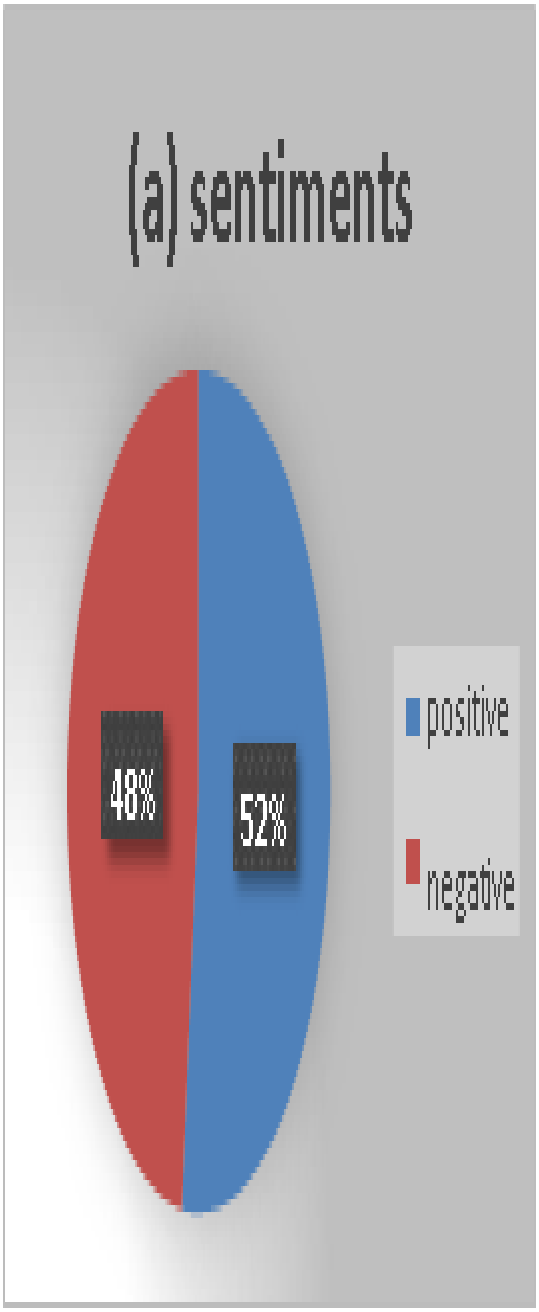
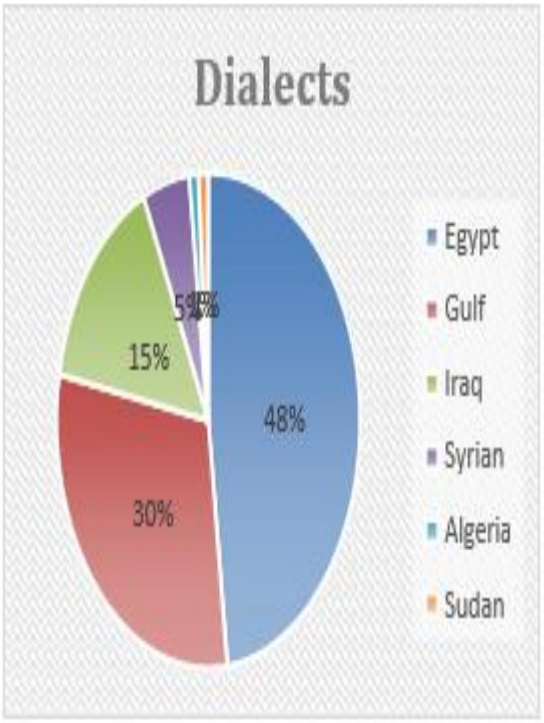


Fig 3

• Dialects used in dataset classified on the bases of regions.



• Number of instances of video data based on age group

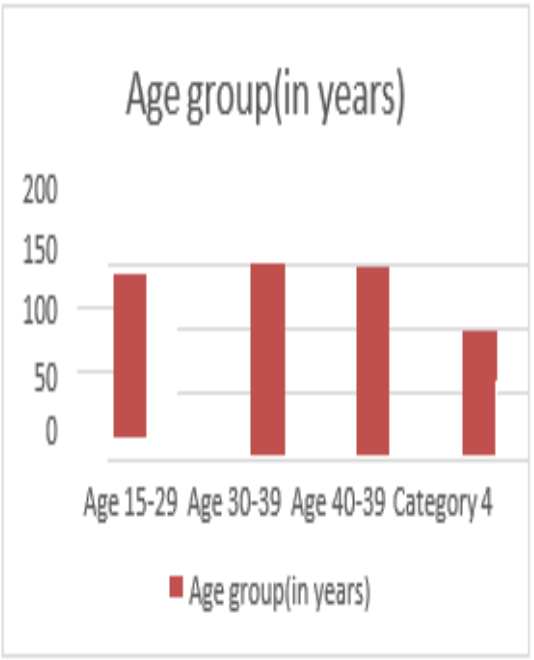


Fig 4

IV. PROPOSED SYSTEM

We must first extract visual, audio, and textual information from a video using the appropriate visual, auditory, and textual feature extractors in order to categorize the mood of the video. To accurately predict

the correct emotion, a classification model is fed with the three modality features that were retrieved. The next sections give a thorough description of the most recent models being utilized in the field as well as different kinds of visual, auditory, and textual feature extractors. The multimodal sentiment analysis technique for multimodal data is depicted in Figure 5.

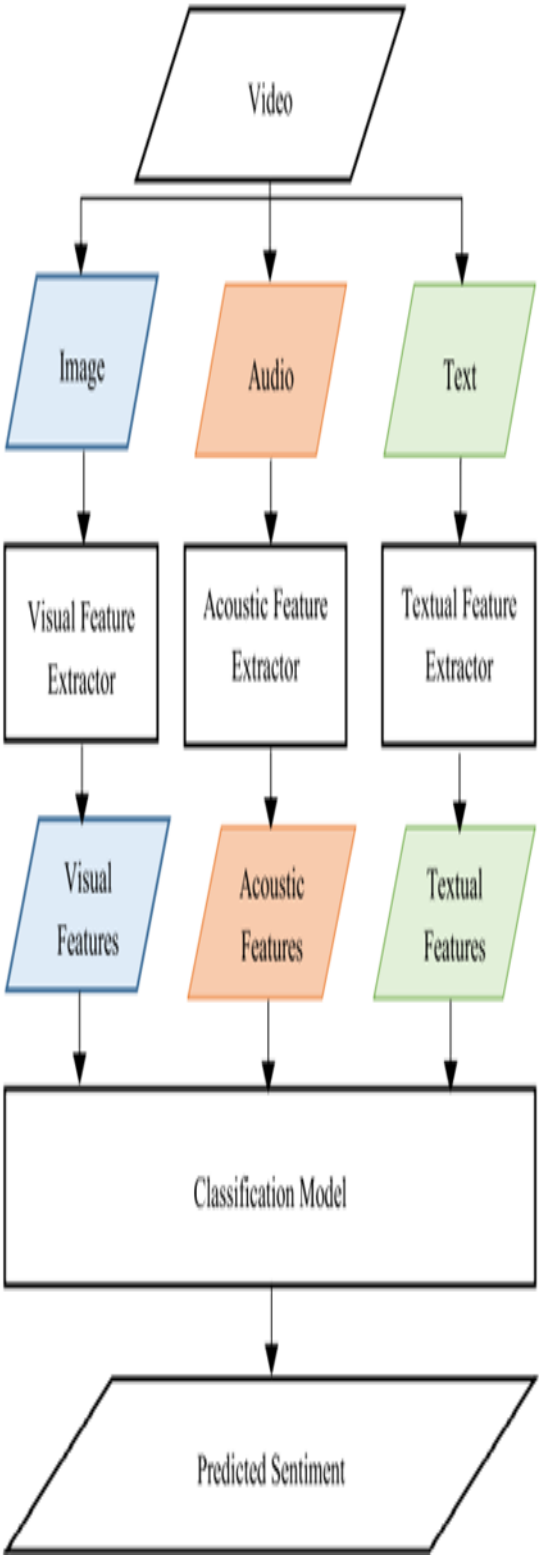
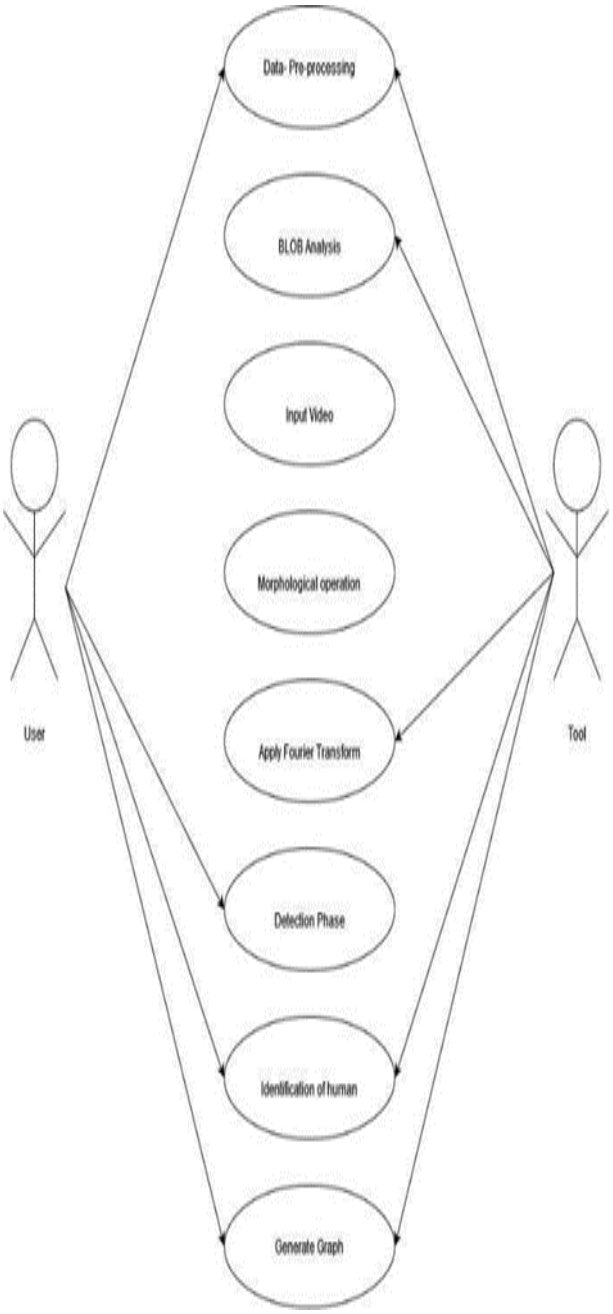


Fig 5: Sentiment analysis on a video



V. MODEL EVALUATION AND RESULT

These function files are provided for use in AI/ML/DL. The DL video analytics framework is highly modular and customizable. This makes the development lifecycle simple and easy. The flexibility of the Feature Extractor component makes it easy to integrate new feature extraction algorithms into the platform based on business specifications. The video data processing layer can also

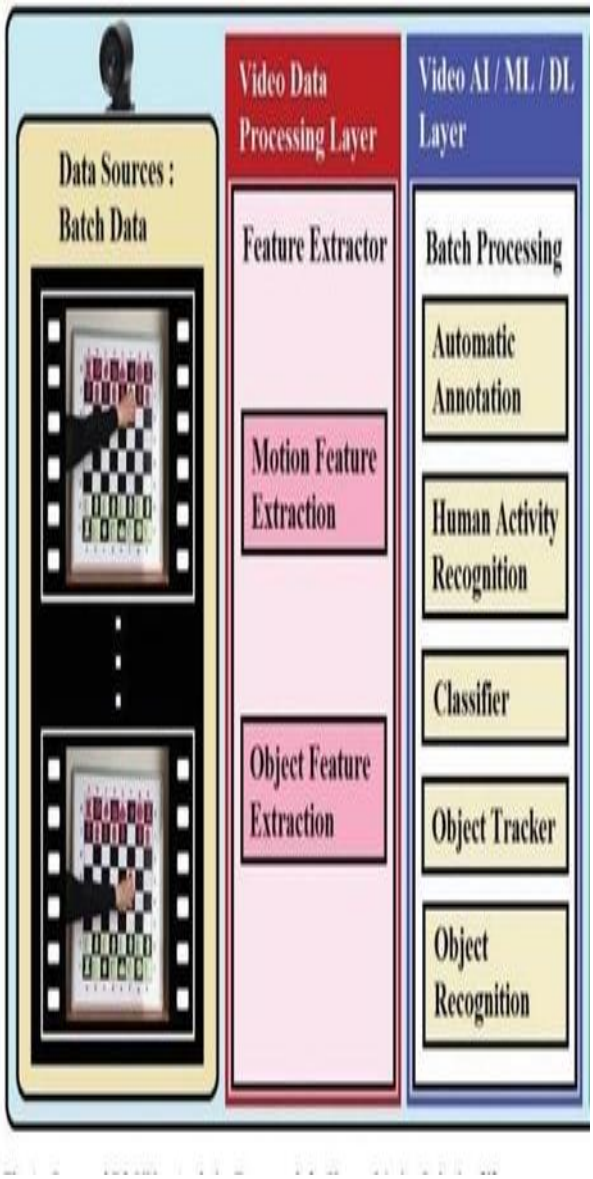
be extended.

For example, a new segmentation algorithm for 4464 videos can be created and added to the system to analyze long sequences of videos. In our work, this layer is

primarily in charge of processing raw video and image data. Her -layer Feature Extractor component also extracts significant features from image and video data.

Her two main extraction methods are object feature extraction and motion feature extraction. The Python and OpenCV libraries are used to implement the feature extraction method in the proposed hybrid deep model [1].

The feature extraction for objects is constructed using the checkerboard pattern [3] and the TensorFlow object identification API [4]. The Motion Feature Extraction API is built using a real-time portable detector [5]. The layer's input is the micro video data set, which consists of chess players' movements. This procedure generates a file that contains feature tensors as its results.



VI. ACKNOWLEDGMENT

I gratefully acknowledge the support, guidance, and encouragement of my Dissertation Guide Associate Professor Dr. Veena Kulkarni ma'am for this novel work.

VII. CONCLUSION AND FUTURE SCOPE

Video analytics has gained a lot of interest and contributed significantly to numerous applications. The sentiment analysis of financial services is covered in this white paper using a number of multi-modal, multi-dialectical video analytics methodologies. The effectiveness and prospective contributions of speech, text, and visual modalities were analysed together with the creation of a dataset, several models, and a dataset. This paper also investigated different Fusion technologies at single and hybrid levels. To compare the significance of progress for each model, a thorough statistical analysis is offered. When multiple modalities are combined, the model is able to choose more pertinent features, producing better results than the unimodal baseline system.

In the future, we will concentrate on creating a new model that is capable of stronger analysis of human emotions. In order to generalize these models to any language while performing prediction tasks, we also put a lot of effort into making them language agnostic. We also intend to update fresh bank records in this area.

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Design and development of deep learning based model for video

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safaumatia@gmail.com,neelamyadav2469@gmail.com,tanisha.v2001@gmail.com,Veena.kulkarni@thakureducation.orgANALYSIS

Abstract

In order to analyze video streams and extract particular features or patterns, such as object recognition, motion detection, facial recognition, or behavior analysis, video analysis employs computer vision and machine learning techniques. Analyzing video footage to spot suspicious activity or items and locate people or vehicles is part of the process. This approach comprises keeping an eye on and controlling traffic at crossings, on roads, and in highways. It entails reviewing video footage to find traffic jams and overcrowding and to offer prompt alerts or suggestions for crowd management.

Keywords-- ***Open CV, Real time, Video analysis, facial recognition, object recognition, feature Extraction***

I. INTRODUCTION

In order to conduct their investigations, law enforcement officials frequently need to spend a significant amount of time manually reviewing CCTV material. In order to make their job easier, a video analysis system is required that can automatically scan through CCTV footage for known facilitators like criminals and potential suspects. This system aims to improve object tracking and detection accuracy both in real-time and using historical data.

We are counting and locating recognized facilitators in addition to conducting real-time human detection. Real-time human detection uses either a live capture, static video, or snapshot for identification. We produce a report and analysis for it after detection.

II.LITERATURE SURVEY

Paper	Author & Year	Gap	Accuracy
Edge AI Face Recognition for Public Transport Fare Payment	Rusoke, Blaise Marvin; Musinguzi, Denis; Miyingo, Simon Peter; Katumba, Andrew (2022)	Our system's pipeline makes use of a pre-trained anti spoofmodel based off research by Costa et al. [7]. During ourdeployment tests, this model efficiency deteriorated with variations in lighting, and with low image quality	94%
Face Recognition Method for Online Exams	Sukmandhani, Arief & Sutedja, Indrajani. (2019).	further application development is expected by using updated algorithms for face recognition with a higher degree of accuracy. Trials for this method are only carried out with the same level of lighting, not yet done at different lighting levels and distances	96.3 %
Smart Surveillance System Using Face and Optical Character Recognition for Secure Environment	HarikaPalivela, Lakshmi &PM, Ashok Kumar & Krishna, V.V.. (2022).	If multiple cameras are used, additionally, the area or location at which the suspected individual was identified can also be included so as to better facilitate the authorities to apprehend that particular suspect. If a suspect is identified for a continuous protracted period of time, back-to-back emails will be sent to the authorities, which will lead to a spamming problem	98%

Table 1: Literature Survey

III. METHODOLOGY

A) Proposed Work

This is a rudimentary flowchart for a computer vision-based people detection system:

- Image or video feed capture: The system begins by taking a picture or video from a camera or sensor.
- Preprocessing: To improve the quality of the collected image or video and get rid of noise or artefacts, the data is first processed.
- Object detection: In order to identify faces or human bodies in the image or video, the system uses an object detection technique like Haar cascades and Histogram Oriented Gradients.
- Feature extraction: The algorithm collects information including shape, size, color, and location after identifying human bodies or faces.

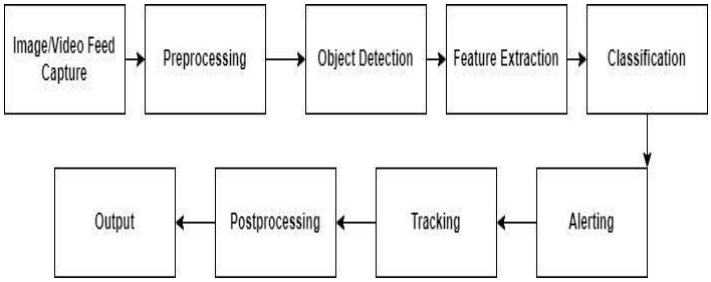

Fig.1. Flow diagram

- Classification: The system classifies the collected features as human or non-human using a machine learning method, such as support vector machines (SVM) or neural networks.
- Alerting: If a human is found, the system notifies a monitoring station, security staff, or other pertinent parties by sending an alarm or notification.
- Tracking: Using methods like optical flow or Kalman filters, the system may also follow the motion of any persons it has identified in an image or video over time.
- Postprocessing: The system then applies postprocessing to the result, such as removing false positives or enhancing the precision of the categorization, and creates a final report.

When utilizing computer vision to recognize humans, preprocessing is crucial. These are a few typical preprocessing methods for human detection:

Image normalization: is the process of enhancing an image's quality and making it better suited for human detecting algorithms by altering its brightness and contrast.

Picture resizing: is the process of adjusting an image's dimensions while keeping its aspect ratio. When the image resolution needs to be changed to meet the specifications of the human detection algorithm because it is either too high or too low, this technique can be helpful.

Noise reduction is essential for human detection systems because it gets rid of noise or other artefacts from an image or video input. The quality of the input data is increased by using methods like smoothing, median filtering, and Gaussian filtering to minimize noise.

Image enhancement By enhancing the contrast and edges in an image, one can make it simpler for human recognition algorithms to recognize the aspects of interest. Such approaches include contrast stretching, histogram equalization, and sharpness.

We looked into ways to more accurately count the number of people in movies or photographs.
Haar Cascade Classifier usage, In this case, we employ an .xml file for human detection, and with its help, we can identify people in real-time videos and photographs. We initially utilized this method to identify people, but the precision was poor.

For the purpose of object detection, computer vision and image processing employ the feature descriptor known as Histograms of Oriented Gradients (HOG). We tried this method, however we found no discernible improvement over the Haar Cascade Classifier method in terms of accuracy.

We have included a preview button in addition to the HOG description, which enables us to examine a preview of the selected image or video.
Following detection, we also displayed the maximum number of people in the window.

Finally, we used a third technique based on deep learning and convolutional neural networks utilising Tensorflow.

Using CNN and TensorFlow for Deep Learning
This is the solution to a number of computer vision issues, including object localization, object detection, and image classification.

Google's open-source TensorFlow API is frequently used to complete machine learning tasks involving Deep Neural Networks.

CNNs were a third way that was widely adopted, and we are now utilising deep learning to learn how to detect humans.
Comparing this procedure to the first, it provides greater accuracy.

To develop a personalised Haar cascade classifier for a specific object, there are only four easy steps.

1.Calculating the Haar features
2.Making Integral Images
3.Using Adaboost
4.Application of Cascading Classifiers

To recognize and help programs comprehend object detection functions, Open CV is employed. They include the methods cvtColor(), detectMultiScale(), rectangle(), and others.

Any video extension (.mp4,.mkv,.ovi, etc.) that is accepted as input for human detection can be used with the program's flexibility and human detection feature.

A big number of people are shown in the first test video's open space.Also, we have upgraded certain user interfaces and incorporated a few new functions.using other libraries like Imutils, a collection of useful functions that allow using OpenCV and Python to display Matplotlib pictures and do simple image processing operations like translation, rotation, scaling, and skeletonization much simpler.

Argparse is a module that makes it simple to create comprehensible command-line interfaces.
Work has also been done on labelling the human body that the algorithm detects with a counter that displays the number of persons in that scene in the video.

IV. RESULT

We have developed a system that can help identify known facilitators, and can identify human as well as keep a count of it. We have developed a interface where user can input image, video or he/she can make use of camera. After taking the input it's processes it, and extract features from it after which it detects the human.

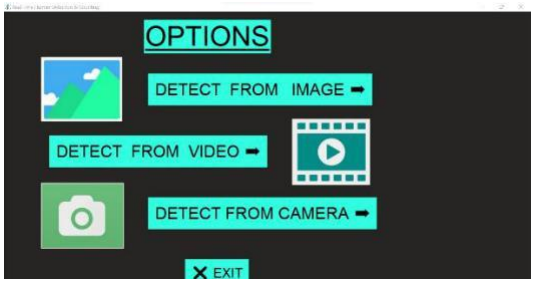

Fig.2. Fronted of human detection

Other then detecting humans, we have also developed a interface in which user can input image, and any video, after which our model will process through the video input and find that particular person in the video and will show the output in the form of image, with bounding boxes created on the person face.

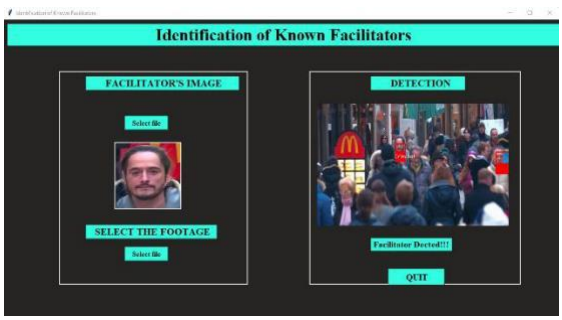

Fig.3. Frontend interface of known facilitators

Fig.4. Frontend interface of known facilitators output

We have used haar cascade and histogram orientated gradient for human detection purpose, where as for face identification we have used OpenCV etc.

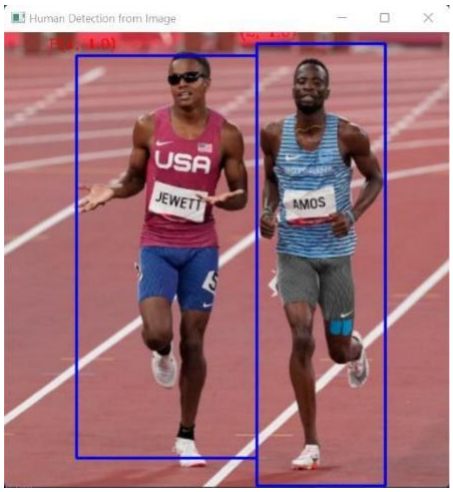

Fig.5. Bounding Box

Fig.6.Human detection output

We are also generating crowd report which shows, maximum human count, average accuracy as well as maximum average accuracy in the end it's show' s if the area is crowded or not as output.

This crowd report can be helpful for detecting crowded areas, and places.

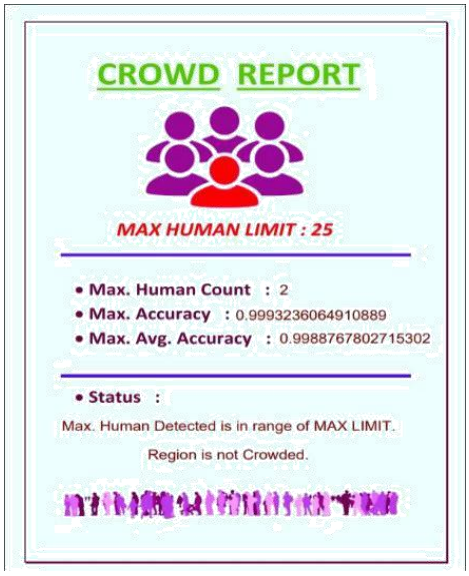

Fig.7.Crowd Report Output

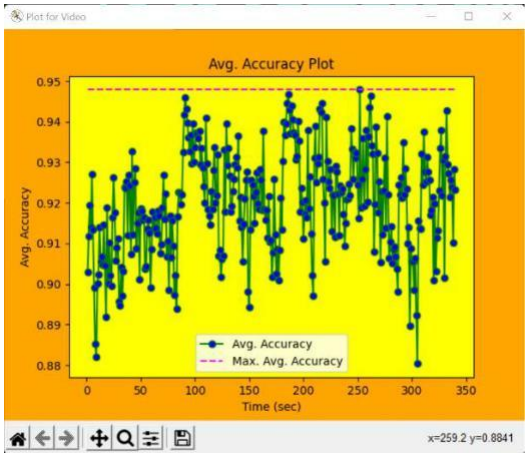

Fig.8. Accuracy Plot for Image

V. CONCLUSION

The proposed system is vital in today's world. This system can be used for various purposes such as at public areas like streets, parks, transportation hub to get rid of crime as well as to assist in emergency response. People can use for their personal use to monitor any activity, prevent theft and vandalism, and ensure safety. Also this proposed system can help identify known facilitators in case of criminal identification, where police professional can input image and check in the surveillance video and identify the criminal.

VI. FUTURE SCOPE

For future work, we can work more in image preprocessing as well improving our accuracy further. As well as we can work on to make a background running application could be made which keeps working without interfering and notifies when detects something abnormal. Accidents happening in public places could be detected. The model can further be trained in such a way that unusual events such as eve-teasing or involving any kind of violence could be detected. Can be used in the defense sector for security purposes.

VII. ACKNOWLEDGEMENT

We gratefully acknowledge our mentor Ms. Veena Kulkarni ma'am, for guiding and supporting us throughout this project work, as well as our Principal Sir, for providing us a platform to showcase our work.

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Music Recommender System using Facial Features Recognition

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Abstract – ***Facial expressions say a lot about the user's mood. Even a small change in facial expression can help us in detecting the change in the mood of an individual. Researchers have conducted a lot of studies in the field of Machine Learning and Computer Vision, where ML models are trained to detect various human emotions or moods based on the facial features that are captured.***

In this research, we propose a system that is capable of identifying the user's emotions and moods and then suggesting a list of appropriate songs that can improve the user's mood. This can be considered as an additional feature to the traditional music player apps that are already available on the internet. An important benefit of incorporating mood detection is customers' mental health condition and their personal satisfaction. The objective of this system is to capture the user's image, detect the mood of the user and suggest songs that could help improve their mood accordingly.

Keywords – ***Face Recognition, Emotion Detection, Music, Mood Detection, Recommendation System***

I. INTRODUCTION

The easiest way to understand a person in the conversation is to look at their face and body. Facial expressions are one of the most basic parts of human communication and can be viewed as a form of non-verbal communication [1]. Face recognition and emotion recognition are two concepts that have received a great deal of attention in recent research areas such as digital imaging, pattern recognition and computer vision [1]. Face recognition is a two-step process that begins with finding faces in photos or videos. It doesn't matter if the face is personal or not. Emotion recognition is used today in a variety of applications including smart card applications, surveillance, image database research, crime, video indexing, civil applications, security, adaptive human computers, and Interface for multimedia contexts.

Therefore, the main goal of this project is to develop a system that can identify different emotions of the user, from joy to sadness, from natural to shock. The proposed system then presents the user with a music playlist containing music clips of different types of music that enhances the user's mood after the emotion is evaluated. For example, if the user's facial expression is categorised as happy, the most appropriate playlist is activated: Classical Music playlist, where the user can choose from many music clips.

A. Motivation

Nowadays, music platforms make it simple to listen to a large amount of music. They are constantly working to improve music organization and search management, addressing the issue of choice, and making it easier to discover new music pieces. Recommendation systems are becoming increasingly popular, assisting people in selecting appropriate music for all occasions. However, there is still a gap in personalization and recommendation based on emotions. Music has a large influence on humans and is widely used for relaxation, mood regulation, stress and disease destruction, and mental and physical work maintenance [3]. Music therapy has a wide range of clinical settings and methods for well-being support [2]. This project will present the design of a personalized music recommendation system based on the emotions of the listener. A recommendation system is being developed using a combination of artificial intelligence technologies and generalized music therapy approaches to assist people with music selection for various life situations while also maintaining their mental and physical health.

B. Problem Definition

A user has to manually browse through his playlist and select songs that would soothe his mood and emotional experience when using traditional music players. Although these features meet the user's basic needs, the user is still required to manually browse through the playlist of songs and select songs based on his current mood and behaviour. The user suffered from the need and desire to browse through his playlist on a sporadic basis, depending on his mood and emotions.

The main goal of this project is to solve user problems and create a system that presents a music player that recommends music based on the user's real-time mood via a web camera using Deep Learning Algorithms.

C. Objectives of the Project

- To use various deep learning models and test it on the dataset and use the best model that provides the highest accuracy.
- To create a mood-based music player which performs real-time mood detection and suggests songs as per the detected mood.
- To provide appropriate music suggestions to the users based on their preferences.

D. Scope of the Project

- Only English songs will be recommended to the user using our system.
- The user should have a good camera with adequate brightness so that his/her face's emotions can be properly recognized.
- Our system will not work on a computer having an operating system less than windows 7.

E. Expected Outcomes of the Project

- The application would be able to accurately predict the user's mood based on the facial features captured.
- The recommendation engine in the application would be able to recommend the songs to the users based on the mood detected.
- The application would be able to suggest songs that would fit the user's preferences.

F. Applications of the Project

- How can it save the lives of drivers?

  Road rage occurs when a driver becomes enraged and directs his rage at other drivers on the road. Road rage diverts the driver's attention away from safety and disrupts his clear-headed thinking. It can endanger the driver as well as everyone else on the road. According to the National Highway Traffic Safety Administration, rash driving caused more than 55% of accidents (around 106,729), with anger being the most common cause.

  This mood-based music player project includes a special mode that distinguishes it from others. If the user's mood is classified as angry, it can play music to calm the user and change the user's mood to calm and cool. It may reduce the driver's aggression, preventing the driver from driving recklessly and potentially saving lives.

- How can it improve the mental health of a person?

  Our system can help improve the mental health of an individual by playing music according to his/her emotions. This can reduce the stress of an individual which can positively impact his mental health and reduces the chances of hypertension from which the user might suffer earlier.

- Other applications: Act as a plugin for the website, Smart TV, Personal Assistant etc.

II. LITERATURE REVIEW

In the research paper [4], implementation was done in two parts. First was mood detection and second was the song recommendation system. Mood detection was further divided into two modules the first being face detection and the second being mood detection. For face detection face detector class of java was chosen over Open CV library of Python since openCV is computational expensive and challenging to integrate with the android app. For mood detection Mobile net and Keras and again keras is computationally heavy and slow in android so mobilenet was used too. For the facial expression dataset, two datasets from Kaggle was used one was FER 2013 dataset and other being MMA facial expression recognition dataset. For the second part of the implementation i.e., song recommendation system, the dataset is downloaded from Kaggle which is labelled on different moods and firebase is chosen to be a dataset.

In this research paper [5], with the aim of coping with a few data and extracting only useful features from images, we propose new face cropping and rotation strategies and simplification of the convolutional neural network (CNN) to make data more abundant and only useful facial features can be extracted. Experiments to evaluate the proposed method were performed on the CK and JAFFE databases. The experiments recorded high accuracy of 97.38% and 97.18% for 7-class experiments on the CK+ and JAFFE databases. The results show that the proposed FER approach achieves competitive rests in terms of training time, testing time, and recognition accuracy. Furthermore, the proposed method can be implemented on an ordinary computer without GPU acceleration.

Another paper [6], divides the overall problem into three sections. The first one is emotion detection. CNN was used and the dataset used was FER2013. The final network was trained on 20K images and tested against 5K mages. This emotion detection model recorded an accuracy of 90%. The second section was to apply deep learning and classify the songs of the song database in different emotions. Again, CNN was used for that. The model achieved a classification accuracy of 97.6%. The third section is to recommend songs. Once the mood is detected, the User is provided with a playlist of all the songs classified as that mood.

Another Research [7] proposes an intelligent agent that sorts a music collection supported by the emotions conveyed by each song and then suggests an appropriate playlist to the user supported by his/her current mood. The user's local music collection is initially clustered and supported by the emotion of the song i.e., the mood of the song. This is often calculated by taking into consideration the lyrics of the song. Whenever the user wishes to get a mood-based playlist, the user takes an image of themselves that instant. This image is subjected to

facial detection and emotion recognition techniques, recognizing the emotion of the user. The best-matched music to this emotion is then recommended to the user.

III. PROPOSED WORK

Our suggested system is a music controller that detects emotions automatically. As illustrated in Figure 5, a camera is utilized to collect the photos that will be used as input to the proposed system, after which it is sent to the facial emotion detection model, which classifies it into: "Happy", "Natural", "Sad" or "Surprised.

Figure 1: Proposed Work

The user will be given a music playlist based on the expression or emotion identified, from which they can choose from a selection of music clips. For example, if the user's expression is classed as happy, the users will be able to select music clips from a joyful music playlist. We used a free dataset from the internet that contains 182 photos of four different emotions: joyful, natural, astonished, and sad.

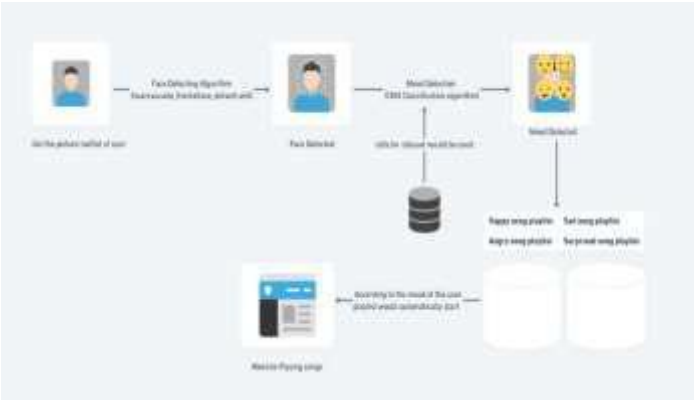

Figure 2: Proposed System Architecture

The stages that our project will follow are –

A. *Image Acquisition*

Nowadays, music platforms make it simple to listen to a large amount of music. They are constantly working to improve music organization and search management, addressing the issue of choice, and making it easier to discover new music pieces.

B. *Face Detection*

The system will begin to detect the face after obtaining the image. Simply put, the algorithm uses a sub-window to scan the photos and recognize the features of the face in the image. To improve the proposed system's performance, the image is trimmed to just contain the face once it has been determined.

C. *Emotion Detection*

Next, we must determine the user sentiment. To do so, we employ the PCA method, which is a well-known method for detecting facial expressions. The face space will be constructed using PCA, and the eigenvectors with the highest eigenvalues will be chosen. The acquired image will also be projected onto the face. The emotion is then detected by computing the scores for each emotion for the user image, and the image's emotion is chosen by taking the highest score of the calculated emotion scores.

D. *Enabling the corresponding Playlist*

The proposed system will display the appropriate music playlist based on the identified emotion. Because there are four emotions, we have four playlists with carefully selected music samples. The classical music playlist will be active for pleasant emotions, while the new age music playlist will be activated for natural emotions. For unpleasant emotions such as surprise and sadness, a designer music playlist will be enabled to improve the user's mood.

E. *Dataset*

The dataset contains 48x48 pixel grayscale images of faces with different emotions. The faces have been automatically registered so that the face is centred and occupies about the same amount of space in each image. Our job task is to categorize each face based on the expressions on the faces into the following categories (0=Angry, 1=Disgust, 2=Fear, 3=Happy, 4=Sad, 5=Surprise, 6=Neutral). The training set consists of 28,709 examples and the public test set consists of 3,589 examples.

F. *Feature Description*

- The user opens the app.
- The app gets opened and the user’s image is clicked through the webcam.
- The face gets detected then and the mood is identified.
- Some songs will be suggested to the user based on the mood of the user and if the user does not like the suggested song, then the user can click a button which will show more songs to the user from which the user can select the song of his preference.

G. *Generating the Playlist*

- The first task here is to generate the playlist.
- To do that first a random song is suggested to the user.A certain threshold (in seconds) is decided. If the user listens to the first song more than the threshold, then 20 similar songs would be taken, and a playlist would be generated. If the user skips the suggested song before the threshold is crossed, then a new random song will be suggested, and the same process is repeated until a playlist is generated of the user’s preference.

H. Alteration of the Playlist based on the mood

- Now the playlist is generated, and the user is enjoying the music. But suddenly the user skips the song. There could be 2 reasons for this: The first one could be that he does not want to listen to the song anymore (either he/she dislikes the song now or the user's mood is changed). The second potential reason could be that the user's mood has changed now and an alteration in the playlist is required now.
- This problem can be solved by clicking the picture of the user again when he/she changes/skips the song and again identification of the mood takes place.
- If the mood (which is just identified) matches the previous mood, then it can be concluded that the mood of the user has not changed yet but it's the song which no more stimulates the user and then that song then can be removed from the playlist.
- But if the new detected mood is different from the previous mood, then the playlist needs to be altered in a slightly different manner.
- This time we would add any random song of the new classified mood in the playlist, and it would be given to the user (Note: This new song would be recommended as the just next song after the user skips the previous song).
- Again, we will check for the threshold and if the threshold is cleared then 60%-70% songs of in the current playlist can be replaced by the songs like the randomly selected one.

I. Analysis at the End of the Day

Now the day is over and its midnight, the user is sleeping. A few analyses can be done now:

- Calculate the average time (in secs) of the listened music that changed the user's mood.
- To observe a particular mood, the user listened to the songs of which artist more.
- Calculate the average time (in secs) of the song listened,
- The user has which mood at what time in a day can be observed.

J. The last stage will be deployment and front end

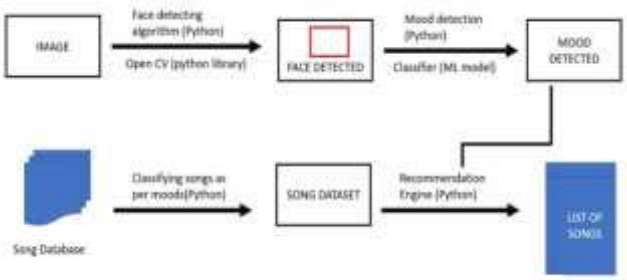

Figure 3: Methodology

IV. REQUIREMENT ANALYSIS AND PLANNING

After a careful analysis as shown in Table 1, the prime requirement of clients is to express proper unambiguous meaning of images and that will perhaps help intellectually impaired people. This analysis is done after observing responses to a survey created by us and floated among college students and elders.

Description	Criticality Level
Face detection in the Image given	4
Mood Classification using Facial Features	5
Song classification in the Songs Database	2
Recommending songs to the users from the database according to the mood detected.	5

Table 1: Requirement Specification (1-Least Critical, 2-Critical, 3-Recommended, 4-More Critical, 5-Most Critical)

A. Technical Feasibility Study

Deep learning is one of the most popular technologies used nowadays. The technology required in this project mainly surrounds the domain of deep learning. The first part of the project requires CNN (Convolution Neural Networks) for Identifying images and then classifying captions based on the image features. Creating appropriate CNN architecture or using pre-defined CNN architecture is a challenge here. Implementation would be done using the Tensorflow library of python which is an open-source library so implementing it is feasible. In the second half, a caption generator would be built to justify image captioning. Training our model to increase accuracy is a challenge. To train CNN models, we may use the GPU of Google Colab to increase the speed of training and validation. The users will be able to access and use our project via an online website.

B. Financial Feasibility Study

As of now, since the dataset is limited, no financial help is required. The online GPU provided by Google Colab is sufficient for training and evaluating the model. Though, to deploy the model on a website and to host a website online we need to buy a domain which may cost around 500 rupees per year with some maintenance costs. As a future scope, once the site is hosted and becomes popular, the number of users will increase hence the dataset increases too. With ever-increasing data, training the CNN model will become difficult on the free GPU which was provided by Google Colab hence we may need to buy Google Cloud GPU which costs around 325$ for 40Gb per GPU.

C. Technical Requirements

For implementing purposes, we used Anaconda and Jupyter as our IDEs. The language used is solely python as it is reliable for Deep Learning models. We are going to use some pre-installed python libraries to create our models and process the data.

The front-end is built using ReactJs. React is a free and open-source front-end JavaScript library for building user interfaces based on UI components. For styling, we have used modern styling methods in the web application. This is done using a Styling library known as Tailwind CSS. Tailwind CSS makes it faster and easier to build modern websites. It is a highly customizable, low-level CSS framework that gives you all the building blocks you need to build designs without any annoying opinionated styles you have to fight to override. For managing the different states of our react app components, we have made use of the React Redux. React Redux makes it easier to manage component states for big and complex React projects.

Google Colab or Google Colaboratory is a free-to-use Jupyter notebook environment that runs in the cloud. Similar to documents in Google Docs, team members can simultaneously edit the notebooks. A lot of Machine Learning libraries are supported by Colab.

Figure 4: Technologies Used

Figure 5: UI for the Music Player

V. RESULTS AND DISCUSSIONS

The first model that we created i.e., fer_1.h5 had the problem of overfitting. It happened because there were too many conv2D layers one after the other without max-pooling. The reason we removed max-pooling layers is that the image size is already too short and applying max-pooling layers was making it way less in a dimension that training the model became impossible. (20 epochs).

Now we have a slightly improved model. In this max-pooling layer are added again but this time in conv2D layers we are using padding to solve the above issue, also we have added a batch-normalizer. First, we are training our data on this model for 20 epochs initially. Still, we faced here the same problem of overfitting.

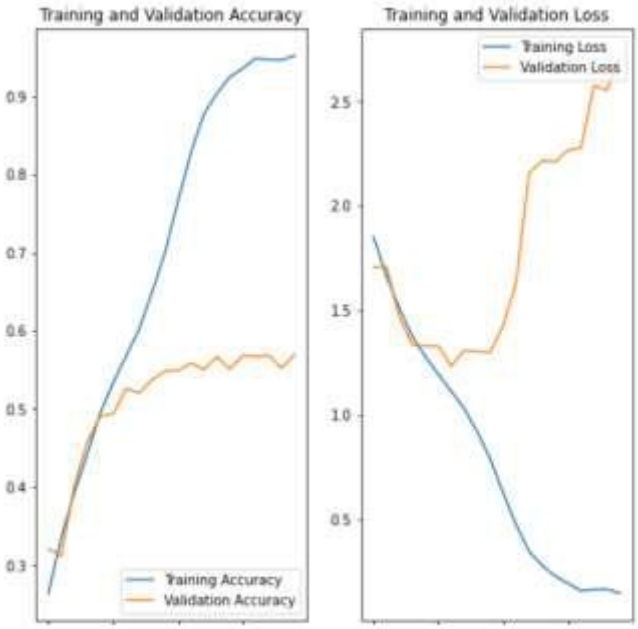

Figure 6: Results of the model with the most accuracy (57.90% accuracy on test data)

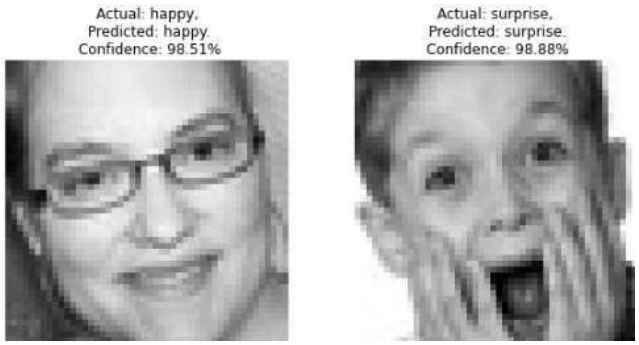

Figure 7: Predictions by the model with the most accuracy

The third training model has slight improvements from the second. We removed half of the convolutional layers and changed the number of filters and the filter size. Here also, we faced the problem of overfitting.

The fourth model is a transfer learning of the Resnet50 model trained on Imagenet for the first 55 epochs the accuracy of the model is 37% on test data. We observed there was slight overfitting after the 40th epoch as some gap between the training line and validation line was seen. After training for more than 50 epochs the accuracy for test_ds was still 37% and overfitting also increased.

The fifth model is the transfer learning of the VGG16 model trained on Imagenet for the first 55 epochs. The accuracy of the model is 46.6% on test data and the problem of overfitting persisted here too.

The sixth model is the upgradation of 3rd model. We are adding a layer of augmentation to deal with overfitting and, we are adding a dropout layer just before the flattened layer. The problem of overfitting was solved here. After 60 epochs the accuracy of the testing data is around 51%, the same for training and validation data.

The seventh model is transfer learning (pre-trained VGG16 model) with data augmentation, dropout layers and regularization (all to get rid of the problem of overfitting). This model underfits.

Sr. No.	Model	Accuracy on test data
1	Model 2 – best accuracy	57.90%
2	Model 7 – least accuracy	24.49%

Table 2: Comparison of the best and the worst trained model

VI. CONCLUSION

We present an outline of how music can affect a user's mood and how selecting the proper music tracks can improve a user's mood in this project. We also demonstrated approaches for detecting emotions. The technology that is created will be able to detect the user's emotions. The algorithm was able to distinguish happy, sad, natural, and astonished emotions. After assessing the user's emotion, the suggested system created a playlist for the user that included music that matched the mood. After researching which kind of music are appropriate for each mood, the music was picked to improve the user's emotion.

VII. ACKNOWLEDGMENT

We are extremely thankful to our project guide Dr. Sheetal Rathi for the valuable support and guidance she gave us on every step of the project execution. We also like to express gratitude to all the mentors and faculties of the Thakur College of Engineering and Technology who helped us accomplish this work.

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Image Meaning Extraction to Aid Visual Learning

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Abstract—**Nowadays, an image caption generator has become the need of the hour, be it for social media enthusiasts or visually impaired people. It can be used as a plugin in currently trending social media platforms to recommend suitable captions or can aid visually impaired people to understand the image content on the web thus eradicating any ambiguity in image meaning in turn also free of any discrepancy in knowledge acquisition. The proposed paper aims to generate a description of an image also called as image captioning, using CNN-LSTM architecture such that CNN layers will help in extraction of the input data and LSTM will extract relevant information throughout the processing of input such that the current word acts as an input for the prediction of the next word. The programming language used will be Python 3 and machine learning techniques [21]. We have used the Resnet50 model to first extract train images features and then have run our own CNN-LSTM model on them. The model created by us has been trained for 60 epochs giving us the accuracy of nearly 80%. This paper will also elaborate on the functions and structure of the various Neural networks involved.**

Keywords— ***CNN, LSTM, BLEU, encoder, Resnet50***

I. INTRODUCTION

Generation of accurate captions for an image has been one of the major challenges to be solved by Artificial Intelligence and Deep Learning with vast amounts of applications ranging in diverse fields like commerce, marketing as well as social welfare. Its use ranges from providing accurate captions for videos in situations like security systems as well as in robotic vision aiding the visually impaired. As the name suggests, the aim is to build an optimal system generating grammatically and semantical captions for an image with minimal scope of error. Image captioning works for converting a given input image into a natural language description. It is described as one of the challenging yet fundamental tasks. This is due to it great potential impact which includes:

- Providing compact and accurate information of images in video surveillance systems.
- Helping in the generation of captions while sharing images on social networking sites.
- For better understanding of content images on the web for visually impaired people.

In this paper, we analyse a deep neural network-based image caption generation method. We can provide as input the image to obtain an English/Hindi sentence describing the contents of the image. This is done through a subfield of machine learning concerned with algorithms working like the brain, structurally and functionally called Deep learning. The techniques used will be Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN).

CNN helps in classification based on differentiation of images from one another. The neural network consists of several convolutional layers mixed with nonlinear and pooling layers such that as an image is passed through one convolution layer, the input for the second layer is the output generated by the first layer. This is continued for all subsequent layers until we receive a fully connected layer containing output information. LSTM (RNN) can extract relevant information throughout the processing of inputs such that input of one word for each LSTM layer results in prediction of the next word, thus optimizing itself by learning from captions. The CNN-LSTM architecture basically involves using CNN layers for feature extraction on input data combined with LSTMs to support sequence prediction such that combination of image feature and LSTM are added as inputs in the decoder model to generate output as caption with the length as that of dataset captions. This model is specifically designed for sequence prediction with:

- Spatial inputs, like the 2D structure or pixels in an image or the 1D structure of words in a document [4].

● Temporal structure in their input such as the order of images in a video or words in text, or require the generation of output such as words in a textual description [4].

II. LITERATURE REVIEW

Past papers have suggested neural models, which have generated captions by using the technology of recurrent neural networks, usually a long short-term memory (LSTM). A NIC model has been used to showcase an end-to-end neural network model to not only automatically see a photo but produce a reasonable description in English using CNN which can help visually impaired people understand content of any image. This is done through a given query image to join current human-made expressions retrieved by model to produce a novel description for the inquiry picture. Further, the creation technique explains the content of the images by anticipating the nearest possible nouns, preposition and verbs.

In recent years, there has been development in the process of image description which can be seen by the [1] use of attention mechanisms to allow the neural network to have the ability to focus on its subset of inputs (specific inputs) rather than the whole. The mechanism can be divided into two aspects:

- Decide the part of the input to be paid attention.
- Allocation of limited information processing resources to a significant part.

Over the time, different types of attention have been used, thus not only considering the relationship between the state and the predicted word, but also considering the image, but allowing a direct association between the title word and the image region. Therefore, recent input images have shown that the [4] trained model could detect relationships between various objects in images as well as the actions of those objects. For evaluation,[1] BLEU [14] and METEOR are used for machine translations, ROUGE is for automatic summary, and CIDEr and SPICE are used for image caption. Finally, we have CNN used for extracting features from the image using a pre-trained VGG-16 model and GTTS API is used to generate the image caption to audio. Evaluation of this model is done by generating descriptions for all photos in the test dataset and evaluating those predictions with a standard cost function which functions as a standalone module.

Past papers have revealed various tools and technologies for effective image caption generation but also have some gaps to be yet filled. In paper [3], the model is only able to generate description sentences corresponding to multiple main objects for images with single target objects and also the speed of training, testing, and generating sentences for the model are not optimized. The model [3] needs to expand its scope to train on datasets larger than 100,000 images thus producing better accuracy models on production level. Right now, it is restricted to predicting the words in its vocabulary only in a single language. One more model [5] that is studied deals with cross-lingual caption generation i.e., converting English to Japanese with cross-lingual retrieval of information. This is achieved by exploiting the English corpus with establishing a connection the dataset to be a comparable corpus. When pre-training was done ahead of time, cross lingual transfer was effective when the resource in the target language and convergence was faster in same amount of time. Paper [5] serves as a baseline for future research in the area of cross-lingual image caption generation. Another paper [6] studied deals with and end to end neural network system, NIC based on CNN and RNN such that model is trained to maximize the probability of a sentence for any given image. Evaluation like [1][3][4] is done using BLEU and ranking metrics such that as dataset for image increases so does the performance. Approximately five datasets have been used to understand the effect of dataset size on generalization. One of the challenges faced involves overfitting providing high variance. The paper classifies [13] the model into two different architecture - the merge and the inject architecture. In the inject architecture, we input the tokenized caption and the image vectors into the RNN block. The merge architecture just inputs the captions to the RNN block to merge the output with the image. Though both of the architecture guarantee accuracy equally, the merge architecture owing to its simple design leads to faster training due to reduction in hidden states.

Various other papers have been studied described by the table:

TABLE I.
LITERATURE SURVEY

Paper Name	Technology/Algorithm	Advantages	Gaps Identified
Image Caption Generator Based on Deep Neural Networks, Jianhui Chen Wenqiang Dong, Minchen Li [8]	Convolutional Neural Networks, Recurrent Neural Networks, Long Short-Term Memory	1. Proposed a simpler version of GRU having less parameters achieving comparable results evaluated using COCO caption corpus. 2. Generation of semantically correct sentences for the uploaded images. 3. End to end learning framework. 4. A deep study of the image captioning method to find out an optimal pipeline by replacement or modification of components and evaluation.	1. Has a considerable number of errors while detection of objects and generation of sentences. 2. Requires a larger amount of human labelled data which can be expensive in terms of operation. 3. Need exploration of methods to generate multiple sentences for a better understanding of the uploaded image.
Image Caption Generator Using CNN and LSTM, Swarnim Tripathi,Ravi Sharma[9]	Convolutional Neural Networks, Recurrent Neural Networks, Long Short-Term Memory	1. Shows a study of various image captioning techniques such as CNN, RNN and LSTM with their pros and cons. 2. Discusses the Vanishing Gradient problem[15] and the role of LSTMs in solving the problem. 3. Study of CNN architecture - convolutional, pooling and fully connected to generate the feature map. Study of the LSTM architecture consisting of forget gate, input gate and output gate [12].	1. The image caption generation model is a simple model with a considerable number of errors.
Camera2Caption: A RealTime Image Caption Generator, Pranay Mathur, Aman Gill, Aayush Yadav, Anurag Mishra and Nand Kumar Bansode [10]	Convolutional Neural Networks, Long Short-Term Memory	1. The technique generates well-formed sentences requiring semantic and syntactic of the language. 2. Shows high accuracy in image recognition and object detection. 3. Is computationally efficient.	1. Larger amount of training data is required. 2. Convolution Neural Network does not encode the position and orientation of the object. 3. Inability to be spatially invariant to the input data.
Domain-Specific Image Caption Generator with Semantic Ontology, Seung Ho Han and Ho-Jin Choi [1]	Convolutional Neural Networks, Long Short-Term Memory, Recurrent Neural Networks	1. Generate domain-specific image caption based on object information. 2. It makes use of semantic ontology to provide natural language description.	1. Model is not in end-to-end manner for semantic ontology.

After a careful analysis as shown below, it can be seen that the prime requirement of clients is to express proper unambiguous meaning of images and that will perhaps help intellectually impaired people. This analysis is done after observing responses to a survey created by us and floated among college students and elders.

1- Less Critical
2- Critical
3- Recommended
4- More Critical
5- Most Critical

TABLE II
REQUIREMENT ANALYSIS

DESCRIPTION	CRITICALITY LEVEL
Expressing image meaning	5
Removing image ambiguity	4
Suggesting good image captions	3
Aiding intellectually impaired people	4

III. METHODOLOGY

A. CNN Architecture

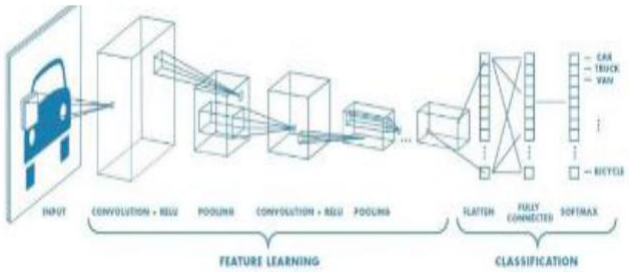

Fig. 1. Architecture of Convolutional Neural Networks for object classification.[20]

The CNN architecture consists of three layers - convolutional, pooling and fully connected. The first layer creates a features map on the basis of the input image read through the CNN. This output is passed onto the pooling layer where the feature map is broken down into simpler parts to discover critical information about the image. Depending on the picture, the two layers are practiced to get in depth information about the image creating a dense feature map. Finally, the last layer performs classification to a greater level to identify people and objects among others.
The AlexNet[20], VGGNet [20] and GoogLeNet [20] are widely used deep convolutional neural network architectures. They share the convolution pipeline explained having different shapes and connections of layers, especially the convolution layer. AlexNet is the first deep convolutional neural network used for large scale image classification. VGGNet and GoogLeNet achieves the-start-of-the-art performance in the ImageNet recognition challenge 2014 and 2015. [20]

B. LSTM Architecture

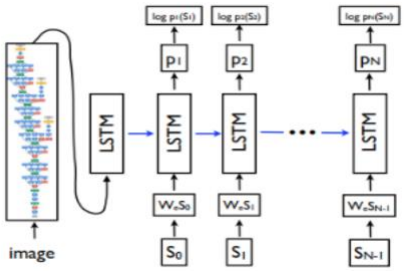

Fig.2. LSTM Model

LSTM, a discipline of Recurrent Neural Networks solves the vanishing gradient problem occurring in RNN. RNN stores the data for a fleeting time and stores only some array of data. The vanishing gradient problem is formed when RNN stores data values at each time step resulting in storing huge amounts of data, much greater than feasible. LSTM comes here to rescue. It stores the input data and generates predictions about the subsequent dataset on its own [20]. LSTM uses three main gates:

1. Forget Gate - Acts as a filter to remove the unwanted data and optimize it.
2. Input gate - Take the output of CNN as input.
3. Output gate - showing the final outcome.

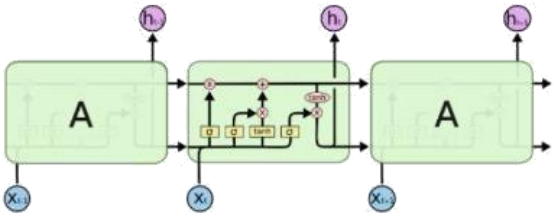

Fig. 3. The recurrent module in LSTM contains four interconnected layers[20]

LSTM uses several gates ensuring studying values again and again, mainly back propagation easier. All the gates are skilled enough to make judgment and take decisions regarding the data.

C. Workflow

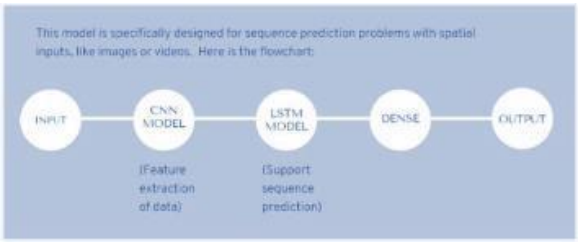

Fig. 4. Workflow

1) Dataset

The corpus that we used was the Flickr 8K dataset. There are 5 captions for each of the 8000 photos in the dataset. Understanding all the different circumstances is made easier by the single image's 5 captions. The dataset includes three prepared datasets: Flickr 8k.trainImages.txt (6,000 photos), Flickr 8k.devImages.txt (1,000 images), and Flickr 8k.testImages.txt (1,000 images) (1,000 images).

The images are chosen from six unique Flickr groups and don't feature any famous people or locations. They are nevertheless manually chosen to display a diversity of scenes. [20]

These links (thanks to Jason Brownlee) will allow you to download these datasets, each of which is 1GB in size:

Image Dataset:https://github.com/jbrownlee/Datasets/releases/download/Flickr8k/Flickr8k_Dataset.zip

Text Dataset: https://github.com/jbrownlee/Datasets/releases/download/Flickr8k/Flickr8k_text.zip

Fig. 5. Flickr8k Image Dataset

Fig. 6. Flickr8k Text File

2) Preparing Resnet50:

Here, Resnet50 which is a transfer learning model(pre-trained) is imported. The model is modified a bit by removing its last layer and thus making its penultimate layer the output layer with about 2048 labels.

3) Feature Extraction:

For each train image, the above Resnet50 model is executed to extract useful features from the image, which are stored in a python dictionary besides its respective keys which are the corresponding image addresses itself. The images are reshaped to a dimension of about 224*224*3 for feeding it to our Resnet model.

4) Text Processing:

Simple text processing techniques like converting all captions to lowercase, removing punctuations and adding a start and end phrase to each caption is performed.

5) Vocabulary Creation:

The main idea is to first count occurrences of each unique word within the captions dataset and then replace each word in every caption by their respective word count. This will convert all our captions to Integer values which is useful and interpretable to our model.

6) Data Generator:

As this is a supervised learning assignment, training the model requires giving it an input and an output. Our model is trained on almost 6000 photos, with each image containing:

1. A 4096-length feature vector.
2. A numerical value is used to represent the caption that goes with the image. Here, the variables X,Y_in,Y_out are created where:

a) X: Image Features

b) Y_in: Input Word

c) Y_out: Next Predicted Word

All the three variables are then converted to numpy arrays.

7) Model Building:

We will use 6000 training photos to train the model, creating its input and output sequences in batches before fitting them to the model. It would take a lot of training to get the model to 60 epochs. An LSTM-based model will be created with the help of the features vectors received from the Resnet50 Network in order to achieve the goal of creating a caption for the provided image.

8) Model Evaluation:

Each epoch will generate an accuracy score and the loss value which will give us an idea about the model performance.

9) Testing:

The same Python notebook can be used for testing or another one can be made. In any case, we will load the trained model that we had previously saved and produce predictions.

In addition to the tokenizer file, we made earlier, the sequence generator will now be used.

For the specific image under observation, the first stage of feature extraction will be carried out.

The function is manually supplied the path of one of the remaining 2000 test photos. A dictionary or a list can be used to keep track of the predictions for each image as you iterate through the test data set.

The start sequence and the finish sequence are used in the actual functioning of image generation.

10) Integration with frontend:

The model created will be integrated with a good user interface created via HTML, CSS and JavaScript which will support text to speech conversion as well as language translations. Flask framework will be used to integrate the same. So at the end a web application will be created where:

1. User will upload the Image from the frontend
2. The Image will be processed by our model created to predict an appropriate caption to the image.
3. The user will have an option to view the caption in different languages and also to hear the caption in case the user is visually impaired.

IV. RESULTS

A. The captions dictionary was prepared which binds image urls to corresponding captions.

```
captions_dict

{'3338654550_3efe9a71af.jpg': ['A line of bikers on a busy street',
  'Busy street full of cars and bike riders .',
  'Five people on bikes in traffic with man watching from the side of the road .',
  'Group of cyclists spotted on an Asian highway .',
  'Men in a bicycle race ride through the streets of China .'],
 '3334953664_8669038795.jpg': ['A baseball player in a blue uniform has just released the baseball on the sidelines .',
  'A baseball player is following through with an action nearby a teammate .',
  'A baseball player streins to throw a ball .',
  'A yough boy in a blue and white baseball uniform throwing a baseball while tucking his glove close to his body .',
  'The baseball player wearing blue is throwing the ball .'],
 '3335581468_628655d688.jpg': ['A bird is flapping its wings on the water .',
  'A brown duck with a green head flaps its wings in the water .',
  'A green headed mallard duck flapping its wings in the water .',
  'Duck flapping wings .',
  'Mallard duck swimming out in the water .'],
 '3335547029_74d620fa6c.jpg': ['A girl in a black and blue wetsuit is surfing .',
  'A woman , in a blue and black wetsuit , is water boarding .',
  'a woman surfer on a white surfboard riding a large wave',
  'A woman wearing a black and blue striped suit is surfing on a wave .',
  'A young woman is watersking'],
 '3335692531_dd4a995f91.jpg': ['Brown dog and two black dogs have three-way tug on red object , outdoors .',
  'Three dogs are all tugging on the same toy as they stand behind a house .',
  'Three large dogs , one brown and the others black , tussle over a red toy in the grass outside a building .',
  'Two black dog and a brown dog are tugging at a red object with their mouths .',
  'Two black dogs are tugging on a red toy that is in a brown dog 's mouth .'],
 '3335772346_ac0d97efeb.jpg': ['A grey haired in a wetsuit poised in the water .',
  'A group of surfers in wetsuits are trying to catch a wave .',
  'A man is running through the water alongside others doing the same .',
  'A wave crashing through a group of people wearing wetsuits and goggles .',
  'The swimmers are getting ready to race wearing black swimmers .'],
 '3335885203_a3fe6e541f.jpg': ['A female rugby player runs with a rugby ball during a match .',
  'A group of children wearing uniforms run along the field after one who is holding the ball .',
  'Children play football .',
  'Young people are engaged in a game .',
  'Young people in uniform are playing in a rugby game .'],
 '3335997221_254366c480.jpg': ['A group of dressed-up people talking .',
  'a group of five young people all dressed in black in a dimlight room',
  'A total of five people in black clothes are having conversations in a plain white room .',
  'Three men and two women talking .',
  'Two groups of people dressed in black clothes and with brown hair , except for one blonde woman , hold separate conversations .'],
 '3336065481_2c21e622c8.jpg': ['A small girl in yellow slides down an orange slide .',
  'A young girl dressed in yellow sliding down a curvy , red slide at a playground .',
  'A young girl on an orange slide',
  'A young girl sliding down an orange slide',
  'Little girl sliding down an orange playground slide .'],
```

Fig. 7. Image ids bound to their captions

The necessary pre-processing has been done by removing punctuations, converting to lowercase etc.

```
[79] '''
     One of the main steps in NLP is to remove noise so that the machine can detect the patterns easil
     '''
     import string
     def clean_description(desc):
       for key, des_list in desc.items():
         for i in range(len(des_list)):
           caption = des_list[i]
           caption = [ch for ch in caption if ch not in string.punctuation]
           caption = ''.join(caption)
           caption = caption.split(' ')
           caption = [word.lower() for word in caption if len(word)>1 and word.isalpha()]
           caption = ' '.join(caption)
           des_list[i] = caption

     clean_description(descriptions)
     descriptions['1000268201_693b08cb0e']

['child in pink dress is climbing up set of stairs in an entry way',
 'girl going into wooden building',
 'little girl climbing into wooden playhouse',
 'little girl climbing the stairs to her playhouse',
 'little girl in pink dress going into wooden cabin']
```

Fig. 8. Pre-processing the captions

Start and End phrases also have been added to define the start and end of the caption.

```
startseq A child in a pink dress is climbing up a set of stairs in an entry way . endseq
startseq A girl going into a wooden building . endseq
startseq A little girl climbing into a wooden playhouse . endseq
startseq A little girl climbing the stairs to her playhouse . endseq
startseq A little girl in a pink dress going into a wooden cabin . endseq
```

Fig. 9. Start and end added to captions

B. The Resnet50 model was used for extracting image features.

```
conv5_block2_3_conv (Conv2D)   (None, 7, 7, 2048)   1050624    ['conv5_block2_2_relu[0][0]']

conv5_block2_3_bn (BatchNormal (None, 7, 7, 2048)   8192       ['conv5_block2_3_conv[0][0]']
ization)

conv5_block2_add (Add)         (None, 7, 7, 2048)   0          ['conv5_block1_out[0][0]',
                                                                'conv5_block2_3_bn[0][0]']

conv5_block2_out (Activation)  (None, 7, 7, 2048)   0          ['conv5_block2_add[0][0]']

conv5_block3_1_conv (Conv2D)   (None, 7, 7, 512)    1049088    ['conv5_block2_out[0][0]']

conv5_block3_1_bn (BatchNormal (None, 7, 7, 512)    2048       ['conv5_block3_1_conv[0][0]']
ization)

conv5_block3_1_relu (Activatio (None, 7, 7, 512)    0          ['conv5_block3_1_bn[0][0]']
n)

conv5_block3_2_conv (Conv2D)   (None, 7, 7, 512)    2359808    ['conv5_block3_1_relu[0][0]']

conv5_block3_2_bn (BatchNormal (None, 7, 7, 512)    2048       ['conv5_block3_2_conv[0][0]']
ization)

conv5_block3_2_relu (Activatio (None, 7, 7, 512)    0          ['conv5_block3_2_bn[0][0]']
n)

conv5_block3_3_conv (Conv2D)   (None, 7, 7, 2048)   1050624    ['conv5_block3_2_relu[0][0]']

conv5_block3_3_bn (BatchNormal (None, 7, 7, 2048)   8192       ['conv5_block3_3_conv[0][0]']
ization)

conv5_block3_add (Add)         (None, 7, 7, 2048)   0          ['conv5_block2_out[0][0]',
                                                                'conv5_block3_3_bn[0][0]']

conv5_block3_out (Activation)  (None, 7, 7, 2048)   0          ['conv5_block3_add[0][0]']

avg_pool (GlobalAveragePooling (None, 2048)         0          ['conv5_block3_out[0][0]']
2D)

==================================================================================================
Total params: 23,587,712
Trainable params: 23,534,592
Non-trainable params: 53,120
```

Fig. 10. Resnet50 summary

C. The set of unique words with their count(frequency) in the entire dataset was found.

```
'bikes': 18,
'in': 19,
'traffic': 20,
'with': 21,
'man': 22,
'watching': 23,
'from': 24,
'the': 25,
'side': 26,
'road': 27,
'group': 28,
'cyclists': 29,
'spotted': 30,
'an': 31,
'asian': 32,
'highway': 33,
'men': 34,
'bicycle': 35,
'race': 36,
'ride': 37,
'through': 38,
'streets': 39,
'china': 40,
'baseball': 41,
'player': 42,
'blue': 43,
'uniform': 44,
'has': 45,
'just': 46,
'released': 47,
'sidelines': 48,
'is': 49,
'following': 50,
'action': 51,
'nearby': 52,
'teammate': 53,
'strains': 54,
'to': 55,
'throw': 56,
'ball': 57,
'yougn': 58,
'boy': 59,
```

Fig. 11. Word count of all unique words

D. Using these counts, all the words from the captions were replaced by their respective counts to convert the textual data to integer.

```
[1, 80, 75, 81, 82, 19, 25, 73, 15, 9]],
'3335547029_74d620fa6c.jpg': [[1,
  2,
  83,
  19,
  2,
  84,
  12,
  43,
  85,
  49,
  86,
  15,
  9],
 [1, 2, 87, 88, 19, 2, 43, 12, 84, 85, 88, 49, 73, 89, 15, 9],
 [1, 2, 87, 90, 6, 2, 60, 91, 92, 2, 93, 94, 9],
 [1, 2, 87, 68, 2, 84, 12, 43, 95, 96, 49, 86, 6, 2, 94, 15, 9],
 [1, 2, 97, 87, 49, 98, 9]],
```

Fig. 12. Captions converted to integers

E. After text processing, the model was built using CNN-LSTM layers.

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 dense (Dense)               (None, 128)               262272

 repeat_vector (RepeatVector  (None, 34, 128)          0
 )

=================================================================
Total params: 262,272
Trainable params: 262,272
Non-trainable params: 0
_________________________________________________________________
Model: "sequential_1"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 embedding (Embedding)       (None, 34, 128)           424832

 lstm (LSTM)                 (None, 34, 256)           394240

 time_distributed (TimeDistr  (None, 34, 128)          32896
 ibuted)

=================================================================
Total params: 851,968
Trainable params: 851,968
Non-trainable params: 0
_________________________________________________________________
Model: "model_1"
__________________________________________________________________________________________________
 Layer (type)                Output Shape              Param #   Connected to
==================================================================================================
 embedding_input (InputLayer)  [(None, 34)]            0         []

 dense_input (InputLayer)    [(None, 2048)]            0         []

 embedding (Embedding)       (None, 34, 128)           424832    ['embedding_input[0][0]']

 dense (Dense)               (None, 128)               262272    ['dense_input[0][0]']

 lstm (LSTM)                 (None, 34, 256)           394240    ['embedding[0][0]']

 repeat_vector (RepeatVector)  (None, 34, 128)         0         ['dense[0][0]']

 time_distributed (TimeDistribu  (None, 34, 128)       32896     ['lstm[0][0]']
 ted)

 concatenate (Concatenate)   (None, 34, 256)           0         ['repeat_vector[0][0]',
                                                                  'time_distributed[0][0]']

 lstm_1 (LSTM)               (None, 34, 128)           197120    ['concatenate[0][0]']

 lstm_2 (LSTM)               (None, 512)               1312768   ['lstm_1[0][0]']

 dense_2 (Dense)             (None, 3319)              1702647   ['lstm_2[0][0]']
```

Fig. 13. CNN-LSTM Model Summary

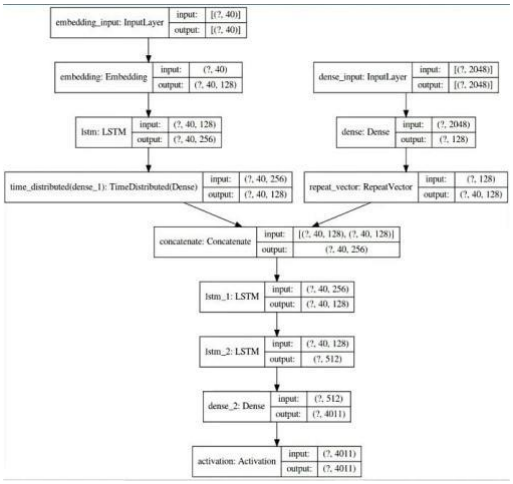

Fig. 14. Model Architecture

F. The training was done for 60 epochs with batch size of 125 images per epoch and the end result was the model being successfully trained with an accuracy of about **80%.**

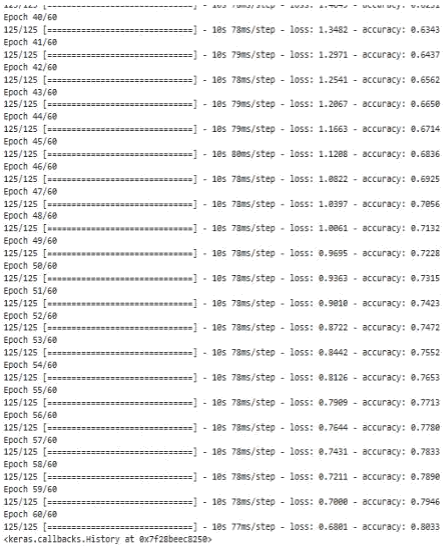

Fig. 15. Training Results

G. To validate the model, a test image is picked and the model is executed on it to predict the respective captions.

Fig. 16. Caption predicted by model for a test image

The results after running our model on different images are summarized below. The captions generated are near accurate and similar to original ones.

TABLE III.

RESULTS OF THE MODEL FOR CAPTIONS PREDICTIONS

Image	**Actual Caption**	**Predicted Caption**
	A person is riding an orange ATV in a large empty field	A man in a hat and a red helmet, holding a ATV on a dirt path
	A boy in his blue swim shorts at the beach	A young boy is standing at the camera with his hands in his arms standing in the street.
	Two girls smiling	Two girls playing in a pool

H. The final integration with the frontend using flask is done and the web application(website) is created using flask. The captions generated can be converted to different languages using Google Translate API and also captions can be heard by voice by the users. This is the page where the user will upload the image.

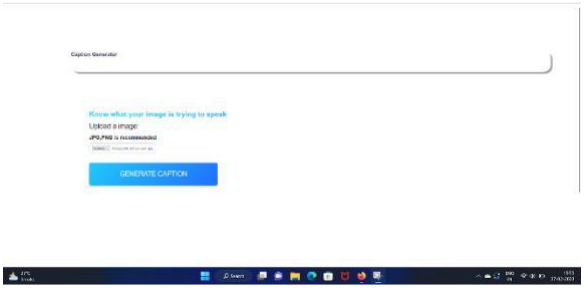

Fig. 17. Main web page

Here, the caption will be visible after the “Generate Caption” button is clicked.

Fig. 18. Caption Result

Also, the caption can be heard by clicking the “Listen your Caption” button and the caption can also be viewed in different languages.

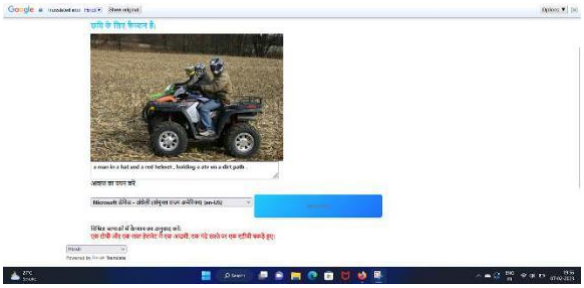

Fig. 19. Caption in Hindi language

V. CONCLUSION

As a result, we can conclude that deep learning can be used to generate image captions. We can go even further by creating a hashtag generator. Based on the findings, we may conclude that the deep learning technology employed yielded positive outcomes. Because the CNN and the LSTM were synchronized, they were able to determine the relationship between objects in images.[21]

The product can be sold as a plugin to various social media platforms due to its compact and small size nature. The features namely language translator and text to voice eradicates all possible barriers to the people with disabilities to read or understand.

VI. FUTURE SCOPE

The work done in this research has been done on an existing database on which a lot of work has been done. Here, the accuracy was improved by introducing some different techniques and model structure. However, in future we could do this same work on a dynamic dataset. Also, more images could be brought into the dataset so that the model works accurately and is even able to perform better on unseen images. The Web application created in this work can be converted into a mobile application which can enhance usability.

ACKNOWLEDGMENT

We gratefully acknowledge the support, guidance and encouragement of our guide, Mr.Shailesh Sangle sir for this work. [21]

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Development of an intelligent management accounting system by using Machine learning and extensive data mining techniques

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Abstract: **Too many assumptions are baked into the conventional management accounting data processing, making it difficult to change the issue. This study employs data mining algorithms to acquire data and explore rules to increase the operational efficiency of a system using artificial intelligence information technology. Furthermore, the study employs statistical, machine learning, and other approaches to examine the relationship between attribute values and convert data into valuable information for decision-making. In addition, it identified the close relationship between corporate finance and business. This paper employs several machine learning algorithms to create an intelligent management accounting information system that, in turn, facilitates closed-loop management among financial analysis, risk management, performance monitoring, and managerial decision-making. In conclusion, this research plans studies to test the accuracy of the model. Based on the study's findings, it is clear that the system designed in this article adequately provides the sophisticated need for accounting data.**

Keywords- statistical, machine learning, Data mining, decision-making, management accounting.

I. INTRODUCTION

With the advent of AI, data has increased at an unprecedented rate. Large data sets provide challenges for conventional management accounting, and the complexity of extracting useful information from them is growing. Improving the management accounting information system's intelligence using artificial intelligence technology and combining data mining and machine learning is important to increase the system's operational efficacy.

The administration of businesses is becoming more reliant on the advancement of information technology due to the current era's rising social and economic growth levels. Management accounting's role corporate financial management is expanding in today's business world. Via the merging of financial and business data, through the study and analysis of information technology approaches, management choices that are conducive to the growth of company strategy may be found.Scientific management judgments are of great significance to the enhancement of the future economic profit of the firm. The extension of the scale of operation and the constant strengthening of comprehensive strength. At the same time, business complexity and size increase. At that point, it will depend more on management accounting for its decision-making.

II. NEURAL NETWORKS TECHNIQUE:

2.1 The neural network model has two main phases:

Training and recognition. Gathering training data, planning the network's architecture, deciding on the neural network's depth, the number of hidden nodes in each layer, and the activation function and loss function for the output layer are the primary components of the training process. Precisely, the weight matrices of each layer are adjusted based on the discrepancy between the prediction results of the present network and the goal value we genuinely desire. Acquire the Data collection process via training samples and the Learned parameters of each layer through training samples. The loss function, sometimes called the objective function, is an equation used to quantify how far off the actual value is from the projected one. Mean square error (MSE) is often used to measure how far off the actual value is from the projected one. The accuracy of a forecast is enhanced when the MSE is low. Training consists of gradually decreasing the MSE.

One kind of neural network architecture, error backpropagation, uses feedforward neural networks with three or more layers. The gradient algorithm uses the difference between the expected and actual output to adjust the weights of each link. The BP network is taught by randomly selecting examples from training samples that provide the desired outcomes. Data travels across the intermediary levels from the input layer to the output layer. Then, Compare the final result to the ideal value, and the weights of the connections between the intermediate and final layers are adjusted accordingly.

At last, the algorithm loops back to the input stage. Model weights are continually improved via repeated sample selection and training to reduce the gap between the actual and desired output values. Here are BP neural network's calculated steps:

Initialization process for the three-layer neural network:

inputs, l hidden nodes, and m output nodes. In addition, aji represent the bias from the input layer to the hidden

layer, Wjk means the weight from the hidden layer to the output layer, Wij represents the weight from the input layer to the hidden layer, and bk represents the bias from the hidden layer to the output layer. The excitation function is g, and the learning rate is (n). The excitation function g(n) is one, and it has the Sigmoid form

$$g(n) = \frac{1}{1+e^{-n}} n \in (-\infty + \infty)$$

The hidden layer's output denoted Hj, is

$$hj = g(\sum W_{ij} n_i + a_j)$$

The output layer is

$$O_k = g(\sum H_j W_{jk} + b_k)$$

Error is

$$Error = \frac{1}{2} \sum (y_k - o_k)^2$$

We may train a network with n input nodes, n1, n2,...,nn

III. MODEL DEVELOPMENT:

Big data is the foundation of the business intelligence (BI) process. Additionally, the data is saved in DW in an organized manner after being processed using ETL technology. Reveals the Data linkages after OLAP analysis, which is an excellent tool for managers to learn more about their operations. From time to time, managers must go deeper into the data to uncover the insights hiding inside. DM may assist appropriate data sources using tools like data crawlers and model libraries.

The decision's outcome may be recorded in the DW and used as a foundation for future choices. With the help of BI, the enterprise's management operations may evolve into more strategic endeavors. Figure 1 depicts this procedure [12].

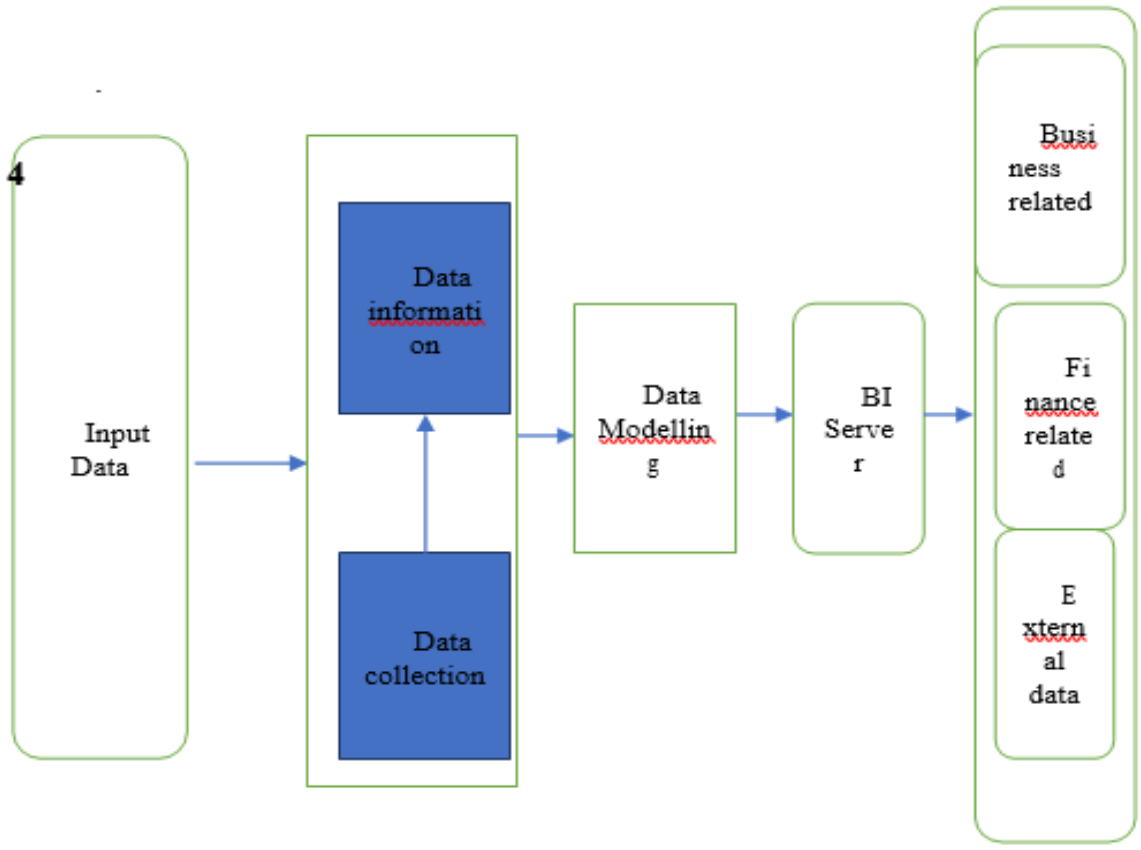

Figure 1: business intelligence (BI) process.

The Data Warehouse (DW) is the hub of an organization's data storage, offering an enterprise-wide, topic-based analytical environment. Conceptual, logical, and physical models are the three most common types of DW models. The three-tier data warehouse model's mapping connection is in Fig. 2.

• Themes in the conceptual model are conveyed via dimensions and metrics, while the conceptual model Expresses itself through topics. One's perspective, or "dimension," is the lens through which one examines the world, and one's "measure," or "measurement," is the quantitative information associated with that perspective, such as sales volume. The conceptual model may represent an information package schematic, which would include the subject's multidimensional features, the level of each dimension, and analytical indications.

• The star model and snowflake model are the most common logical models. The star model includes a fact table and a dimension table, with numerous dimension tables linked to the fact table.

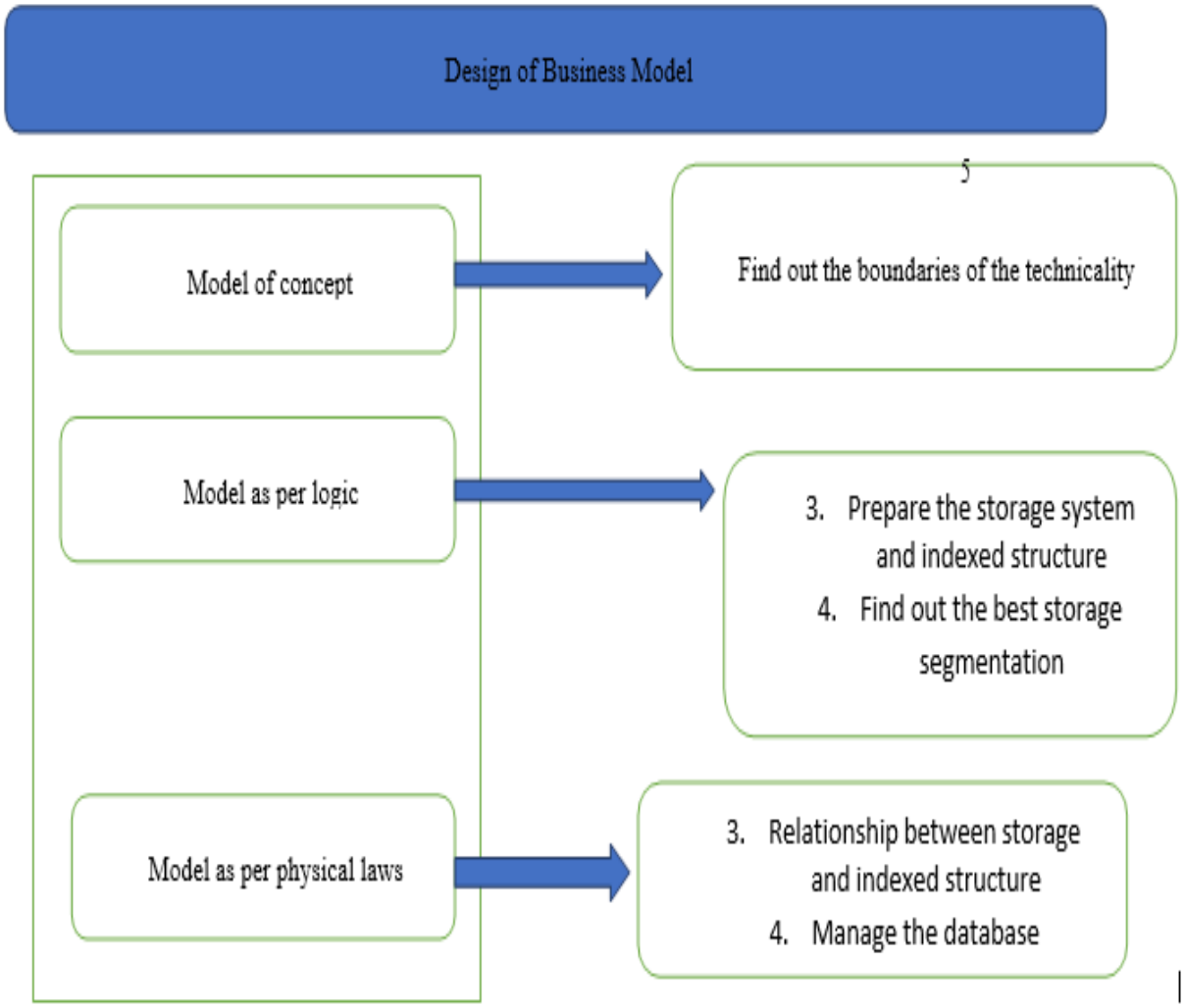

Figure 2: Relates the data model to data warehouse in layer by layer

A procurement star model in Fig. 3. The date table, the product table, the supplier table, and the logistics table are all dimension tables. In contrast, the procurement table is a fact table. Similar to how the star expanded model into a snowflake model. To reduce duplication, some data in dimension tables are divided into more specific tables. Data warehouse features, including data storage structure, data indexing technique, data storage strategy, and storage optimization allocation, are all examples of the physical model.

DW does more than collect information; it also shares news by way of a predetermined procedure (Fig. 4). Extraction of Data,

• Information in DW organizes by topic. Thus, it's essential to Before loading raw data into a data warehouse, isolate the information used for decision support. Each stage of describe extraction here.

— Information from the specified source and its interpretation; this brings us to option

— extraction. Determine which source data files or tables are accessible.

— The rate of extraction occurs at determined.

— Results. Where the information is going, and what file produce.

— Dealing with unexpected situations or how to process information when necessary information is not recovered.

• Cleaning up the data. When comparing data, the noisy data and the quiet data are filtered.

• converting data. The basic information evolves into the necessary destination data, which often entails converting formats, summarizing data, etc.

After the data has been cleansed and transformed, it is loaded into the DW using direct append and complete coverage.

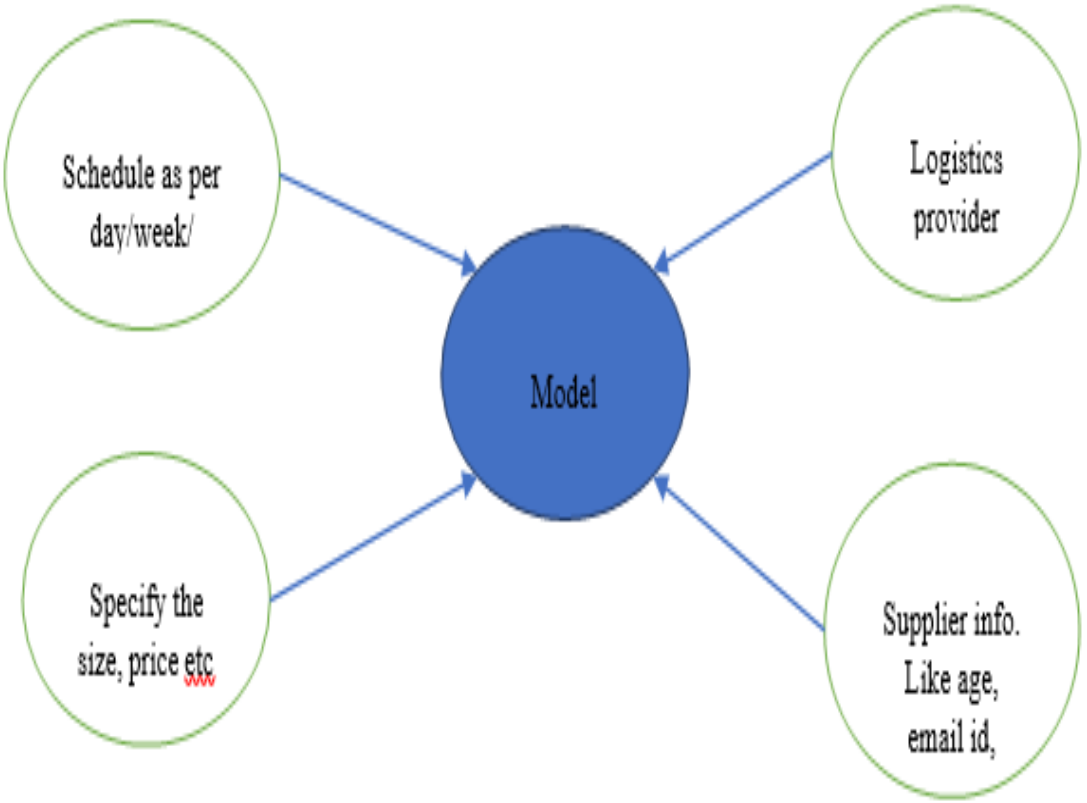

Figure 3: Model development

Figure 4: Framework of ETL process

When it comes to Online Analytical Processing (OLAP), the primary framework relies on a cube because anything can describe. In online analytical processing, the cube is a (virtual or physical) multidimensional data structure that allows for fast data processing; it also supports multifaceted in addition to intelligent data analysis and smooth operations. Develop the cube's data structure to address the shortcomings of database systems that rely on relationships between tables.

The term "data mining" (DM) describes analysing data using automated or semi- automated tools to unearth previously unknown relationships and correlations. In contrast to the OLAP described in the preceding section, data mining (DM) seeks to unearth previously unsuspected patterns in the data rather than verify the integrity of a specific hypothesis. Therefore, at its core, it is an inductive learning process. The steps involved in DM are exhaustive. The stages of data mining Fig. 5.

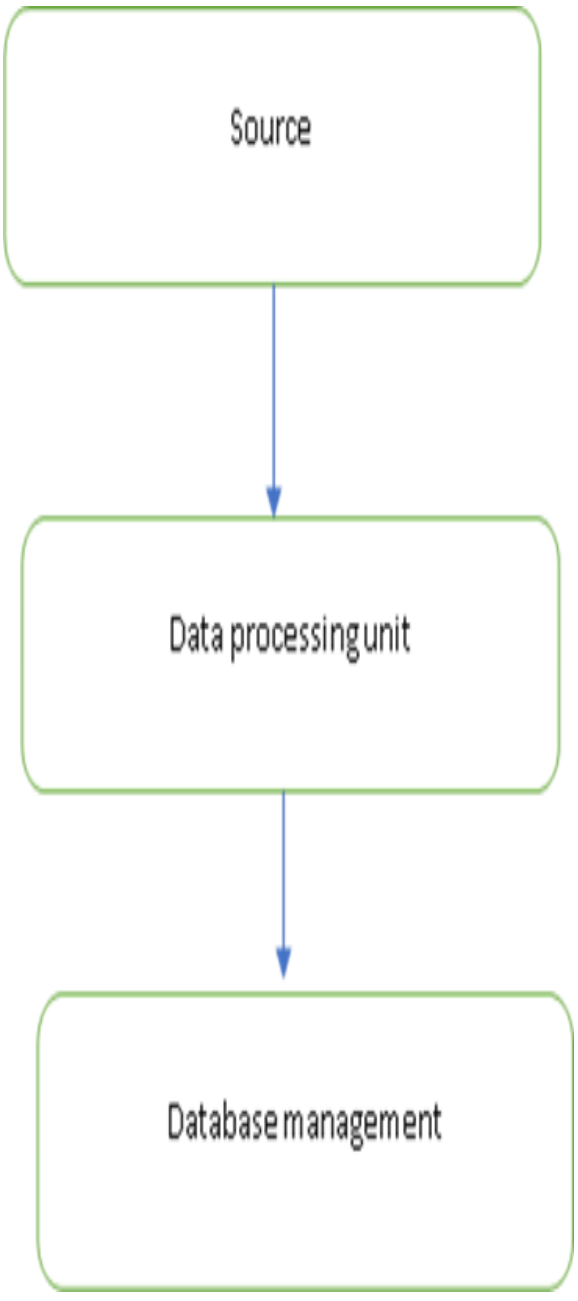

Figure 5: Data mining process

OLAP is the way to go when it comes to data analysis in DW. However, there are large-scale patterns of data. OLAP is currently unable to provide an estimate. However, The importance of predicting today's managers often requires additional support beyond what is provided by management accounting their decision-making through forecasting work to aid in constantly shifting

conditions. Right now, DM stands out as crucial in the field of management accounting The data processing system. Technology such as statistics, databases, machine learning, and others are all used in data mining. It performs a correlation analysis to determine if there is a significant relationship between two attributes. It helps businesses see previously hidden patterns in data, convert raw data into actionable insights, and competitive benefits, advantages, and merits.

Figure 7: Intelligent Accounting management system

This essay argues that a sophisticated, cutting-edge management accounting data system should have many vital components (Fig.6). One of the four components is the Accounting Analysis Management System. Risk Management Information System 2 System for Performance Management Information Fourth, a system that aids in making accounting-related decisions.

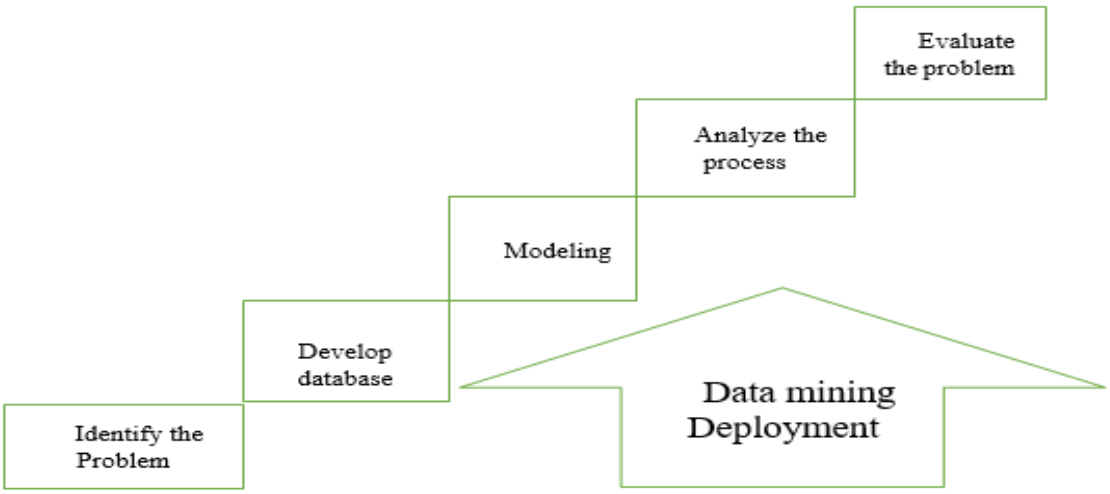

Figure 6: Data mining deployment process

In light of the account above, the authors of this study set out to create the kind of intelligent management accounting information system shown in Fig. 8. The system's primary components are a support platform with features like a data interface and system services. An accounting analysis management system with features like accounting report management, an information system for managing risks in a closed- loop fashion, a method for evaluating the effectiveness of an organization's performance, and a plan for providing decision-makers with information to guide their accounting practises. In addition, each system operates separately, takes care of its tasks, and communicates with the others to lend a hand in the enterprise's administration

IV. MODEL PERFORMANCE EVALUATION PROCESS:

This article checks the model's performance after it has been built and conducts data processing analysis according to the actual demands of management accounting. First, this study uses expert scoring methodologies to assess the effectiveness of model data mining and rank its performance—seventy-five data sets used in the simulations presented in this research. The results are in Table 1 and Fig. 8.

Sl. No	Scores	Sl. No	Scores	Sl. No	Scores	Sl. No	Scores
1	72	21	71	41	68	61	71
2	78	22	75	42	65	62	67
3	79	23	68	43	62	63	64
4	74	24	69	44	63	64	61
5	76	25	71	45	80	65	62
6	78	26	70	46	73	66	65
7	77	27	72	47	71	67	68
8	72	28	73	48	75	68	69
9	71	29	69	49	74	69	63
10	70	30	70	50	75	70	78
11	61	3	68	51	80	71	74

1

12	67	32	62	52	79	72	75
13	68	33	63	53	74	73	79
14	69	34	74	54	75	74	72
15	68	35	75	55	78	75	71
16	62	36	71	56	79	76	76
17	62	37	72	57	76	77	68
18	64	38	70	58	73	78	62
19	68	39	80	59	73	79	64
20	78	40	68	60	72	80	67

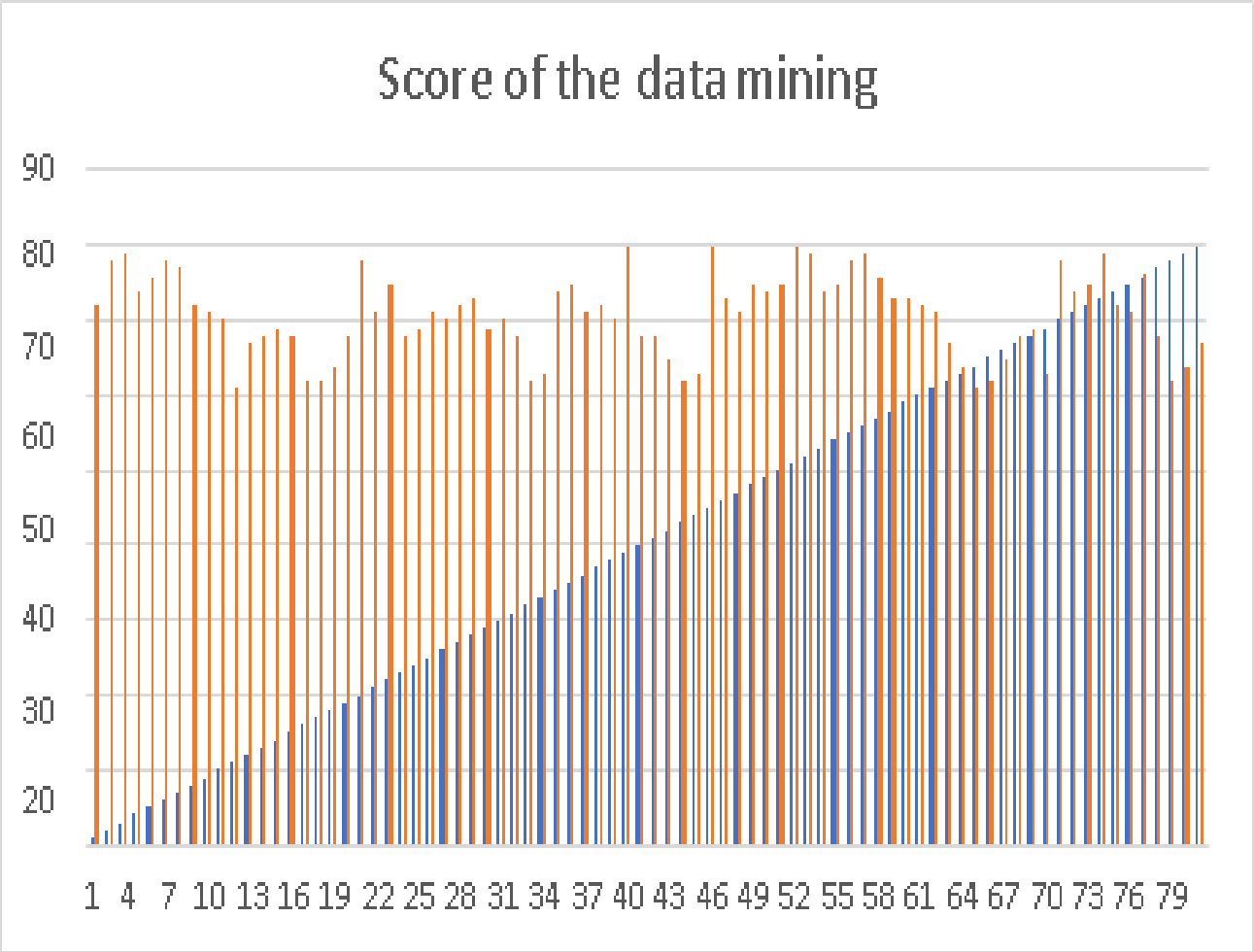

Figure 8: Statical data mining management accounting system

By examining the data above, it is clear that the management accounting information system developed in this paper has a robust data mining effect and can extract valuable knowledge from large datasets. The article then assesses the reliability of the management accounting database's data processing. Both Table 2 and Figure 9 display the findings.

Table 2: Summary statistics for MIS data processing precision

SI. No	Score s
1	99.8
2	99.8
3	99.8
4	99.8
5	99.8
6	99.8
7	99.8
8	99.8
9	99.8
10	99.8
11	99.8
12	99.8
13	99.8
14	99.8
15	99.8

16	99.8
17	99.8
18	99.8
19	99.8
20	99.8
21	99.8
22	99.8
23	99.8
24	99.8
25	99.8

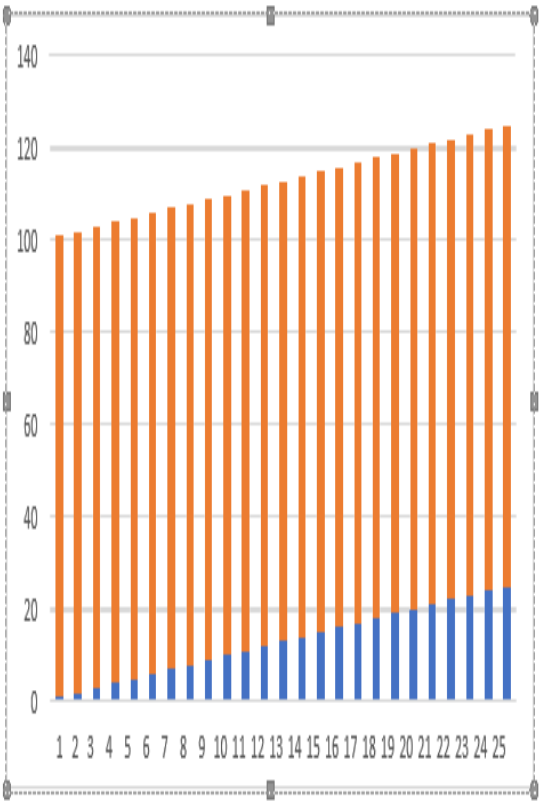

Figure 9: statistics for MIS data processing

The accompanying graph demonstrates the high precision rate of return on investment for the management accounting the data processing efficiency of this material may reach a maximum of 99.8 per cent. satisfies the stringent needs of data accounting methodical processing, so it may be used in actual settings.

V. CONCLUSION:

In this article, we employ data mining and machine learning to build a management account creation system, which is the natural next step for management accounting information systems in the AI era. Furthermore, the study argues that management accounting informatization is a natural progression in the field and that a complete management accounting information system should have analysis management, risk management, performance, and decision support modules. The various parts work separately yet are linked together. The accounting analysis management system realizes basic accounting data processing and analysis functions, enterprise-wide risks are mitigated by the risk management information system, the performance management information system paves the way for the actualization of corporate strategic goals via target decomposition and layer-by-layer implementation, and the accounting decision support system optimizes the quality of accounting decisions. In most cases, a company's ability to manage its operations may benefit significantly from the interplay between its four primary subsystems.

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Financial Decision-Making System Implementation System by Using AI & ML Technique

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Abstract: . Corporations everywhere work to extract more meaning from the data they've amassed. The study's overarching objective is to explore the role of machine learning in generating lucrative business approaches. To get a competi- tive edge in today's market, corporate executives must sift through vast amounts of saved data, analyzed and easily accessible. Machine learning, a branch of AI, is used to improve business operations with little or no involvement from a hu- man operator. Financial, marketing, supply chain, human resources, and other decision-makers may all benefit from ML approaches since they allow for ana- lyzing patterns and recognition from vast data sets. Machine learning aids the changeover from physical to electronically stored data, improves memory, and assists financial decision-making. It also allows the extraction of quality patterns and database data forecasting, stimulating development. This research aims to shed light on how companies can better use machine learning to manage their finances in today's challenging market. ML has become an increasingly important tool for companies in this fast-paced environment. It has given company execu- tives new ways to profit from their access to vast data stores. The research aims to compile information from workers, supervisors, and CEOs of various sectors and analyze the impact of machine learning on financial decision-making.

Keywords- : Decision-making, finance, Machine learning, Artificial intelligence..

I. INTRODUCTION

Machine learning (ML) and deep learning (DL) are increasingly being used by top ex- ecutives worldwide because of the significant improvements they bring to the decision- making process. Artificial intelligence (AI) is the simulation of human intelligence in technological systems. Better risk management models, cash need estimates, and other estimates may be made from historical data using -e methods and other parts of artificial intelligence (AI). ML is used for enhanced financial decision-making, mainly in stock markets, to predict asset prices and manage risk [1]. Nearly $42.2 billion is invested yearly in AI, with most of that money going to the financial sector to improve decision- making. Making choices is at the core of being human and central to how we engage with the world. It's common knowledge that individuals may make both sound and foolish choices, and studies have shown both. Refrain from the best approach to helping indi- viduals make sound choices. Classes are one approach to explaining choices and getting insight into how to help others who are struggling with them. Decision-making is orga- nized, semi structured, or unstructured. For a long time, structured decision issues have which there is a single, best answer; these cases do not need help making decisions. A choice, for instance, finding the shortest path between two places, is a precise answer to an analytical problem.

In contrast to structured issues, which have established criteria and solutions, unstructured problems need the decision maker's preferences. For instance, choosing a life partner is a haphazard choice. A large variety of semistructured situations fall be- tween these two extremes, often having some agreed-upon criteria but still requiring human input. Criteria-based decision-making input or preference-based decision-mak- ing input. For instance, the company's choice to enter international markets may have a loose framework to guide it. With this in mind, semi structured choice issues might benefit from decision assistance, which entails the approach that uses user feedback and data analysis to create viable options about best practices and criteria. For example, when AI methods are used, the process of coming up with different options is called "decision tree learning," and the resulting system is called an "intelligent decision mak- ing." system of support.

II. LITERATURE SURVEY:

Since thematic modelling is a kind of ML applied to Natural Language processing , we include a mutually-beneficial element in our research by making use of ML methods to comprehend ML studies in the financial sector [7]. Research on ML's use in financial decision making was conducted for the first time, with a focus on neural networks as a tool for economic decision making. Preliminary research evaluating whether ML may enhance lending choices and credit risk management were published in the 2010s in the Journal of Banking &

Finance, suggesting prospective advantages for the banking in- dustry [8]. When ranking Italian enterprises for the likelihood of financial troubles, researchers employed neural networks but also used genetic learning algorithms. Re- search published in financial journals has shifted its emphasis from traditional ML methods like linear regression to more cutting-edge ML approaches like deep learning. Some of the most recent software packages deal with modelling the investment climate, learning the coverage rates for the best alternatives, and gaining a better grasp on how quickly defaults are recovered.

Risk management with the help of AI and ML by doing more precise risk assessments in advance. When it comes to risk management, ML is most beneficial to the company, and the most significant connection is seen in cash flow management. To handle these risks, we equipped financial institutions, for instance, with artificial intelligence and machine learning to enable choices based on prior correlations between the prices of various assets [9]. The system as a whole may benefit significantly from risk-mitigating tools for drivers. [5]. Artificial intelligence and machine learning achieve better risk management by prior anticipation and identification of potential fraud, suspicious trans- actions, late payments, and cyber-attacks. However, AI and ML-based technologies might miss emerging threats and events if they "over-educate" themselves on historical data [10]. The current innovations in artificial intelligence and machine learning imply that these tactics still need to be evaluated to manage risks in fluctuating economic conditions. Still, they have the potential to enhance risk management in the meanwhile significantly. This scholarly essay follows the following structure: The literature review is discussed in Section 2, while Section 1 represents the introduction. Section 3 explains the procedure followed. Section 4 summarizes the results and consequences, and Sec- tion 5 discusses the conclusion and prospects.

When AI and ML are used to make decisions, they create "black boxes" of risk, which might lead to difficult situations, particularly in retrospect. Financial users, especially regulators, may need help making sense of complex choices, such as those involving trade and investing. The lack of transparency around AI and ML is just part of the issue; the approaches may pick up biases from human assumptions and hidden artefacts in training data, leading to unfair or inaccurate decisions. Furthermore, human operators of such systems may need help monitoring due to the incomprehensibility of these in- struments' communication methods [11]. Users of these AI and ML systems may all pull the "shut-off switches" (manually disabling the tools) simultaneously if they have any lingering doubts. Users may only revive the systems after an event if they get con- firmation from most of the market's users. The potential for system-wide voltage con- cerns and the need for adequate switches may rise with -it.

By analysing large amounts of data, AI and ML may pave the way for "more personal" financial services [12]. Extensive data analysis, which AI and ML may aid, can help businesses better understand their customers and investors so they can create more per- sonalized products and services. However, there are potential privacy and security risks associated with using customer data. Additionally, it would be essential to think about customer outcomes as analytical artificial intelligence and machine learning data may analyse the characteristics of specific consumers using public data. It has to be guarded while also ensuring that customers' privacy is preserved and big data is used effectively and securely to improve service delivery [13]. Deep learning algorithms are particularly beneficial to organisational decision-making, which may aid workers in analysinginformation, boosting their analytical abilities and easing the shift to greater design out- put. Further, it would be essential to set up well-designed governance frameworks for financial service providers leveraging AI and ML to safeguard customers and investors

III. METHODOLOGY:

This research examines how machine learning may apply to company finance. The re- searchers have considered several criteria in selecting private banks and financial or- ganizations from India and data is collected from them. In the financial industry, ma- chine learning algorithms have shown to be necessary due to their capacity to identify fraud, improve trading procedures, and give individualized financial counsel to con- sumers. In contrast to more conventional education techniques, machine learning may rapidly examine vast data sets in search of patterns and enhance performance [14]. As a result of machine learning's importance in economic decision-making for low-income nations, researchers have begun to focus on it using a descriptive approach. In addition, CEOs are looking to adopt new technologies that will help them optimise risk manage- ment, cash inflows and outflows, asset pricing, and the identification of profitable busi- ness opportunities.[15]

The researchers obtained data using a questionnaire administered to respondents; they used a nonprobability sampling strategy to compile their sample of 3241 responses from the sample population used in the analysis. Researchers may efficiently collect answers from the sample population by using closed-ended questionnaires; Translate the aggre- gate replies into quantitative aspects by the Likert scale concept [1 = strongly disagree, 5 = strongly agree]. Test data using descriptive analysis of demographic factors and then implement the structural equation model (SEM) using AMOS [12]. The SEM model allows for the comprehensive evaluation of the correlation between independent and reliant variables.[16,17]

3.1 Hypotheses testing:

Ho: Effective financial decision-making in the organization correlates significantly with machine learning in risk management.

H1: The use of machine learning to analyze ways to improve financial performance correlates with something other than better financial decision-making inside an organ- ization.H2: The company's ability to make sound financial decisions differs from how well it handles its cash flow.

3.2 Data collection process:

The data acquired by the authors are analyzed in depth in this part, with the most critical analyses being percentage analysis, correlation analysis, and structural equation modelling. From Table 1 sample population was composed of: 30.79% of males and 69.23% of females; 14.79% of the respondents were be- tween the ages of 37-50, 30.61% were under the age of 25, 15.30% were over the age of 50, and

Variable		**In Number**	**In %**
Gender Con- sideration	Male Female	20 45	30.79 69.23
Age consid- eration	Less than 25 26-36 37-50 Above 50	60 77 29 30	30.61 39.28 14.79 15.30
Type of in- dustry	Banking sec- tor Finance sec- tor	148 91	61.92 38.07
Management grade	Low level Mid level Head level	69 139 41	27.71 55.82 16.46
According to Experience	Less than 3 years 4-10 11-15 16-20 More than 20 years	64 62 29 17 76	25.80 25.00 11.69 6.85 30.64
According to family	Combined family Nuclear fam- ily	124 112	52.54 47.46

This study examines how machine learning might help businesses make better-in- formed choices. Table 2 shows that nearly half (43.66%) of respondents strongly agree that machine learning provides more opportunities for management to make better de- cisions. In comparison, another 20.42% approve, and 11.26% disagree (plus 9.85% who strongly disagree). Introduce the possibilities afforded by machine learning through a chart in Figure 1.

were under the age of 25, 15.30% were over the age of 50, and the remaining respondents were in the age range of 26 to 36. About half of them (47.46%) were members of a nuclear family, another 61.92% were employed by financial institutions and the remaining 38.07% were employed by businesses outside the banking sector. In the existing organizations, around 16.46% were in upper man- agement, 27.71% were in lower management, and the remaining 55.82% were Mid- level Management. 25.80per cent have less than three years of experience, 25per cent have between four and ten years of experience, and 11.69 per cent have between 11- 15.

Opportunity	**In Number**	**In %**
Highly Disagree(1)	14	9.85
Disagree (2)	16	11.26
In neutral (3)	21	14.78
Agree (4)	29	20.42
Highly agree (5)	62	43.66
Total	**142**	**100**

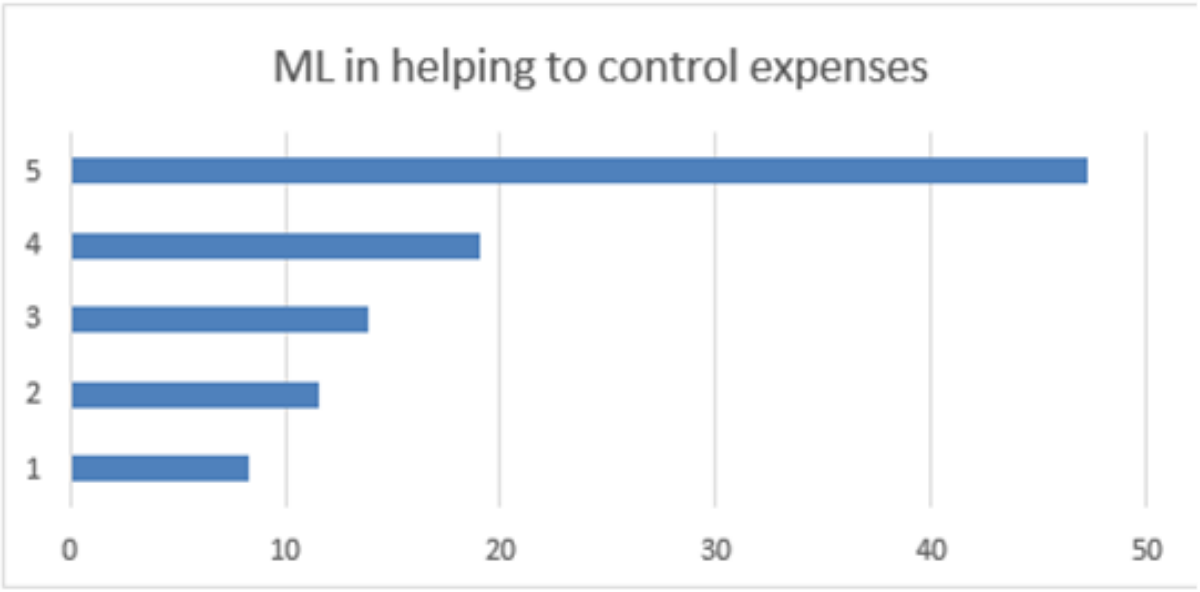

Figure 2: Usefulness þf ML in helping to control expenses

Where machine learning comes in handy since cheap and abundant computing re- sources make this technique feasible, the proliferation of affordable and powerful com- puting has fueled the explosion in the amount of data we're able to collect and the im- provement in machine learning algorithms performance.

The authors have also ran surveys to gauge respondents knowledge of whether or not machine learning aids in controlling overhead expenditures. Table 3 shows that 47.22 per cent of respondents strongly agreed with the statement, while 30.1 per cent agreed. While 9.6% of respondents disagreed and 8.33% strongly disagreed.

Figure 2 demonstrates the usefulness of ML in controlling expenses. The bars in this diagram show the percentages of respondents who strongly disagree, disagree, are neutral, agree, or agree.

Opportunity	In Number	In %
Highly Disagree (1)	18	8.333333
Disagree (2)	25	11.57407
In neutral (3)	30	13.88889
Agree (4)	41	18.98148
Highly agree (5)	102	47.22222
Total	216	**100**

3.3 Correlation Factors:

In this study, the researchers considered three crucial independent variables: risk man- agement, areas for improving financial performance, and cash management, and dis- covered that all three had favorable effects on the dependent variable. Correlation anal- ysis is a useful statistical tool that assesses the overall association between variables.

Table 4 shows that variables have a strong positive link if their values are above

+0.64. ML helps the organization make better risk management choices since financial decision-making and risk management are highly correlated. Machine learning tech- nologies allow organizations to make

reduce expenses and enhance earnings from sales and other sources.

Table 4: Results of a correlation analysis

	Risk management process	Performance of finance	Effectiveness of management process	Decision making system
Risk management process	1	0.76	0.82	0.94
Performance of finance	0.76	1	0.76	0.73
Effectiveness of management process	0.82	0.76	1	0.84
Decision making system	0.94	0.73	0.84	1

IV. RESULT AND DISCUSSIONS:

3.4 Structural Equation Modelling Approach (SEM):

SEM is a comprehensive multivariate technique that allows the researcher to apply fac- tor and regression analysis. It also evaluates the global structural relationship between the variables and the constructs. This model has widespread scholarly and practical support because it estimates multiple and other dependencies via analysis considering both endogenous and exogenous factors. Figure 3 demonstrates this. We reject the null hypothesis and accept the alternative idea because Table 5 shows that none of the independent variables has a P value higher than the 5% threshold of significance (deal at 0.05) about the made financial decisions. This leads us to Table 6, which serves as the hypothesis statement.

Therefore, critical, independent variables, such as risk management and area analysis to improve financial performance and cash management using machine learning, help make quick monetary judgments. When making financial decisions, business leaders are in a prime position to focus on risk management and the areas that will impact the corporation's revenues —used machine learning tools and techniques to predict the outcomes. In addition, managers recognize that cash flow is one of the most critical aspects of production, and it must be appropriately handled by analyzing operational costs and expenditures. Management can make informed choices by better anticipating financial needs and with the help of machine learning algorithms.

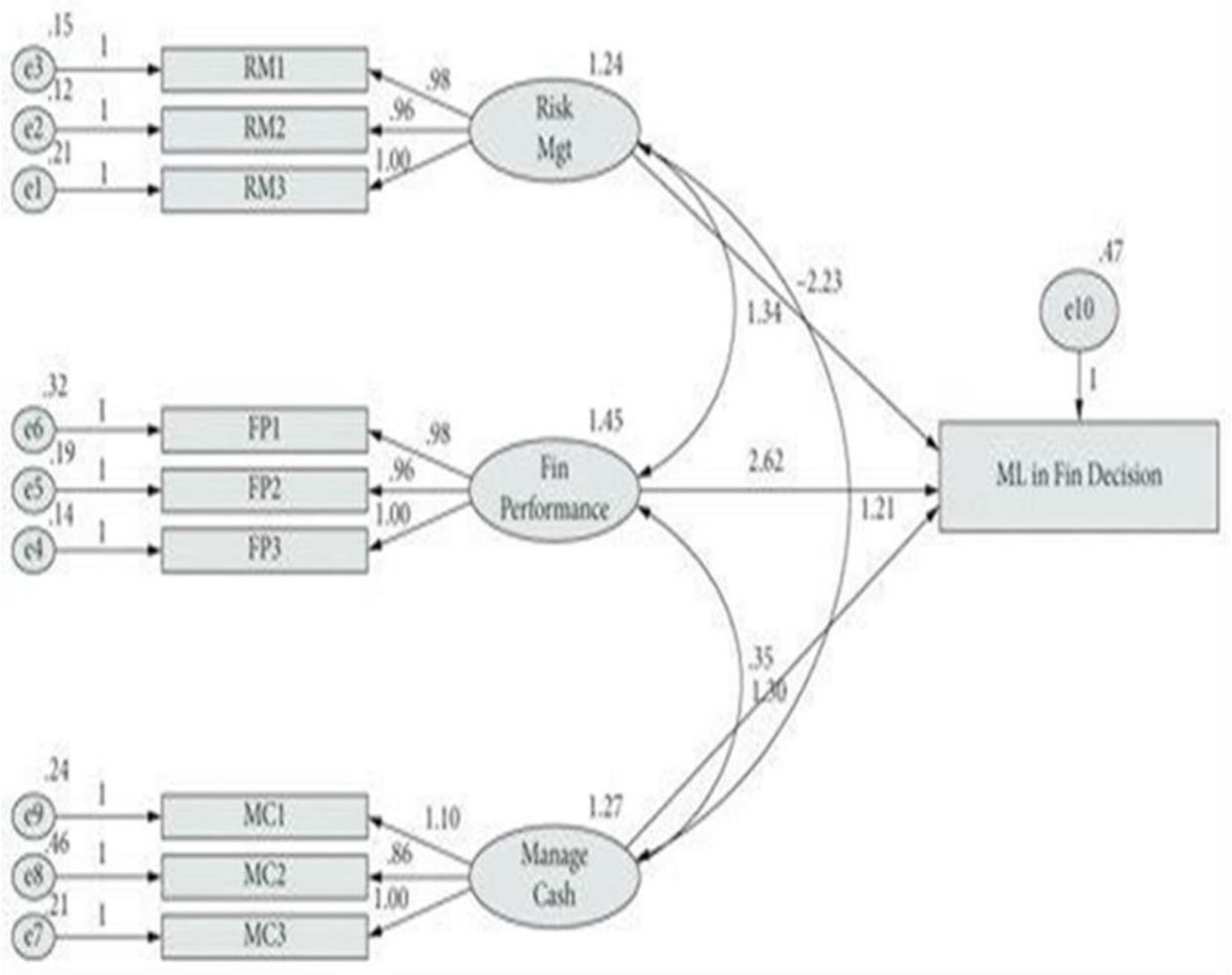

Figure 3: Graph showing the structural equation model (SEM) between the independent and de- pendent factors

V. CONCLUSION:

Machine learning is often defined as a branch of AI that seeks to automate the optimization of commercial procedures. Management can get the insights they need to make sophisticated choices in various financial, marketing, and supply chain domains thanks to ML technologies that analyse and identify the model from huge data. Artificial intelligence's ability to apply algorithmic transactions, handle risks, facilitate process automation, and manage cash flow effectively are all essential features. Machine learning is the most critical part of the AI approach since it helps to make predictions based on historical data. In addition, ML-based technology improves consumer interactions by providing more accurate responses to their inquiries. Better ideas can be found, data can be analyzed more efficiently, and better financial choices may be made with the help of machine learning algorithms. Employees and management often design such strategies to identify the pattern, zero in on the value of securities, and implement the necessary steps for successful risk management. Saving money, increasing productivity, mitigating risk, and encouraging prudent spending are all aided by ML techniques. Also, ML algorithms often provide custom reports based on existing data, giving management at all levels clear and concise information in a streamlined style from which to make decisions.

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Implementation of a management accounting system by using Artificial intelligence and data mining techniques

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Abstract **Quality standards are rising as people's disposable incomes, and their reliance on the market for necessities like food and clothing are increased. The main objective of the research is to apply AI expertise and computerization to accounting analysis and its information. In this paper, we use the principle of subsystem combination to develop an AI accounting information web system and conduct a theoretical and technological feasibility study of this system. It has a positive impact that speeds up the dissemination of all types of informa**

tion and encourages a shift in the approach used by businesses to manage the account. The organization's total management level is enhanced, enterprise's overall competi-tiveness and save costs have up to an 8 % improvement in the correctness of the system model compared to the standard system algorithm.

Keywords: Account management, Artificial intelligence, cost, information

1 Introduction:

Influence modern businesses by swiftly and accurately extracting helpful infor-mation from a wide variety of data and information sources of varying sorts and densi-ties in light of the rapid advancements in science and technology. Audit plays an essen-tial role in every organization. Modern businesses risk the crisis of enterprise annexa-tion if they rely

on old-fashioned methods of handling the vast quantities of data and many formats of information created by their operations. Accordingly, how to increase productivity and guarantee the correctness of audit information has become a focal point of study in the domains relevant to the current, ever-shifting information land-scape.

May quickly assume the accounting data and expertise thanks to develop-ments in big data. In today's advanced economies, businesses want to become "intelli-gent firms," focusing on increasing their value via knowledge production. China's na-tional economic growth policy makes clear proposals for sustainable development information, and scientific advancement in light of the country's rapid progress in in-formation technology. The question of how Chinese businesses may best use IT to boost their competitiveness in the fast-paced "information economy" and "knowledge econ-omy" is one of the most pressing issues facing the country's business community. With the advent of modern information technology, data mining has emerged as an essential aspect of knowledge acquisition and business intelligence, despite its origins as a mul-tidisciplinary field spanning both computer science and management science. The In-ternet's widespread adoption and use have resulted in a dramatic increase in the volume of data and information available. This, in turn, provides a wealth of data and infor-mation resources and an easily accessible interactive communication platform to aid in decision-making and encourages the inclusion of more knowledgeable parties in the process. In another way, all the workers need to concentrate more on the data mining process to develop the new learning things and to get the decision-supporting data to the decision-supporting system. It is a hot issue in educational and corporation systems how to convert the business information to the primary resource information to get the massive achievements.Accounting information management is critical to the development and prof-itability of modern enterprises, which is why companies must use artificial intelligence technologies like big data information processing. Consequently, this work's original contribution is combining a decision support system with an expert system to create an interactive accounting information system (IAIS).Furthermore, include accounting data and auditing expertise in the IAIS-based management information model for account-ing. Finally, assess its usefulness as a resource for the evolution of accounting data via examination of its performance and feasibility.

Basic information about Account management and information system:

How an individual or group uses the accounting system's tools to determine the perspective on accounting's fundamental nature. Organization management authorities supply management accounting and financial accounting information; however, the former is used mainly for internal purposes. Accounting information providers and con-sumers work together as one. Management accounting information and financial ac-counting information do not need societal regulation. Management accounting data is isolated and can only be utilized internally and not shared with other departments. The foundational idea is that society cannot care about management accounting principles, but that cannot imply that management accounting is devoid of accounting standards. Compared to the uniformity, legality, and coercion of financial accounting principles, the uniqueness, discretion, and awareness of management accounting principles stand out. Because of this, management accounting data is not only a made-up system. It may be built and tailored to meet specific needs and can-do comprehensive data analysis.

Most definitions of a system emphasize its holistic nature, defining it as a collec-tion of parts that work together to perform a single purpose. This framework includes systems, elements, structures, and functions. It illustrates the interconnectedness of

interdependence of eco-systems, perspective of system theory to describe these connections. To this end, as knowledge and technology advance, employees must apply system principles to their everyday work in areas as diverse as operations, finance, planning, compensation, and performance. Individuals need to learn to see management from the viewpoint of sys-tem integrity to make informed decisions about how to strengthen best the management capacity of their company and usher in a new era of effective management.

Basic theory on AI and implementation process:

Artificial intelligence (AI) studies how to programme a computer to do tasks that previously required human intellect at a high level of competence by deducing the rules governing how human intelligence works and then modelling those rules in an artificial system.

Artificial intelligence (AI) researchers are working to develop computer pro-grams that can compete with humans in areas where human intellect is often required, such as solving complex problems. The human brain, for instance, is the first to tackle complex mathematical and scientific issues. This advancement has made it possible for computers to out-calculate humans and does it more quickly and precisely. With the passage of time and the promotion of technology, the definition of complicated labour changes, and so must include the precise purpose of AI.Artificial intelligence and theoretical science are like practice and theory. Arti-ficial intelligence (AI) is a subfield of cognitive science that operates at the technology's application level. For AI to make significant strides forward, it must consider not just logical thinking but also picture thinking and inspirational thinking. Numerous fields look to mathematics as their foundational science, and the subject permeates other do-mains, such as linguistics and philosophy. A place for found may result in both tradi-tional logic and fuzzy mathematics. All branches of AI should use mathematical instru-ments; this will encourage collaboration and speed up progress. Variety of Artificial Intelligence-Related Research Areas.individual components, the interdependence of systems and the

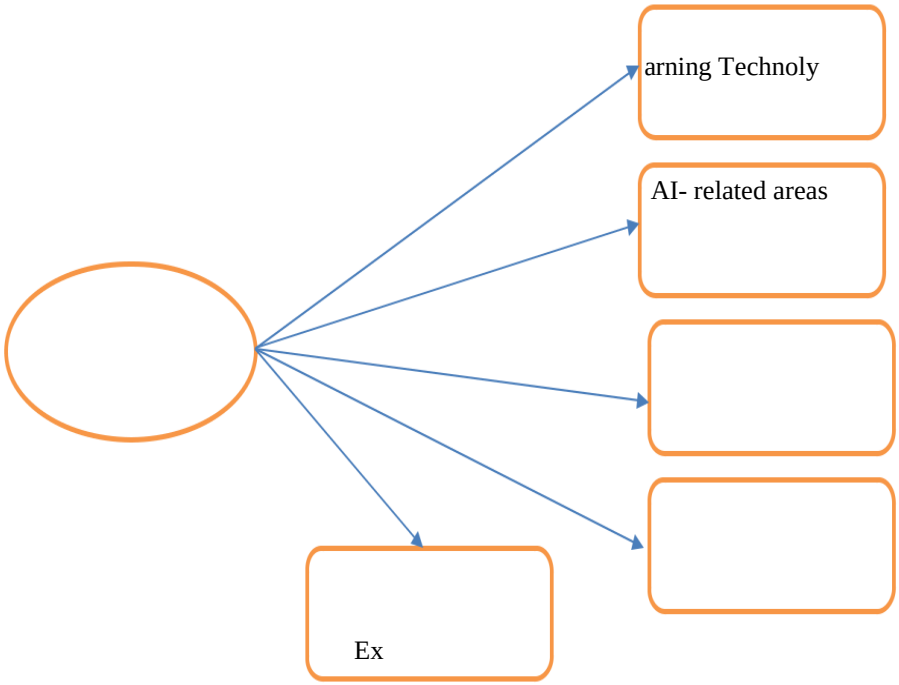


Figure 1: AI related areas

4 Methodology:

4.1Integrating the AI with Management accounting system:

If we assume that information technology continues to develop as it has, then the accounting information system will be complete and transparent. Accounting trans-actions resulting from the circulation of money in a firm are the basis for this network-based framework. In finance, it may educate, aid in analysis and forecasting, and im-prove decision-making and control. Advances in artificial intelligence To remedy the accounting information processing systems to integrate shortcomings, network tech-nology. By incorporating a feature for prudent professional judgement in accounting, strengthening the intelligent decision support function of accounting information pro-cessing within the decision support system, and erecting a network interconnection sys-tem for the accounting information system, they have created a new design that is both intelligent and open. The newly implemented accounting information system (IAIS) now has a much-enhanced capability, allowing for the fast and reliable sharing of ac-counting information.

Given the pervasiveness of AI's use, it's just a matter of time before it is put into finance. These days, AI is a particularly relevant area of study since it uses statis-tical approaches in finance and accounting. The purpose of an expert system, for in-stance, is to have a computer mimic experts' knowledge, reasoning process, and prob-lem-solving skills in a particular subject. In this sense, an expert system is a highly specialized informational system. Making intelligent financial management and deci-sions is possible via its implementation in the accounting information system and the construction of the computer-aided system. This method Using accounting information systems may be successfully adapted to serve as a tool for management and decision-making in addition to accounting. Under the influence of AI, the accounting infor-mation system must become an integrated application of people, machines, data, and software. A basic accounting package and a more includes an advanced accounting decision support system in its user-friendly interface.

The present state of accounting information system has certain glaring flaws, such as a lackluster decision-support function and a simulation of a manual accounting system. Business accounting and finance systems cannot handle the complexity and rigour of modern decision-making challenges. As the need for precise financial records continues to increase, businesses must emphasize centralizing their management in-formatization efforts around their accounting information system. As a result, develop-ers have ramped up their efforts to create a high-performance, high-level accounting information system as quickly as possible, including cutting-edge technology and inte-grated processes into the accounting information system.

4.2 Development and integration of management accounting and AI:

The key to limiting the growth of accounting information to a higher level lies in the difficulty of intelligent judgement by computer programmes, which is at the heart of modern accounting—the following steps in accounting work. The first step in preparing accounting vouchers is verifying and measuring economic transactions from the origi-nal coupons. The second thing must be to certify the registration of accounting vouch-ers.

Third, it's crucial to double-check all financial reports and documents for cor-rectness. Finally, while producing transfer vouchers, validating and measuring the cost accounting and fixed asset depreciation is necessary after the period has ended. Finally, reset when book value, proof and measurement in accounting are still required. Ac-counting judgement, in a word, permeates the three phases of accounting verification, recertification and size.

This study aims to create an intelligent accounting system in IAIS that incor-porates the expert opinion of accountants. The accounting

information system shown in Fig. 2 uses artificial intelligence.

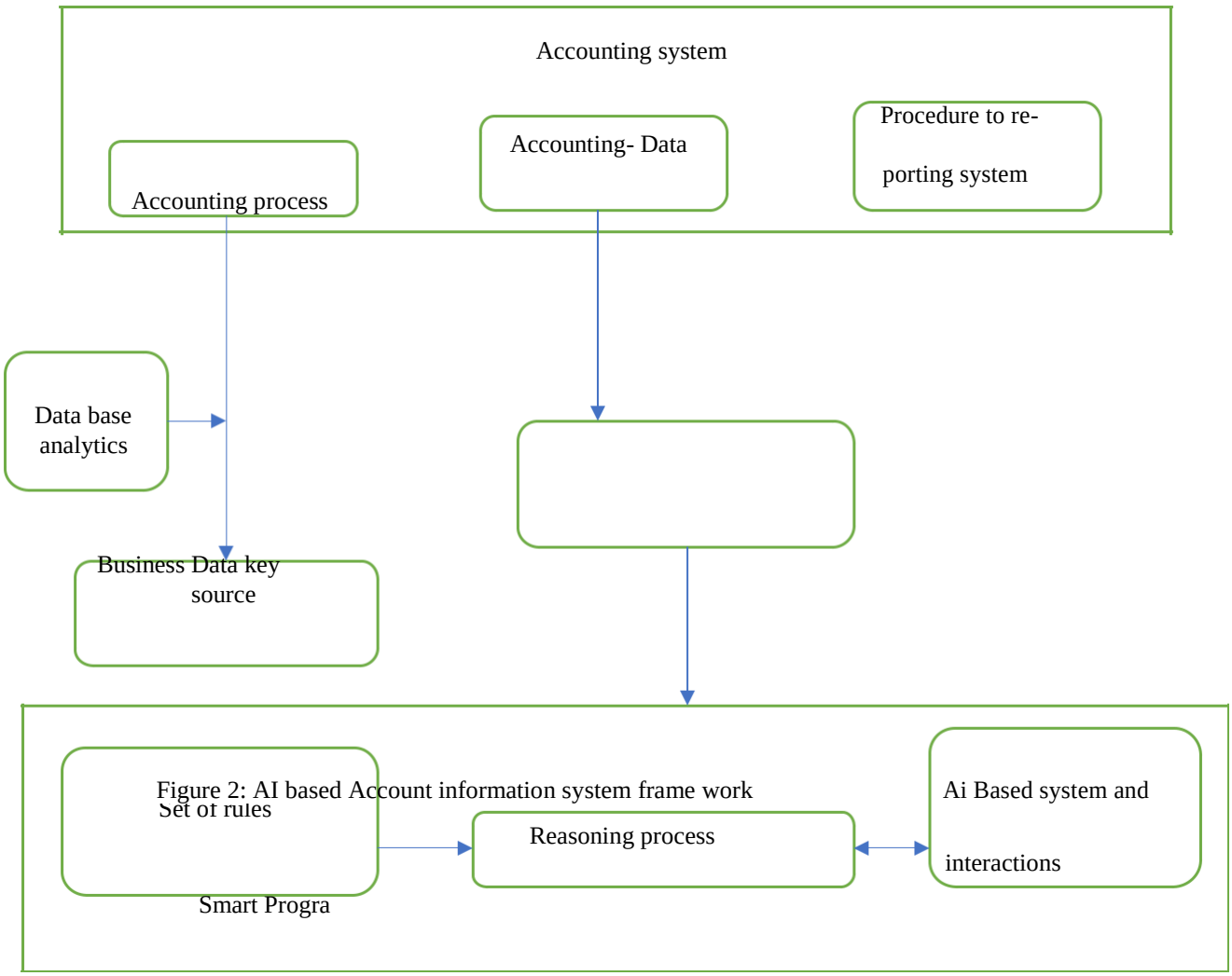
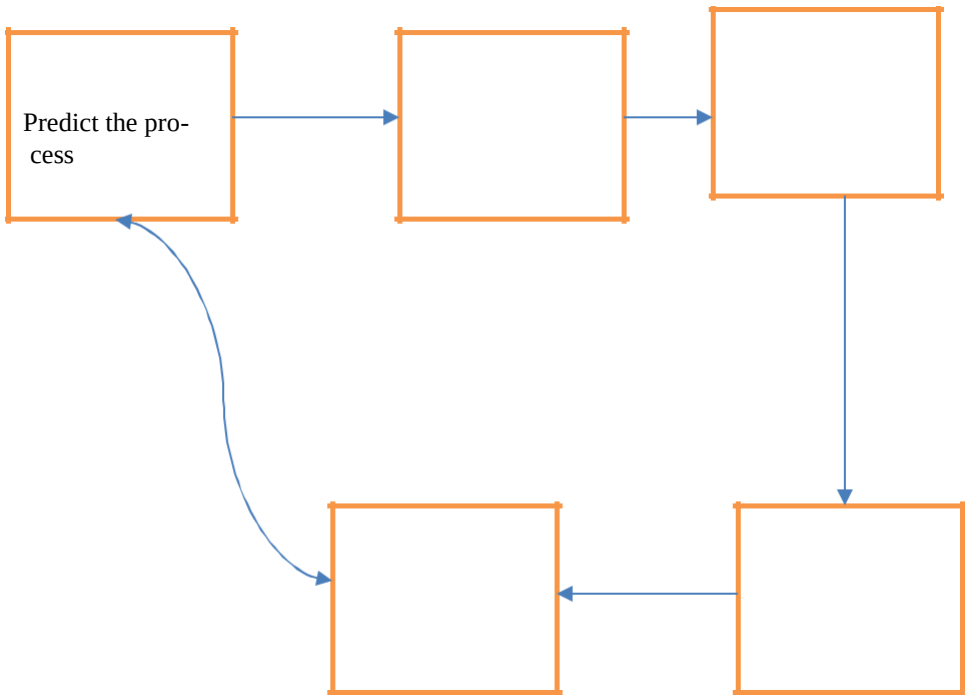


Figure 2: AI based Account information system frame work

Technology from artificial intelligence and database management forms the basis of this system paradigm. Divide into two modules: a formal accounting system and an informal logic engine. An organization's financial transactions are handled automatically by the accounting system. The keep result data in the financial accounting database serves as a reliable and consistent basis for the system's ability to generate its accounting statements.

4.3 Decision making process based on AI with Account information system:

The IAIS intelligent DSS combines features of a conventional DSS with an expert system driven by AI. The basic concept is to add artificial intelligence-based knowledge processing and information representation to the existing accounting decision support infrastructure. If you're making a decision based on a model, you can utilise that system to do some severe numbers crunching. Fig. 3 shows the data processing flow imple-mented into the financial subsystem. With the addition of a knowledge base, manage-ment system, and inference engine, the system may do a qualitative analysis of deci-sion-making based on the knowledge and experience of experts to help in both unstruc-tured and semi-structured decision-making.



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.4 Smart accounting information process:

As the competitive environment in which businesses operate gets more nuanced, the use of conventional internal management and a closed, isolated accounting information system is at a catastrophic disadvantage. Companies must have access to timely market data to choose their next course of action and thrive despite intense competition.This research aims to build an accounting information system that integrates and is exceptionally open to the information of all departments inside an organization and pertinent information from outside the organization. The plan for an architectural build-ing is in Fig. 4.

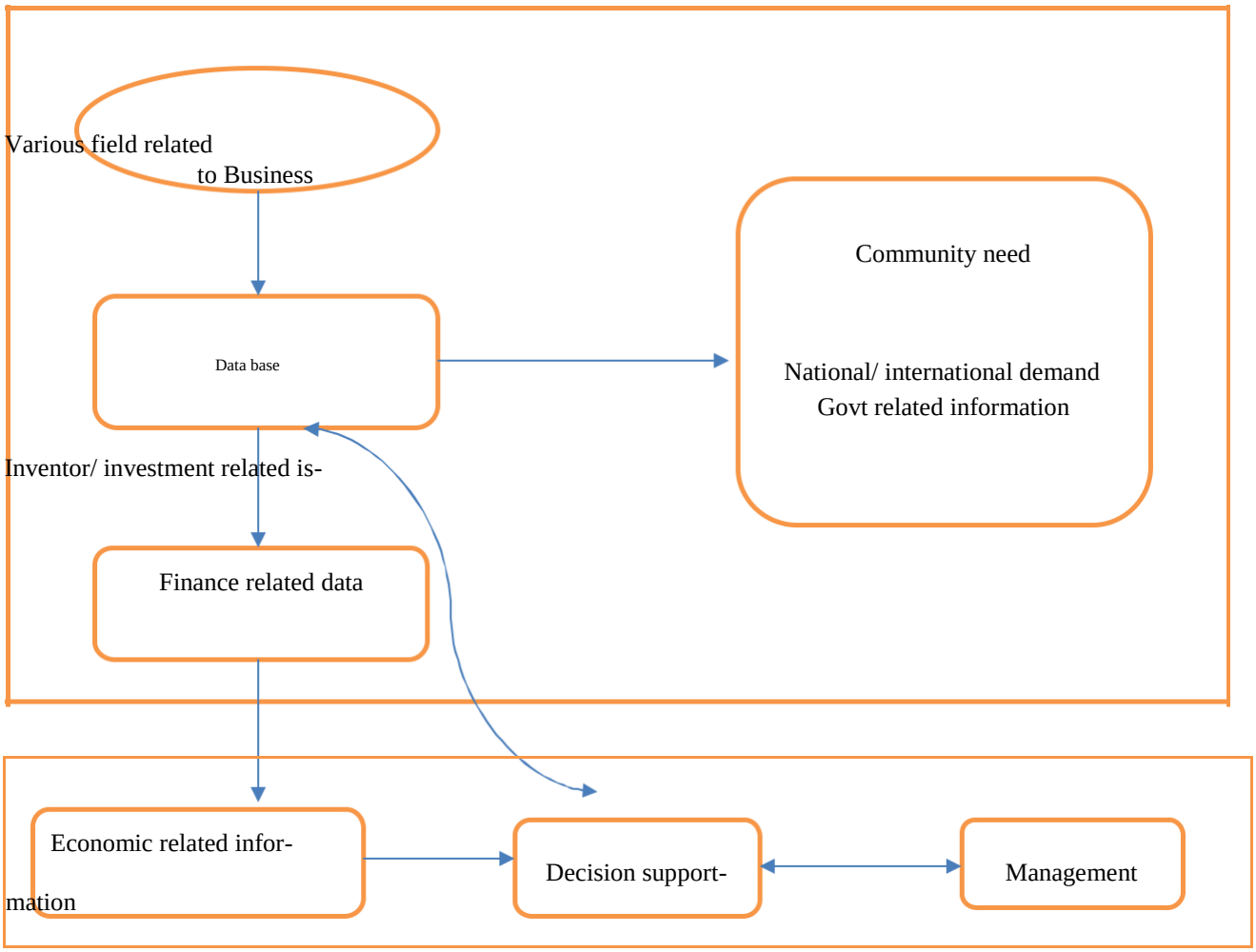


Figure 4: Information process- Accounting process

Intelligent accounting information systems gather data on an enterprise's daily business operations and use that data to automatically process the day-to-day accounts, including creating vouchers, journals, detailed reports, and ledgers. After the internal accounting data has been sorted and processed, it is sent to an intelligent decision sup-port system, which then generates the necessary financial statements for the company. Meanwhile, IAIS will feed economic data into the company's smart decision support system through the system's internal and external network interface, empowering man-agers to make well-informed judgments . The intelligent decision support system (IDSS) collects three different types of data, which then analyses and evaluates the data and the significant decision-making challenges before proposing a solution to the prob-lems facing firm management.

Companies may also use the Internet to disseminate their financial data. En-terprises make it simple for approved, registered users of external accounting infor-mation to get actionable accounting data they can use in their decision-making pro-cesses. Connecting IAIS to other networks improves its intelligence and allows sharing of accounting data in real time.

Theoretical and practical AI management accounting information system analyses rely heavily on arithmetic. The accuracy and latency of the newly built system are investigated and compared to the standard management accounting information analysis platform.

In this study, we will use the core logical structure of the theory underlying intelligent information processing to conduct a theoretical feasibility analysis. The ac-ademic deduce of the foundation of intelligent information processing is analyzed as follows. I, the quantity of physical information, is the integral of r, an ordinal scalar or scalar.

= ∫ ( )

Where n(r) represents the density of information, the data found by solving equation

(1) is neutral data. J is equal to iV is the revised value of the information I, which is the genuine practical information J.

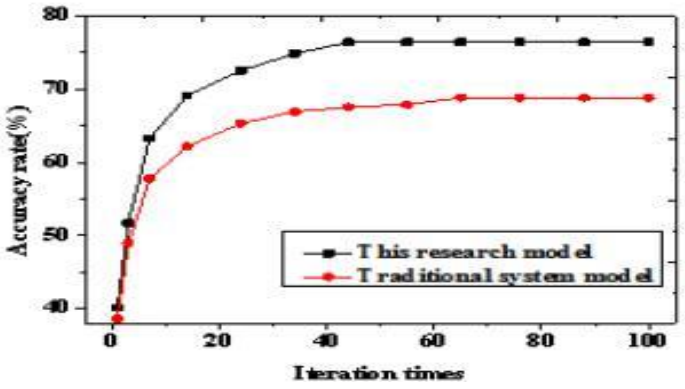
5 Result with discussion:

5.1 Theoretical analysis:

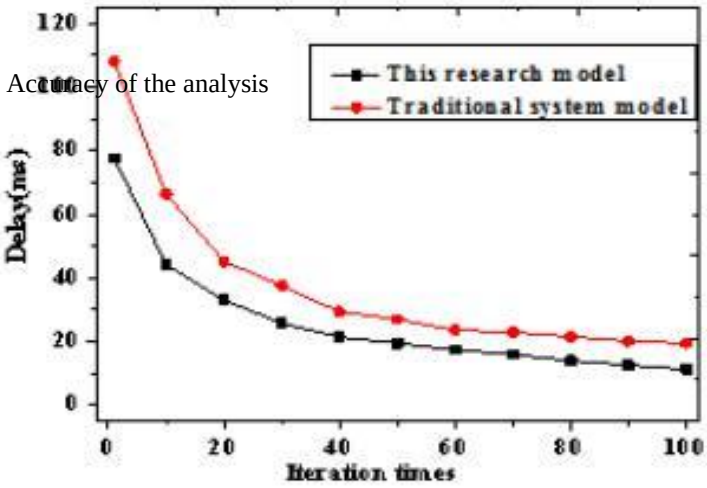
The Decision-making system will suggest the correct prediction of the sub-jective information with the knowledge values through the perfect analysis of the right input information(I) found in the subject knowledge in intelligent information pro-cessing. Knowledge (K) is the goal of a knowledge innovation process (KIP) that uti-lizes the inputs of knowledge (K), information (I), and judgement (J). To function, ex-pert systems are predicated on intelligent information processing. The IAIS system is based on the notion of an expert system. To integrate the AI, Network information with
the traditional accounting system to get the connection with an intelligent decision-making accounting system. Develop a smart expert system for growing IAIS.

5.2 Performance analysis:

It then evaluates the built model against the standard management accounting data analysis method—the precision and delays analysis in Fig. 5.



Accuracy of the analysis



Delay of the time

Figure 5: precision and delays analysis

The created model of the system compared to the conventional model in terms of its correctness and time delay. The suggested model provides a more accurate system representation than the standard model. At 110 iterations, its accuracy may reach 75.89%, while the accuracy of the classic model drops to below 71%; at 100 iterations, the suggested model has a time delay of 11.19ms, while the traditional model has a hold of 19.5ms. Therefore, the proposed system model based on AI is superior to the previ-ous system in accuracy and time delay.

5.3 Technical Analysis:

Since the capacity of traditional operating system limits to the processing of account-ing and its information in the traditional sense, intelligent processing of accounting data is not possible. Recent advances in artificial intelligence (AI), electronic commerce, data warehousing (DB), remote communication (RC), and Internet/Intranet network technology (INET) have bolstered support for IAIS, allowing for the development of system capable of performing sophisticated data processing tasks.

The use of AI allows for enhancing the intelligence of the conventional ac-counting information system. We must focus on these three areas to build an intelligent information processing system. The first is the information repository, which Indicates that all of the relevant information in the subject of analysis is compiled in a structured, machine-readable format. Semantic networks and ontology knowledge trees are two ways to convey this. It helps to boost expertise in analytical reasoning about data. Rule-book, second. In this case, "if... then..." use clauses since the analytical technique is stated as a set of rules. The goal is to make the analysis process more uniform so that the system can

do analyses following predetermined criteria and the information in-cluded in its knowledge base: the knowledge base and use of the ruleset to develop the inference engine. Decision-making generates recommendations when the data is ana-lysed and evaluated using prior knowledge and rules.

6 Conclusion:

To achieve the vision of an intelligent corporate management system, this study employs the expert system technology of artificial intelligence in the context of financial data analysis. A model of AI-powered accounting develops the information system and a method built for making data-driven decisions.

At the theoretical and practical examination viability of the performance of accounting. Both the system's accuracy (which has increased by 6%) and its latency (which is now just 11.17ms) demonstrate significant advancements in theory and tech-nology. Shortly, the system will play a more substantial part in society's accounting work, management level, and businesses that rely on artificial intelligence.

Inadequacies in the studies, however, persist. For instance, artificial intelli-gence is still in the conceptualization phase when analyzing financial data. As a result, the improvement of research on intelligent accounting information systems and its linked challenges would encourage the fast growth of information technology in society as science and technology advance.

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Privacy and security for existing smart grids by using block chain technology

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Abstract. In general, today's society relies heavily on the electric grid. The traditional grids must be transformed into smart grids due to increased problems. Problems due to traditional grids can be lessened by using smart grids, which are more intelligent. The Smart Grid can considerably increase the efficiency and dependability of future power systems as the need for renewable energy sources rises. However, as large power plants become more integrated through commu-nication networks, cyber security in the Smart Grid is becoming more critical. Cyber-attacks can result in severe catastrophes, such as widespread outages and the destruction of power network infrastructure, because they can potentially de-stroy energy data, starting with releasing personal information from grid users. We suggest implementing a secure, decentralized intelligent energy management system based on blockchain to solve this issue. The blockchain is a network of computers that shares and updates a decentralized database. The Smart Grid can manage energy data more securely by integrating blockchain technology; this could be advantageous for the developing intelligent energy sector.

Keywords: Smart grid, cyber security, energy management, blockchain

1 INTRODUCTION:

1.1 Conventional Electrical grid system**:**

The conventional electrical grid [1] uses integrated, long-distance transmission and lo-cal distribution networks to transmit electricity from a few large power plants to indus-try, households, and local
ommunities. The traditional electrical grid was forced to be created since electricity cannot be stored in the grid's distribution network.
Con sumption and production must constantly be in sync. Throughout the day, con-sumption varies, reflecting both industrial and human habits.
Demand-based power systems end this disagreement: Market procedures plan generat-ing capacity based on anticipated future demand—plans for production pro ject industry consumption. Private home use can be evaluated using "Standard profiles", but this cannot be the plan. They represent the annual energy consumption of a typical home for each period of each day.
When expected consumption and production differ from actual usage, an alternating current frequency change indicates either a surplus or a shortfall of energy. These var-iations and consumption peaks are lessened by standby generation capacity. Extra-ca-pacity power plants are adaptable and can quickly ramp up/down production, although they could be more economically efficient. In conventional grids, frequency change is the only means of communicating supply and demand.
The typical power system connects several central generators with dispersed users. It forecasts consumption variations and responds to them using a demand-oriented ap-proach.
Because blockchain technology monitors and validates transactions transparently, many users may profit from it. One illustration is the utilisation of energy or "smart" grids. The power produced by a solar array is the same as that produced by burning coal when it reaches the home. Therefore, determining the energy source is challenging [1].

However, the current certification system and green energy market make it difficult for businesses and consumers to verify that the power they purchase is gener-ated from renewable sources. Tracking the quantity of energy produced by renewable energy sources like solar arrays, hydroelectric dams, and wind turbines and recording the findings by hand may be challenging and depressing in the modern day. The certi-fication process involves recording the data in spreadsheets and sending them to a cer-tifying organisation, may take several weeks. Furthermore, after the agency verifies the validity of the findings, it produces green energy certificates that the business may use to sell the certificates on the open market. Energy users and producers strive to locate one another on the open market to exchange certificates, but the procedure is cumber-some. [2]

After years of widespread blackouts and the associated costs, there is a renewed focus on how to best manage energy

resources to end the world's chronic lack of elec-tricity. To add insult to injury, we need to reduce the pollution from burning fossil fuels like coal and oil before they are all gone. Further, a method is required to effectively manage and use renewable energy sources like wind and solar power. The Smart Grid, an infrastructure that lessens damages while increasing energy efficiency, is of interest as a result of problems with the power grid, the supply and demand for energy, envi-ronmental pollution, and the use of renewable energy sources.

1.2 Smart grid system:

It is difficult to define the smart grid in a way that pleases all stakeholders. This part defines the smart grid's most important consumer privacy and privacy-enhancing tech-nologies for the rest of the dissertation. The European Commission and Ontario's
Privacy Commissioner defined the smart grid in the following section. These two opin-ions were picked for their relevance to European law and smart grid privacy, respec-tively.

"A smart grid is an electricity network that can cost-efficiently integrate the behaviour and actions of all users connected to it—generators, consumers, and those that do both—to ensure economically efficient, the sustainable power system with low losses and high levels of quality, security, and safety."

The Smart Grid, or intelligent grid, is the next generation of power grid technology that has evolved for efficient and dependable energy management. With innovative ICT(Information Communication Technology Automatic control, high power conver-sion, optimal energy demand management, and renewable energy management tech-nologies are all components of the Smart Grid[1, 2]. The Smart Grid's connectivity to both electricity generators and consumers allows it to function as a real-time energy management system that shares data optimally. However, there is a need for initiatives to detect and handle security risks to energy data supplied by grid members and pro-cesses due to the potentially catastrophic repercussions of ignoring them.

2 Existing smart grid:

There is often a surplus of electricity produced by the current power grid. Since it is challenging to predict the demand for power from consumers in real-time, excess energy is created so that users always have access to electricity, even if consumption is higher than expected. Under such a system, the cost of constructing and supplying new power plants with the required fuel would rise. Underutilized electrical power reduces energy efficiency and increases pollution from fossil fuel combustion. Innovative meth-ods of exploiting renewable energy sources like wind and solar have been developed as the world's supply of fossil fuels dwindles. A brand-new energy platform is required to efficiently and meticulously track numerous electrical power sources.

There has been an increase in power plants to meet the demand for power that began in the 1970s and persisted through the 1990s. The initial system went live in 1886. The rapid urbanization and infrastructure development taking place all across the world may be a manifestation of this change. As shown in Figure 1, the current system for distributing electricity from power plants to end users is strictly hierarchical at the top. Electricity and data move in one way and are created using fossil fuels at the power plant, which serves as the system's nerve center. Since the present grid structure pre-cludes it from collecting and interpreting real-time data on the services provided to consumers, it could be more efficient in terms of power loss and excess pow

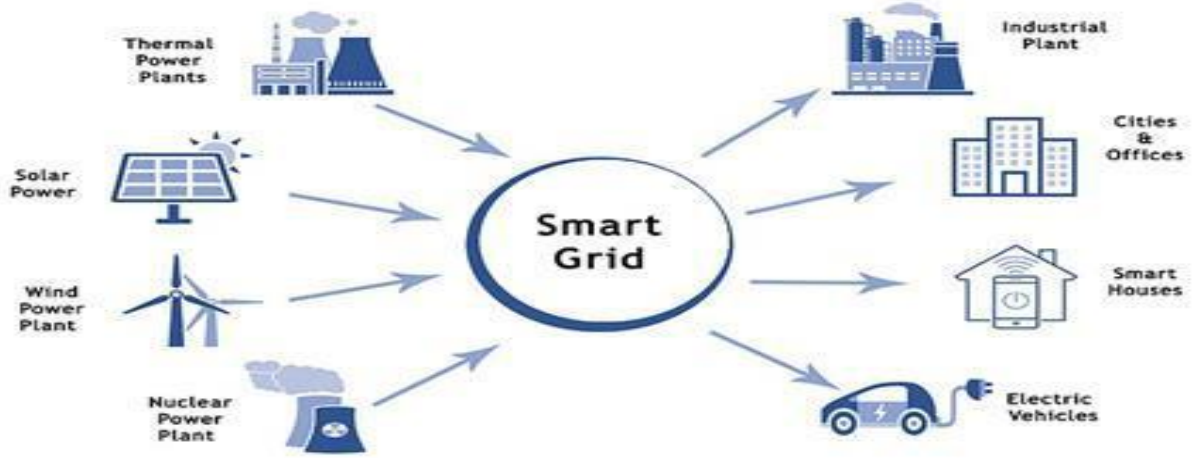

Figure 1: Smart grid- distribution system and generation system

The "Smart Grid," a portmanteau of the terms "smart" and "grid," is a catchall phrase for many components of the electrical power distribution system. Users have greater "situational awareness" of the grid's health because the Smart System integrates cutting-edge information and communication technology into the existing power grid[5]. In other words, it's a technology that facilitates two-way, real-time communi-cation between the utility and the end user to improve energy efficiency. Connecting power plants, substations, and consumers to a shared network. Smart Grid facilitates two-way communication and real-time data sharing for more efficient energy manage-ment. The existing system only allowed for electricity production, distribution, and sale in one direction. Several critical aspects of the current grid are compared to the Smart Grid in Table 1.

Table 1: compares the current grid and the Smart Grid

Si.no	Existing traditional grid	Smart grid
	Electro-mechanical systems	Smart sensors are used
	Only one way communica-tion system proposed	Two-way communication sys-tem proposed in smart grid.
	All are centralized from one part.	All are distributed from differ-ent aspects.
	Very less sensors are used.	Very huge sensors are used for proper response
	No proper monitoring sys-tem.	Monitoring system in all as-pects.
	Manual monitoring system.	Smart monitoring by sensors and IoT.

	Old/ very limited controlling system	Very new technological control system
	Testing's are done manually	Testing's are done by remote ac-cess.

Again, the Smart Grid is a secure two-way system that combines electricity. The secu-rity system will need the data production rate in the meantime, the system's transmis-sion, substation established under the smart grid, distribution system of the power grid, and consumption data making use of ICT for cyber security, communication, and AI.

[7]. Smart Grid users may reduce energy usage and expenses by improving energy management system reliability, efficiency, robustness, and transparency.

1. Reducing global fossil fuel use.
2. Promoting green energy.
3. Pollution mitigation.

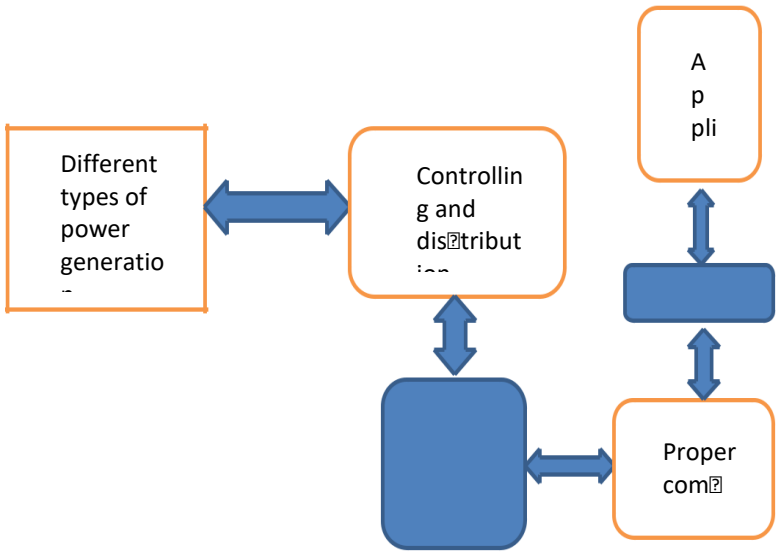

Figure 2: The Smart grid outlook

3 Basic aim and objective of the smart grid:

A smart grid basically aims to develop a dynamic and efficient energy management system. Smart grids integrate intelligent meters and networking systems. Intelligent meters contain a significant speed monitoring system, and networking systems have two ways.However, the communication and networkin technologies on which smart grids depend leave them open to various risks.

The Smart Grid's ultimate objective is to construct a dependable, safe, and optimal power system, yet this goal might paradoxically endanger the power system's function-ing. In this part, we'll discuss the potential dangers the Smart Grid faces, such as cyber security concerns and the accompanying need for a response.

3.1 Existing smart grids- challenges- security threats:

The term "threat" is used to describe a wide range of behaviors that may be neu-tralized via the use of either artificial or natural systems[10]. Theft, hacking, terrorism, natural catastrophes, and other similar dangers all pose problems for the security of the Smart Grid's design and infrastructure [11]. Power outages, faulty consumer products, unstable energy markets, threats to human safety, and other problems might all be caused by flaws in the Smart Grid's information technology architecture.

Smart Grid security issues and dangers have been studied in the past. Below is a list relates potential Smart Grid-damaging risks and related difficulties, compiled from existing research. Most hackers will damage the security system and steal the smart grid's ethical work.

3.2 Smart grid- cyber-attacks:

A specialist in control system security has estimated that 188 cyber events have resulted in power outages, three considered severe (in 2015). This section will discuss the most serious cybercrime incidents against the Smart Grid and the associated dangers.

3.3 Stuxnet attack :

In July 2010, Stuxnet launched its most well-known assault to date. Stuxnet is malicious software designed to reprogram and conceal modifications to certain kinds of industrial control systems. This assault demonstrated the viability of cyber-attacks on such sys-tems.

3.4 Data and Grid intellectual property theft attacks:

The Night Dragon is a malicious piece of malware that aims to acquire sensitive infor-mation relating to industry rivalry; it was first reported in November 2009 and is thought to have originated in China, primarily focusing on oil and electric power busi-nesses. This incident highlighted the risks associated with intellectual property and data theft.

3.5 Hackers' attacks:

A cyberattack on a computer system led to a blackout in January 2008. Although this assault did not affect a large geographical region, it did raise concerns that a hacker-caused blackout may occur.

4 Smart grid security system by Block chain Management:

The smart grid relies significantly on computer networks.

Information on energy generation, energy consumption, and energy trade among prosumers may all be compromised or altered due to cyber assaults on the Smart Grid. May mitigate Damage caused by data leaks on the Smart Grid with a system that safely stores and transmits all data created and exchanged on the network.

The term "information security" refers to a broad category of tools, many of which are used by the Smart Grid. However, a secure system for safe energy trading has become necessary as a result of the rise of the prosumer(prosumer + consumer)[13]. This person is capable of both producing and consuming energy. To ensure the security of all Smart Grid operations, Blockchain-based energy management is our suggestion.

4.1 Block chain with Management system:

Blockchain is a decentralised record that stores encoded data and information regarding each and every transaction without a trusted third party like a bank. Block-chains are decentralised information handling units where all the network operators share and store data without a central server or trusted third party [3]. The smart grid relies significantly on computer networks.

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Data is encrypted and stored using a hash with the preceding block data, and linked in a chain-type connected structure, as illustrated in Figure 3. Therefore, updat-ing the data is challenging since it must change the prior nodes to

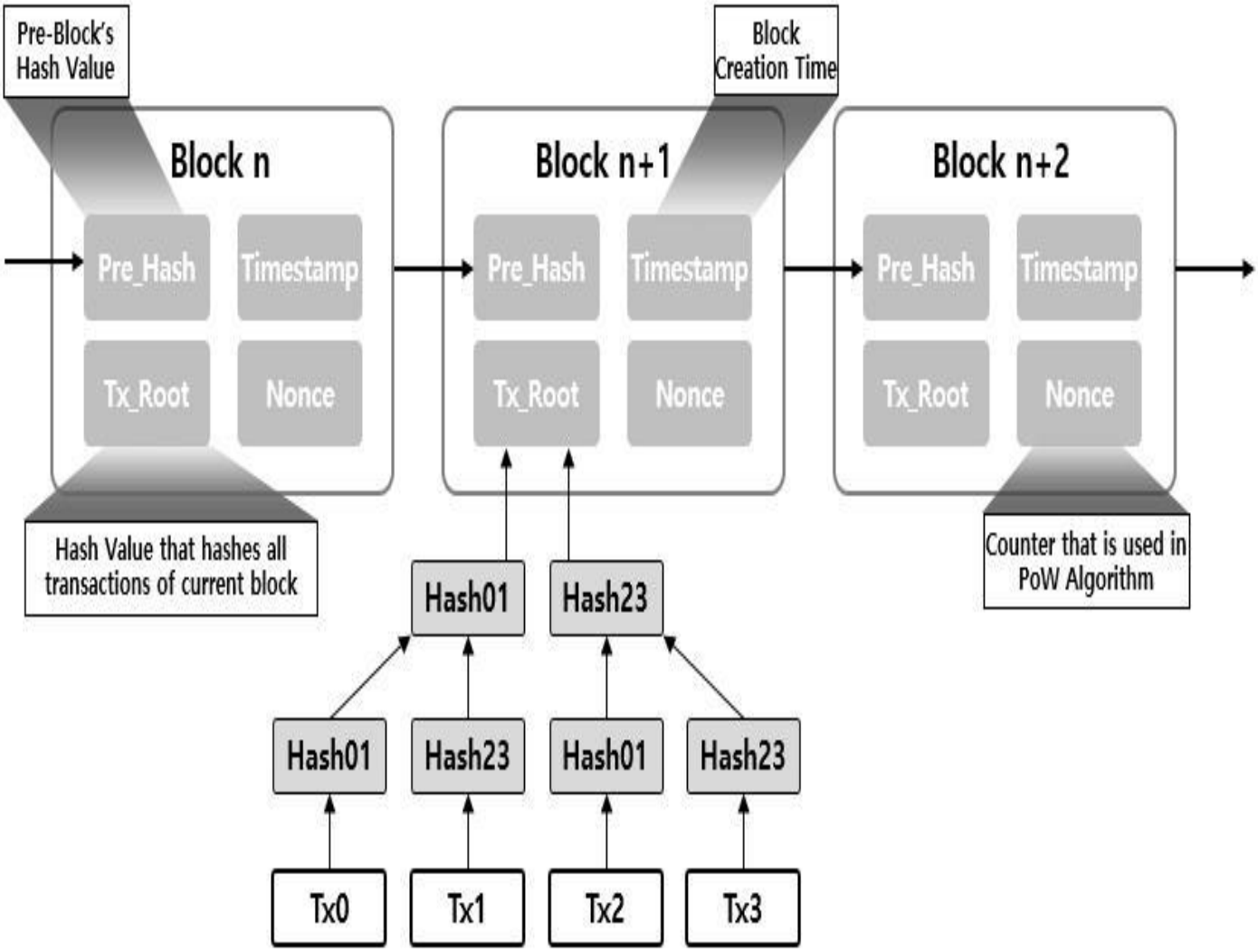

Figure 3: Block chain with management system framework

Result with analysis:

The purpose of this study is to propose a blockchain-based intelligent energy manage-ment system and to describe its operation and anticipated outcomes.

While power plants will still contribute to the Smart Grid's ability to generate and distribute energy, solar panels on every roof will allow residents and business own-ers to develop their clean power. Therefore, the system will make recommendations based on the premise that all homes and businesses will generate power independently.

Figure 4 depicts the bidirectional flow of real-time energy data across all Smart Grid nodes, including traditional power plants, renewable energy power plants, households, buildings, and industrial facilities. The approach might expose sensitive information to cyberattacks. As a result, encrypt these records inside a block before saving and linking to the blockchain in

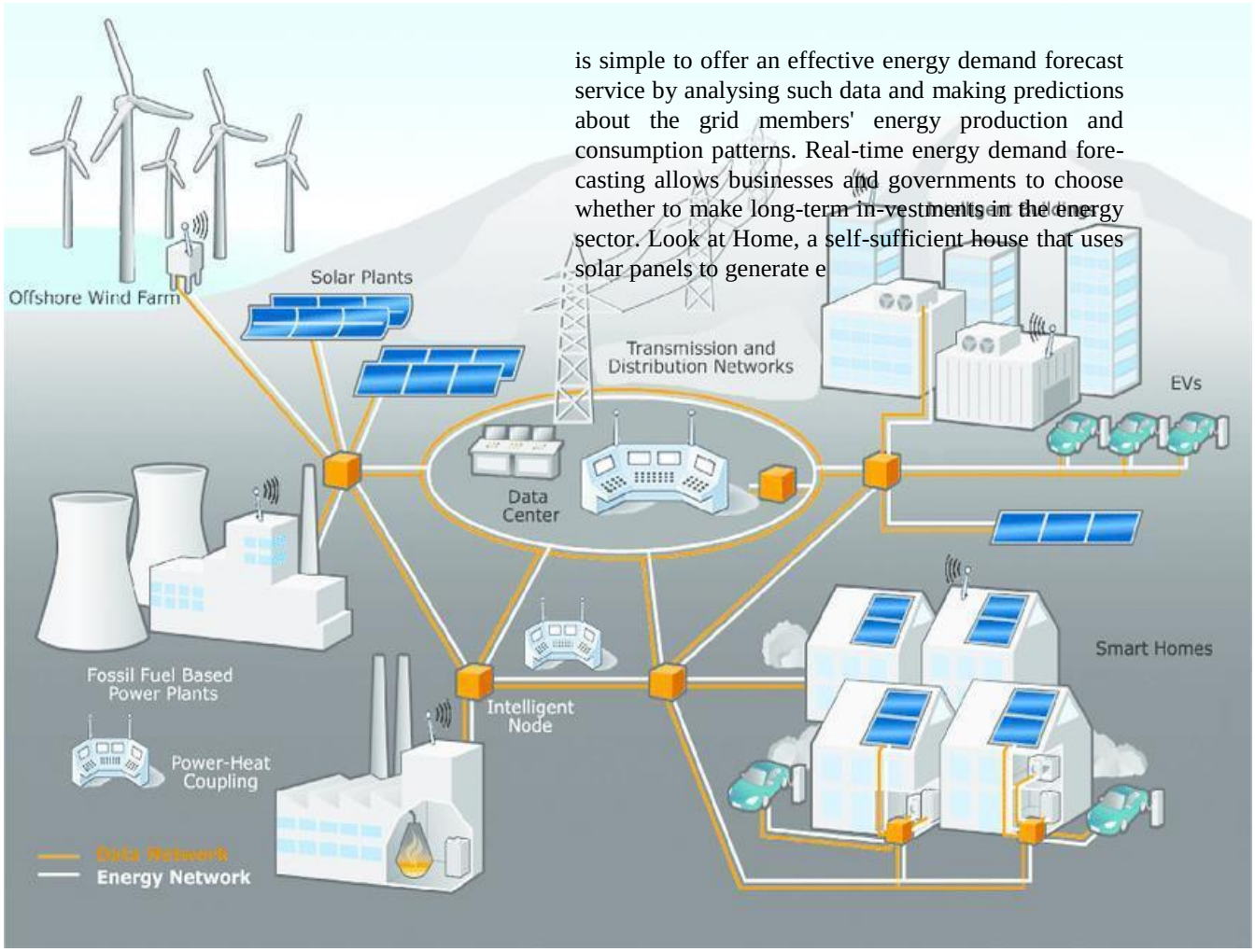

Figure 4: Bidirectional flow of real-time energy data across all Smart Grid nodes

Look at Home, a self-sufficient house that uses solar panels to generate electricity. Since it generates its electricity, the ledger will include its power output and details of usage; the latter enables the storage of any energy excess (production minus consump-tion). Future Smart Grids will also keep data on energy transactions since prosumers on the same grid will trade power on an as-needed basis. To ensure the integrity of the data and facilitate communication across nodes in the same grid network, this is rec-orded in real-time and added to the linked blockchain.

This technology stores all Smart Grid energy data in an encrypted form inside a block and on a distributed ledger (chain) to prevent forgery and theft. That's why it will be a far more secure and trustworthy method for storing information than we have now.

Because users in the same grid network can share data, an organisation (like a government) that manages a Smart Grid can quickly and easily understand the amount of energy generated over a given period, the amount oself-production of buildings and buildings, and the amount of usage. Therefore, it is simple to offer an effective energy demand forecast service by analysing such data and making predictions about the grid members' energy production and consumption patterns. Real-time energy demand fore-casting allows businesses and governments to choose whether to make long-term in-vestments in the energy sector. Look at Home, a self-sufficient house that uses solar panels to generate e

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6 Conclusion:

This study looked at the Smart Grid and outlined several possible dangers and hacks.

We anticipated the severity of a cyberattack on the smart grid.

Therefore, a way to make intelligent energy management more secure against cyberat-tacks is provided when implementing the smart grid.

The smart grid's stored data can be shared and secured using blockchain. Energy data will be carefully stored and used by this system. Thus, it will encourage the growth of the Smart Grid energy industry.

A blockchain-based infrastructure is developed to operate and monitor the smart grid securely and intelligently. After the development of the design, IoT devices will gather energy data and upload it to the storage system via the blockchain.

Following the simulation, the blockchain can examine the shared information. Apply our technique to the actual Smart Grid once it succeeds. Therefore, a way to make intelligent energy management more secure against cyberat-tacks is provided when implementing the smart grid.

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Voice Personal Assistant For Windows Using Rnn

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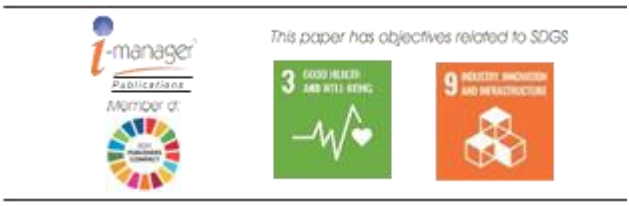
Abstract— **The goal of this work is to build a personal voice assistant for Windows users. Speech is understandable by humans easily but it is difficult for computer to realize. For the detection of speech we have to consider the physical properties of sound waves. Different people got different sound which makes the sound distinct. Background noise, type of microphones are the variables one has to consider for speech module. Neural network is used to analyze to build the model for speech recognition.**

Keyword- Speech Recognition, Neural Network, Voice assistant.

I. INTRODUCTION

A voice assistant can be a digital assistant that uses human voice, language process algorithms, and synthesis to pay attention to particular voice commands and come applicable information or perform particular functions as appealed by the user supported commands, commonly known as intents, tell by the user, voice assistants will come applicable information by hearing for particular keywords and filtering out the close noise. One of the most popular voice assistants are Siri, from Apple, Amazon Echo, which responds to the name of Alexa from Amazon, Cortana from Microsoft, Google Assistant from Google.



The primary goal of this work is to build a local voice assistant that performs the work of human and the daily task that a human needed to do in day-to-day life. The users can ask their assistants questions and devices, media playback via voice and they manage their basic tasks such as g-mail account, calendars with verbal commands. It will also basic and common features of today's voice assistants. As voice assistants are become more widely used to deliver the library services and materials. Voice control is major growing feature. The voice assistants will gather the audio voice as input the human beings from the microphone and it will be converted into text and it will sent the output google text to speech. The voice recognition technology is evolving rapidly to expected to become default input from for smartphone presently the modern voice recognition technology has been very useful to users as it provides uses with various app and resources from the any where in the world. And most systems are allows the user to train the software to understand their voice and it can translate speech to text more precisely. And speech recognition is a keyboard typing it is easily understand your talking to the machine and your voice or your talking words shown on the screen.

Voice assistant are widely used to developed to consumption of time. The voice assistant provides the command to the system and it is giving to the message replay as text and it will directly connect to the web browser.

II. PROBLEM STATEMENT

"Google Voice Search" which is used for in Android Phones. But this Application mostly works with Internet Connections. Cortana, Siri, Google Assistant and many other virtual assistants which are designed to aid the tasks of users in Windows, Android and iOS platforms. But to our surprise, there's no such complete virtual assistant available for Core Windows platform consisting of 70% of the users. So, this is actually a major problem for users where there could be internet instability, server problems and places where internet is not accessible. , there is no universal assistant who would do all tasks equally well.

III. OBJECTIVE

The primary technologies are voice activation, automatic speech recognition, Text-To-Speech, voice natural language understanding and named entity recognition. The data is collected in the form of speech and stored as an input for the next phase processing and input voice is continuously processed to converted to text using STT. The ability of computers to read text aloud and converts written text to a phonemic representation using TTS engine. The use of dynamic base Python pyttsxwhich is a text to speech conversion library in python andunlike alternative libraries, it works offline.

IV. LITERATURE SURVEY

The field of voice-based assistants has observed major advancements and innovations. The main reason behind such rapid growth in this field is its demand in devices like smartwatches or fitness bands, speakers, Bluetooth earphones, mobile phones, laptop or desktop, television, etc. Most of the smart;/// devices that are being brought in the market today have built in voice assistants. The amount of data that is generated nowadays is huge and in order to make our assistant good enough to tackle these enormous amounts of data and give better results we should incorporate our assistants with machine learning and train our devices according to their uses. Along with machine learning other technologies which are equally important are IoT, NLP, Big data access management. The use of voice assistants can ease out a lot of tasks for us. Just give voice command input to the system and all tasks will be completed by the assistant starting from converting your speech command to text

command then taking out the keywords from the command and execute queries based on those keywords. In the paper “Speech recognition using flat models” by Patrick Nguyen and all, a novel direct modelling approach for speech recognition is being brought forward which eases out the measure of consistency in the sentences spoken. They have termed this approach as Flat Direct Model (FDM). They did not follow the conventional Markov model and their model is not sequential. Using their approach, a key problem of defining features has been solved. Moreover, the template-based features improved the sentence error rate by 3% absolute over the baseline [2]. Again, in the paper “On the track of Artificial Intelligence: Learning with Intelligent Personal Assistant” by Nil Goksel and all, the potential use of intelligent personal assistants (IPAs) which use advanced computing technologies and Natural Language Processing (NLP) for learning is being examined. Basically, they have reviewed the working system of IPAs within the scope of AI [4]. The application of voice assistants has been taken to some higher level in the paper “Smart Home Using Internet of Things” by Keerthana S and all where they have discussed how the application of smart assistants can lead to developing a smart home system using Wireless Fidelity(Wi-Fi) and Internet of Things

V. CONCLUSION

This paper provides a basic knowledge and difference between various voice assistant present. Also it gives a brief idea on how we could incorporate neural networks to build the acoustic model. Linguistic model uses beam search which is an rescoring algorithm that deals with the probability distribution of the most probable word which could occur in a sentence which makes a sense in the sentence. Recurrent Neural Network handles the time sequence series of speech as it is light weight in process and could work with various speech dataset with great efficiency.

VI. ACKNOWLEGEMENT

This paper on "Voice Personal Assistant for Windows" has been possible only because of the kind of cooperation lent by our professor and project guide Dr. Manish Rana, without which this would have not been possible. We would also like to thank our parents, who have provided us with all possible resources to gain the best possible knowledge and understanding in our enlightened journey.

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Design and Development of Accessible Video Chat Application for People with Disabilities

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Abstract—**Communication has been a struggle for everyone since the outbreak and in the aftermath, people have had to get accustomed to video conferencing applications. However people with physical or mental limitations are still unable to use video conferencing apps and their interfaces. This necessitates the development of web-based video chat applications that can aid those who are unable to communicate verbally and/or operate using standard mouse and keyboard inputs but yet need to feel close to others when they are apart. The proposed application incorporates various accessibility features such as speech-to-text and text-to-speech, gaze tracking and pictorial speech interfaces. It enables individuals with disabilities to participate in virtual meetings on an equal footing with their peers. The application's goal is to remove barriers and promote inclusiveness in remote work and collaboration for all users, regardless of their abilities.**

Keywords—***Video Conferencing, Accessibility, Assistive Technology, Gaze Tracking***

I. INTRODUCTION

Video conferencing is a type of online meeting where two or more people engage in a live audio-visual call. With a strong internet connection, the participants can see, hear, and talk to each other in real-time, no matter where in the world they are. In business, people typically use video conferencing to communicate and collaborate within and outside an organization. One just needs to set up the necessary hardware and software to get the most out of the experience. There was a time when video conferencing was a luxury that only large corporations could afford. Smaller businesses lack the resources to deploy complex equipment and hire technical experts using other forms of communication. But video conferencing has now become more accessible and affordable. This is mostly thanks to the continued development of Voice over IP or VoIP. These days, one can literally carry this powerful communication and collaboration tool inside the pocket. With more companies incorporating video conferencing into their daily operations, ensuring everyone can connect online through video is a significant aspect.

However, for individuals with disabilities, access to these apps can often be limited by a lack of accessibility features. This can make it difficult for these individuals to fully participate in virtual meetings and events, and can even limit their career and educational opportunities.With the wrong tools, a person with a disability may actually experience new barriers. WCAG (Web Content Accessibility Guidelines) is the industry benchmark that provides support for web users living with various levels of conditions. Making a platform more accessible can assist not only users with physical, visual, photo-sensitive, auditory, or auditory impairments. But also people with temporary disabilities such as a broken arm or lost glasses or "situational limitations" such as language barriers, geographical position or poor network conditions.

To address this issue, many video conferencing apps have begun incorporating accessibility features, such as closed captioning, voice-to-text transcription, and keyboard shortcuts, to make the technology more accessible to everyone. By providing these features, video conferencing apps are helping to close the digital divide and ensure that individuals with disabilities have equal access to the same communication and collaboration tools as everyone else. However, there is still much work to be done in terms of making video conferencing apps truly accessible for all. Some apps may still lack certain accessibility features or may not implement them in a way that is usable for everyone. As such, it is important for developers, users, and organizations to continue to push for greater accessibility in video conferencing technology, in order to create a more inclusive and equitable virtual world.

Our approach aims to develop a universally accessible and free video conferencing application. By integrating 4 Modes to the video chat software, the solution aims to add practical and pertinent interfaces and bring Augmentative and Alternative Communication (AAC) to video conferencing, enabling people with disabilities to connect and speak with those who are important to them.

II. LITERATURE REVIEW

A 2020 study by the Royal National Institute of Blind People found that only 45% of visually impaired people in the UK use video conferencing, compared to 75% of the general population[1]. A survey by the National Association of the Deaf found that approximately 70% of deaf and hard of hearing people in the United States experience communication barriers on video conferencing platforms.[2] According to a 2019 survey by the charity AbilityNet, only 52% of people with disabilities in the UK feel confident using video conferencing, compared to 69% of the general population [3].

A study by the United Nations Department of Economic and Social Affairs (2019) found that people with disabilities face significant barriers in accessing and using digital technologies, including video conferencing[4]. A 2020 survey by the charity Scope found that only 55% of disabled people in the UK have access to the equipment needed for video conferencing, such as a computer or smartphone, compared to 82% of the general population [5]. The World Health Organization (WHO) reports that only 37% of people with disabilities globally have access to assistive technologies, such as closed captioning or sign language interpretation, which can greatly enhance their experience with video conferencing [6].

These statistics highlight the digital divide faced by people with disabilities when it comes to using video conferencing, and the need for increased access to assistive technologies and inclusive design to improve the experience for all users.

Sr. No	Paper Details	Methodology and Outcomes	Gaps and Bridging the Gaps
1	**Title:** Implementing Deep Learning Model in Human-Computer	**Methodology:** The paper attempts to use eye movements and facial expressions as the basis for a handless mouse	**Gaps:** Translation of conventional mouse actions like moving the cursor and clicking is done by tracking the user's

	s Recognition using Convolutional Neural Network [7] **Conference Name:** International Research Journal of Engineering and Technology (IRJET) 2022 **Conference Year:** 2022	The proposed procedure in this paper works based on the following actions: a. Blinking b. closing both eyes c. Head movement (pitch and yawning) d. Opening the mouth **Outcomes:** The mouse control system works and the user can move the cursor and click at will The cursor is moved by moving the eye right, left, top, and down as per the requirement Click action is initiated by opening and closing the mouth	facial orientation and mouth movements respectively These detections require going beyond the segmentation of the eyes **Bridging the gap:** Instead, the actions can be translated as follows: **Cursor Navigation:** Gaze Tracking using the position of specular reflection in the user's cornea **Click:** Blinking Eyes / Persistent Gaze
2	**Title:** Non-Intrusive Gaze Tracking Using Artificial Neural Networks [8] **Conference Name:** School of Computer Science Carnegie Mellon University **Conference Year:** 1994	**Methodology:** The training data for the ANN is 2000 image/position pairs (High-resolution images of the subject's **cornea and pupil**) **Steps:** 1. Find the specular reflection of a stationary light source in the subject's eye 2. Find the pupil center 3. Find the relative position between both to determine the gaze direction **Outcomes:**	**Gaps:** The model relies on the geometric model of the eye, and hence relies heavily on parameters such as cornea radii, cornea center, etc. which are often noisy in a webcam feed Expensive Hardware Systems accuracy: **0.75 degrees** This method: **1.5 degrees** **Bridging the gap:** Instead of using just eye patches for gaze prediction, The model can also incorporate Head Orientation The use of offset tables, generated

		In a gaze tracking system, the most important attributes are speed and accuracy **Speed**: 15 Hz **Accuracy**: Using only cornea and pupil: 2.1 degree Additionally using Eye socket position: 1.5 degrees	after model training can improve the accuracy

3	**Title:** Accessible Education for Autistic Children: ABA-Based Didactic Software [9] **Conference Name:** Universal Access in Human-Computer Interaction **Conference Year:** **2011**	**Methodology:** This paper discusses various techniques and design of physical interfaces for autistic children **Outcomes:** The educator can make use of this physical interfaces namely the carousel, digital core boards, circle of icons and color-coded sheets to teach autistic children	**Gaps:** The mentioned system makes use of physical interfaces thereby reducing the reach of the interfaces among masses No Online centralized application **Bridging the gap:** Due to poor motor skills they cannot use Sign Language or type on a keyboard A pictorial phrase selection based layout to implement to help autistic users build and convey sentence
4	**Title:** Conversation of Sign Language to Speech with Human Gestures[10] **Conference Name:** 2nd International Symposium on Big Data and Cloud Computing **Conference Year:** 2015	**Methodology:** This paper recognizes hand gestures and converts its into speech and text output **Steps:** 1. Image Capture 2.Gray Scale Conversion 3.Contour Detection 4.Convex Hull 5.Analyzing and Identification of Alphabet The OpenCV function determines the edge points. 6.Existing OpenCV Algorithms find features of Contour 7.The set of points in the contour forming	**Gaps:** The existing system is only able to recognize the sign gestures for letters only Colloquial Sign Language also uses representations for syllables and words **Bridging the gap:** By using a densely labeled dataset our Mode will attempt to implement sign language implementation with the ability to recognize not just letters but syllables and words too

		an N-dimensional polygon is Hull **Outcomes:** Recognize hand gestures and convert them into speech and text output Camera captures images of hand and Contour feature extraction recognizes the hand gestures and on the basis of it, the recorded soundtrack is played	

5	**Title:** Accessible Video-Call Application on Android for the Blind [11] **Conference Name:** Lecture Notes on Software Engineering vol. 4 **Conference Year:** 2016	**Methodology:** Screen reader is essential software that allows blind users to interact with smartphones. Web Content Accessibility Guidelines (WCAG) is to suggest a standard for web content accessibility that meets the needs of individuals, organizations, and governments internationally, be they people with disabilities or others Understood outcomes by blind and non blind persons perform the same experiment. **Outcomes:** The paper implemented an application for Android smartphones to help people with visual disabilities to communicate with their assistants for navigation help and more. The paper showed that the existing applications failed to serve this group of users, and this led to the later parts where we proposed the guideline as a solution and simulated it to compare with those popular applications.	**Gaps:** Unable to locate functions. Eg. Hidden option menus Unable to proceed / Unknown status. Eg. System halted when the input was incorrect or loss of call signal Use of Non-standardized or confusing terms. Eg. Tango uses "Discover" to mean "Contacts" **Bridging the gap:** Must have descriptions or announcements for every error handling and change of status. Use terms that can be understood by most and add description in captions. Every button and function must be visible on the screen, can be read out loud by the screen reader, and be accessible by a swiping motion.

Table 1 : Literature Review

III. PROPOSED SYSTEM

Our proposed solution aims to cater to this aforementioned problem by integrating 4 interactive modes to the video conferencing application with each mode serving a special disability.

These Mode are as follows:

- Mode-1 - Voice Based Control
- Mode-2 - Graphics Based Control
- Mode-3 - Eye Gaze Based Control
- Mode-4 - Automatic Sign Language Translation

Fig. 1 contains the component diagram of the system to show the relationship between different components in a system. Other aspects of the application related to the area of implementation, type of the solution, category of the disability are mentioned below:

- Situation Category: Daily Life
- Disability Category: Multiple type
- Disability Type: Open
- Software / Hardware: Software

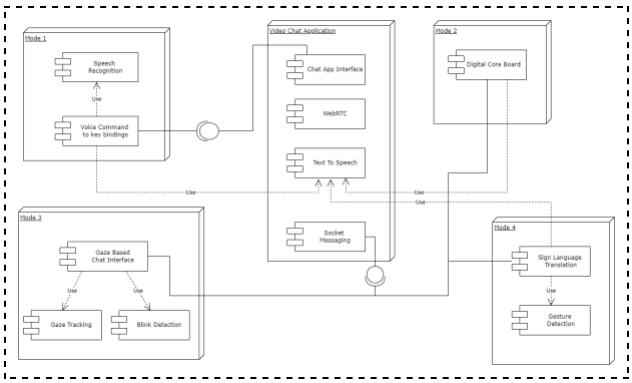

Fig. 1 : Component Diagram

Further is a detailed deep dive into each of the modes of the application.

Mode-1: Voice Based Control

The Target Demographic for this Mode are people suffering from Visually Impaired Ability or Physically Disability. Using Mode-1, users can use voice-based commands to interact with the video chat interface and get voice-based feedback. This helps users

who are unable to use conventional input devices like a keyboard and mouse.

Mode-2: Graphics Based Control

The Target Demographic for this Mode is people suffering from Autistic Spectrum Disorder. Due to poor motor skills, Autistic children cannot use Sign Language or type on a keyboard. Mode-2 provides them with a pictorial word & phrase selection-based layout to help autistic users build and convey sentences.

Mode-3: Eye Gaze Based Control

The Target Demographic for this Mode are people suffering from Severe Physical Disability or Locked in Syndrome. Using Mode-3, Users with severe disability or Locked in Syndrome can use their eyes to interact with the interface. The user's gaze location on the screen will be tracked using the webcam and accordingly, the mouse cursor will be positioned.

Mode-4: Automatic Sign Language Translation

The Target Demographic for this Mode are people suffering from Deafness / Muteness. Often people who communicate using Sign Language need a communication assistant for video conferencing interactions. We can overcome this by training models that can intercept the webcam feed and convert Sign Language into Spoken Language

IV. METHODOLOGY

Mode-1 and Mode-2

The Mode-1 and Mode-2 of our solution is a complete web centric approach powered by WebSockets and leveraging the WebRTC technology.

Earlier, It was quite common for most web apps to have a closely connected backend and frontend, so the apps served data with the view content to the user's browser. Nowadays, typically loosely coupled, separate backend and frontends are developed to maintain a two tier architecture and are connected by a network-oriented communication line. For example, developers often use the RESTful pattern with the HTTP protocol to implement a communication line between the frontend and backend for data transferring. But the HTTP-based RESTful concept uses simplex communication (one-way), so we can't send data directly from the client (frontend) to the server (backend) without implementing workarounds such as polling. The WebSocket protocol solves this drawback of the traditional HTTP pattern, offers a full-duplex (or two-way) communication mechanism between the client and the server over a single TCP socket connection, and helps developers build real-time apps. The WebSocket protocol has only two agendas: To open up a handshake and to help the data transfer. Once the server accepts the handshake request sent by the client and initiates a WebSocket connection, they can send data to each other with less overhead at will. WebSocket communication takes place over a single TCP socket using either WS (port 80) or WSS (port 443) protocol. Almost every browser except Opera Mini provides admirable support for WebSockets. In order to use WebSockets, We employed a Node.js WebSocket server that handles the video conferencing backend logic and a React app that connects to the WebSocket server for real-time features.

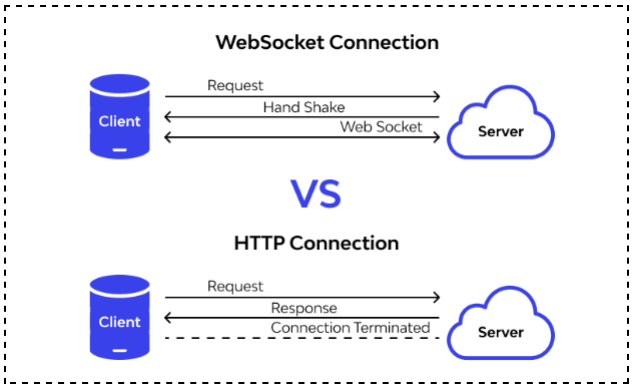

Fig. 2 : WebSocket vs HTTP Connection

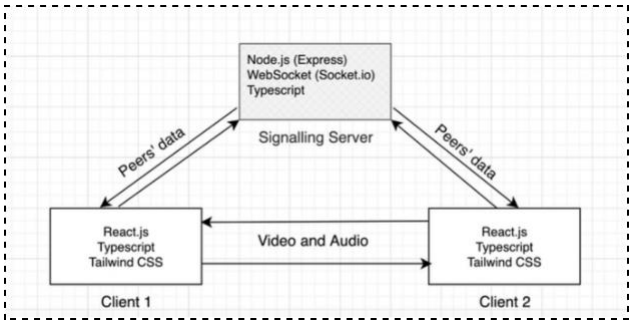

Fig. 3 : Video Chat App Data Flow

Mode-1 of our solution targets the community which are suffering from Visually Impaired Ability or Physical Disability. For example, a person with delocated arms. Such people are not able to use the traditional video

chat apps with their motor arms, thereby making the physical touch a barrier for them. Our solution solves the problem of touch by controlling the entire application using our voice assistant. Each and every step that is being involved right from room creation to sending chats and handling the video audio options, everything can be operated just by the specified voice commands like create a room, join a room, enter the user details, turn off and on audio and video, sending messages in the chat window and also mailing someone the meeting link, basically each and every activity that a normal user does can be performed by the disabled too.

Fig. 4 : An instructor interacting with a student with ASD using Vocabulary Core Board

Mode-2 of our solution targets the community which are suffering from Autistic Spectrum Disorder. In simple terms, the children suffering from this disorder are not able to communicate either verbally or via sign language communication due to poor motor skills. So, in the current scenario, instructors of such children make use of the below shown physical board called as Vocabulary Core board. These are physical boards that serve as a collection of tiles in which 50% of a child's daily vocabulary is represented in a chart pictorially in a color code fashion. The tiles are grouped on the basis of category so that the child can point on a sequence of tiles in order to form a sentence and can communicate with the co-person. In our application, we have digitized this physical load in the form of a digital core board in a similar manner with color code groups such as pronouns, alphabets, letters, adjectives, emojis, etc.The child can click on any tile and that tile is included in the word tray.

Fig. 5 : Vocabulary Core Board (Physical / Paper)

In similar fashion, the child can construct the sentence by clicking on the tiles and once the sentence is ready, the child can click on the speak icon to convey his/her sentence to the instructor over the call using socket programming.

Mode 3

Mode 3 of our solution employs Gaze Tracking to act as a substitute for conventional keyboard and mouse controls as well as a conveying medium for verbal communication. Gaze tracking software is used by individuals who have disabilities or limited mobility that make it difficult or impossible for them to use traditional methods of computer control, such as a mouse or keyboard [12]. This software can provide an alternative method of control that is based on eye movements, which can be especially useful for people with conditions such as:

- Motor disabilities, such as cerebral palsy or multiple sclerosis, that impact the ability to use a mouse or keyboard.
- Neurological conditions, such as ALS or spinal cord injuries, that affect muscle control and mobility.
- Visual impairments, such as macular degeneration or glaucoma, that make it difficult to use a mouse or keyboard.

Web Gazing refers to the act of using eye-tracking technology to control a computer or other electronic device. This technology uses a webcam or other type of camera to track the movement of a person's

eyes and translate that movement into commands for the device. Web gazing technology works by detecting changes in the position and gaze of the eyes, and translating this information into commands for the device. The technology can be used to perform a wide range of tasks, such as scrolling through a web page, navigating menus, and even typing.There are several types of web gazing technology available, each with its own unique features and capabilities. Some systems use webcam-based eye-tracking, while others use specialized hardware that is built into the device. However specialized hardware for gaze tracking is expensive and hence heightens the barrier of inclusion. Hence for our solution we use Web-Cam based gaze Tracking using an Open Source library - WebGazer.js.

WebGazer.js [13] :

WebGazer.js is an open-source library for web-based eye tracking. It works by using a webcam to track the movement of a user's eyes and translate this movement into commands for the computer. The library uses machine learning algorithms to identify the user's eyes and determine the gaze direction. It tracks the position of the eyes over time, and uses this information to determine where the user is looking on the screen. The library can then translate this information into commands, such as clicking a button or scrolling a page.

WebGazer.js runs in a web browser, which means that it can be used on any device with a webcam and an internet connection, without the need for any additional hardware or software. The library is designed to be easy to use and integrate into existing web applications, and it can be used to build a wide range of interactive applications and experiences.

One of the benefits of WebGazer.js is that it provides a low-cost and accessible solution for web-based eye tracking. Because the library runs in a browser, it eliminates the need for specialized hardware or software, and it can be used with a wide range of devices and operating systems. Additionally, the open-source nature of the library means that it can be freely modified and extended to meet the specific needs of individual users and applications.

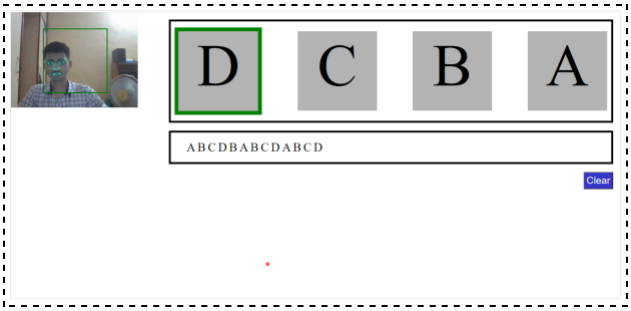

Fig. 6 : Demonstration of typing words by selecting buttons on the screen solely using Gaze Tracking

Internally WebGazer is agnostic about face and eye detection algorithms, it incorporates three different facial feature detection libraries: clmtrackr [14], js-objectdetect [15], and tracking.js [16]. All three implement different vision algorithms in JavaScipt. Js-objectdetect and tracking.js detect the face and eyes and return rectangles that enclose them. Instead of using the whole video frame we first perform face detection for finer-scale eye detection on its upper half, speeding upgaze prediction and suppressing false positives. Clmtrackr a more realistic fitting of the facial and eye performs contour. To provide consistent input for WebGazer, the smallest rectangle that fits the eye contour is used. This is followed by pupil detection and eye feature extraction (120D feature). Then a regression model is used to map these 120D features to 2D screen coordinates.

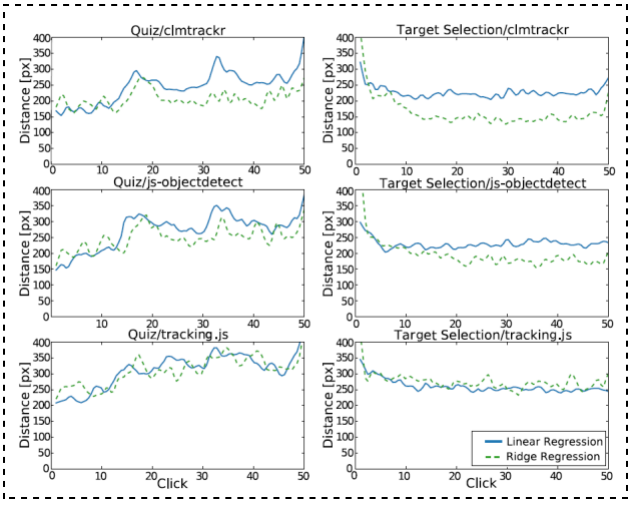

Fig. 7 : Average Euclidean distance in pixels between the click location and the predictions made by the simple linear (solid blue) and the ridge regression model (dashed green).

Interface Design :

Using WebGazer's abilities the interface for Mode 3 can help the user form sentences and communicate them to their chat partners using Text-to-Speech. The size and layout of the buttons that are triggered by Gaze Tracking has been carefully decided so as to combat any errors in the gaze prediction. Also for smaller buttons on the interface Blink Detection has been used as a trigger.

Mode 4

Mode 4 of the solution uses the webcam video feed to detect non-verbal communication like Sign Language and convey it in the meeting via Text-to-Speech.

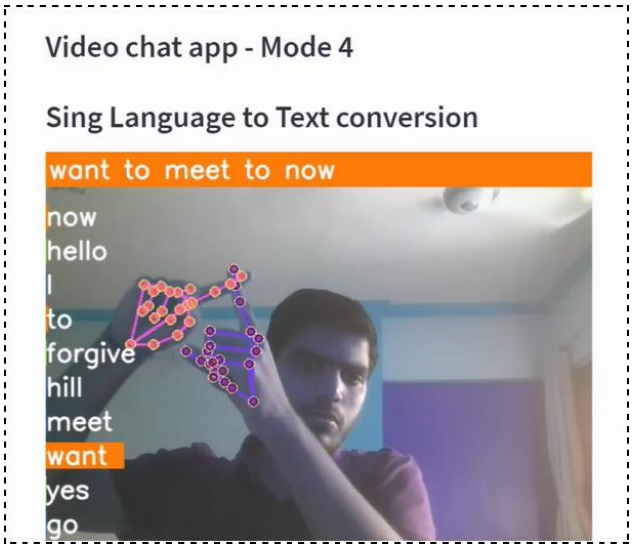

Fig. 8 : Mode 4 Demo

(For demonstration purposes we built our Sign Language Detection model on a limited vocabulary of 20 words)

Mediapipe is a library for building cross-platform multimedia processing pipelines. It provides a framework for integrating and processing image, audio, and video data in real-time. MediaPipe contains a massive array of human body detection and tracking algorithms that have been trained on Google's vast and diverse dataset. They track critical spots on different body sections as the skeleton of nodes and edges or landmarks. All coordinate points are normalized in three dimensions. An overview of how the Sign Language Detection works:

1. Input data: To start, we capture video data of a sign language gesture, by using the webcam.
2. Pre-processing: Before the data can be processed, it may need to undergo some pre-processing steps, such as resizing or cropping the image, converting it to grayscale, and normalizing the brightness and contrast.
3. Sign language detection: Next, we used the Mediapipe library to build a pipeline for sign language detection. The pipeline will include a series of computer vision algorithms, such as edge detection, object detection, and feature extraction, to identify and analyze the sign language gestures.
4. Recognition: Once the sign language gestures have been identified and analyzed, the pipeline uses machine learning algorithms, such as decision trees, support vector machines, or deep neural networks, to recognize the signs and match them to predefined sign language symbols or words.
5. Output: The final step is to output the recognized sign language, either as text or speech. The output can be displayed on the screen, sent to a text-to-speech engine, or saved to a file for later use.

V. RESULTS AND DISCUSSION

Fig. 9 : Website Landing Page

Fig. 10 : Mode 1 Interface

Mode 1 interface imitates any generic video chat interface, but with additional speech recognition capabilities. Common meeting control actions like Creating a Meeting, Turning off video, Unmuting microphone, Leaving a meeting etc. can be done using voice commands. Moreover one can also use the text chat using voice commands.

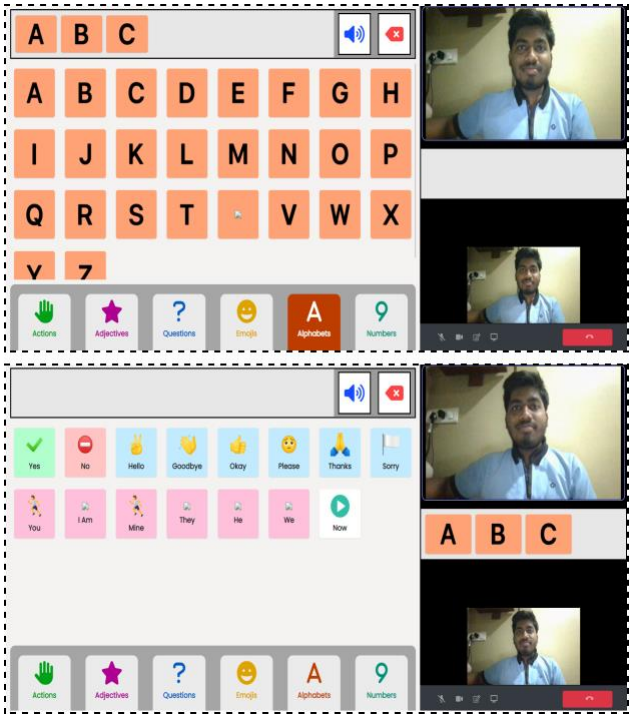

Fig. 11 : Mode 2 Interface

Mode 2 interface implements a Digital Vocabulary Core Board on the left with the video feeds placed on the right of the screen. Users can select tiles from the word tray which are then added to the sentence tray. Once a sentence is formed the user clicks on the Speak button, and the formed sentence is communicated to the meeting partner via Text-to-Speech. The contents of the word tray can be modified using the array of options on the bottom. Also the messages sent by the instructor are displayed on the right in the same word tiles format.

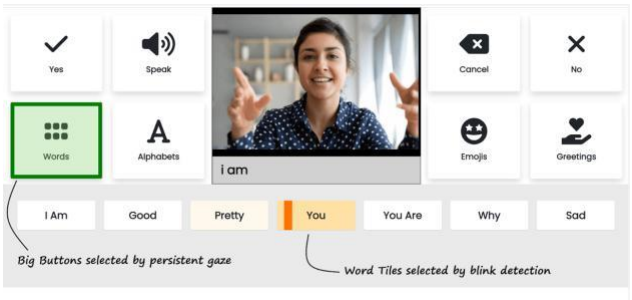

Fig. 12 : Mode 3 Interface

Mode 3 Interface consists of two types of buttons, each being triggered by a computer vision based detection event. The larger buttons in the upper portion of the screen are triggered based on Gaze Tracking. Persistently staring at a button leads to a click event on it. The placement of the video feed at the center and buttons on the sides is deliberate and meant to utilize the comparatively better gaze prediction on the sides of the screen. Similar to Mode 2, in Mode 3 we have a sentence tray. The word tray in the bottom portion of the screen is used to populate the sentence tray. Once activated, a cursor traverses through the tray from Left to Right. When the cursor is on the desired word, the user must blink. The blink is detected and the word is added to the sentence tray. Using the Speak button the contents of the sentence tray are communicated to the meeting partner via Text-to-Speech.

VI. CONCLUSION

The problem statement and the facts that back it up provide the impression that the problem is evident and does call for a necessary solution. The employment of an inclusive video chat application that accommodates various disabilities will lessen the drastic cutoff of offline resources, have a greater reach, and be simple to use in a centralized fashion.

VII. FUTURE SCOPE

The accuracy of Computer Vision models can be improved using extensive training data and more browser performant models. The interfaces created can be decoupled from the core video chat application and can be offered as add-ons to existing video chat applications, thus increasing the potential for inclusivity.

VIII. ACKNOWLEDGMENT

We sincerely appreciate the assistance, direction, and encouragement provided by our mentor Zahir Aalam for this evaluation work. Additionally, we are grateful to the project managers for setting up the facilities required to complete the job.

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Speech Docs – Voice Controlled Document Editing Software

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Abstract- **Every student in school, every student at university, and every professional in the workforce relies on Word documents on a daily basis. These documents may be used for conveying ideas, projects, and even taking notes. Keyboards and mice are useful for most but there are some individuals who have unsupportable conditions such as Arthritis in the hand, Parkinson's, Carpal Tunnel Syndrome, or Essential Tremor for which keyboard is painful. Speech docs aim to solve such problems by enabling only voice to interact with the documents. By using their voice, users can perform any operation, such as creating, editing, opening, writing, or replacing words in a document.**

Keywords- Speech recognition, Voice recognition, Speech-to-Text, Feedback mechanism

I. INTRODUCTION

Voice-controlled systems have revolutionized how humans interact with computers. Users can make hands-free requests to computers with voice or speech recognition systems, which process their requests and respond appropriately. With years of research and development in machine learning and artificial intelligence, voice-controlled technologies have evolved to be more efficient and are widely used in many fields to enable and improve human-to-human and human-to-computer interactions [1].

Word processing software did not develop out of computer technology. It evolved from the needs of writers rather than those of mathematicians, only later merging with the computer field. The history of word processing is the story of the gradual automation of the physical aspects of writing and editing, and the refinement of the technology to make it available to individual and corporate users [2]

. Word processing software can be used in daily life and business to create professional-looking documents such as resumes, letters, applications, forms, brochures, templates, business cards, calendars, reports, eBooks, and newsletters in speed with high quality.

In this paper, we present Speech Docs which is a voice-controlled word processing software and is designed for those who are unable to type on a keyboard. With SpeechDocs, you can create a new document, update its contents (Replace, delete, clear, enter title, type body, etc.) and save it, or download or export the document to a word file to share it with anyone.

II. LITERATURE REVIEW

1. Voice Controlled E-Commerce Web Application

A preliminary prototype of a voice-controlled e-commerce web application using IBM Watson STT, and TTS services is presented, along with performance comparisons of some of the more well-known SRSs from the literature and a taxonomy for classifying SRSs based on their functionality.[1] It also studies some cutting-edge SRSs. Increasing website accessibility is essential for the e-commerce-dependent economy of today. In order to increase accessibility of web applications for visually impaired users so that they can use their voice to manage the application, authors created an SRS-based e-commerce web application. By encouraging easy interaction and multitasking and supporting a lean environment where users may make requests using

natural language, SRS enabled programmes can improve usability for all users.[4]

Results after comparison of some popular SRS available today.

Cloud-based SRS	WER (%)	PRR (%)
Google	15.8	73.3
Nuance	39.7	44.1
IBM	42.3	46.3
AT&T	63.3	32.8
WIT	63.3	29.5

Fig 1. SRS comparison

$$PRR = \frac{\text{Number of Words} - \text{Substitutions} - \text{Deletions} - \text{Insertions}}{\text{Number of Words}}$$

$$WER = \frac{\text{Substitutions} + \text{Deletions} + \text{Insertions}}{\text{Number of Words}} * 100$$

Fig 2. PRR and WER formula

In terms of quality, Google proved to be superior to the other systems as it was able to identify 73.3% of the text with only 15.8% WER and 73.3% PRR. Nuance's The Dragon system achieved around 39.7% WER with a PRR of 44.1%. IBM Watson recognized 46.3% of the text with a WER of 42.3% and 46.3% PRR.

a) Gaps Identified

There are no specifics on how visually challenged users are supposed to login and navigate to different pages on the e-commerce website. Because the entirety of the website cannot be voice controlled, visually impaired individuals are still not independent.

b) Findings

A unique vocabulary is maintained which is frequently used in application,which helps in better recognition of words / sentences. We can populate the vocabulary according to a specific application and can train a model on those specific words and this might help with better speech recognition.

2. Voice Based Email System

The proposed method is usable by both normal people and people with disabilities. The system is pleasant to all user types, whether they are normal, visually challenged, or illiterate, however it concentrates more on regular users.[3] The system directs the user in carrying out the action that is desired. The main benefit of this system is that the user doesn't have to worry about using the keyboard because all actions are voice-based or based on simple mouse clicks, so there's no need to learn keyboard shortcuts in order to provide speech inputs. The technique will also be very helpful to those who are illiterate and cannot read or write.[5] This e-mail system can be used by any user of any age group with ease of access. It has features of speech to text as well as text to speech with speech reader which makes a designed system to be handled by visually impaired persons as well as blind persons.

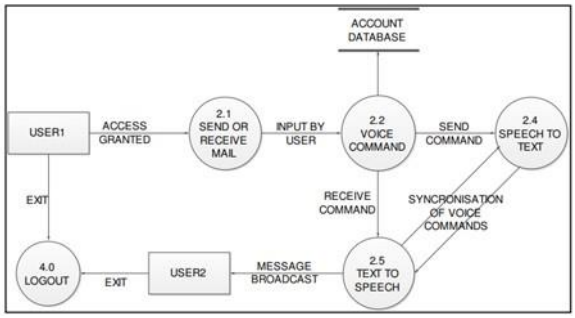

Fig 3. Voice Based Email System Architecture diagram

a) Gaps Identified

Voice-based authentication is used in the planned voice-based email system. Users must speak out their email address and password, which can cause security problems. There is no discussion of how to fix the security problem. Traditional login systems may not work with voice based input as someone can hear the email and password and it can cause severe security issues.

b) Findings

Offers a very good feedback mechanism that can be used to improve user friendliness, particularly for those who are impaired. The system continuously directs the user as to what actions to take next. This can be very helpful for speechdocs user's.

III. PROBLEM STATEMENT

According to WHO, nearly 15% (i.e 1billion population) of the world have some form of disability. Out of 1 billion around 200 million have limb amputations or handicapped. In some cases, they are forced to make do with imperfect hacks such as sending audio files, using keyboards painfully, or avoiding typing altogether. Speech Docs offers users a powerful, fully-featured voice-controlled document

editing system where they can do everything the same way as on MS Word or Google Docs without touching the keyboard or mouse.

IV. PROPOSED SYSTEM

The system mainly consists of three views: landing page, dashboard, and main sheet. The navigation between all the pages will be fully voice controlled with a feedback mechanism. There is a navigation to the authentication page on the landing page. We are going to use facial recognition authentication instead of voice authentication to protect user credentials. The dashboard page will have navigation to the main sheet page and also have the section where users can see all the history of all the past documents. The users can also favorite their documents and see them under the tab 'favorites' again all the processes will be fully voice-controlled. The main sheet area will have commands displayed in an organized manner equally on the left and right of the sheet.

1. Architecture Design

The speechDocs web application receives voice commands from the user and internally recognizes the voice using a speech-to-text converter. The text is then translated using natural language processing. Each command in a speech document is mapped to a specific function. The collection of commands is then compared to the interpreted text. The function mapped to that command is carried out if any of the commands match. If there are any changes to the data, the database's state is updated. Additionally, SpeechDocs features a feedback mechanism, and for each successful command, the user receives feedback that internally implements text to speech.

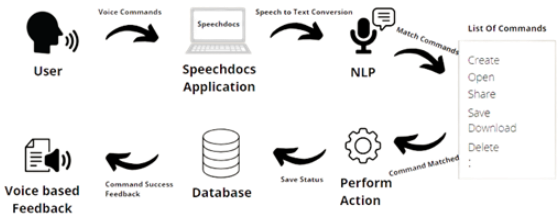

Fig 4: SpeechDocs Architecture Design

2. UI Design

(A) Dashboard Design

The dashboard allows users to open a new document as well as view all their previously edited documents. By saying the unique document id, they can open documents. There is a recent section where users can view the latest version of the document, making it easy to open the latest version. Users can also favorite a document, which can be viewed in the favorites tab.

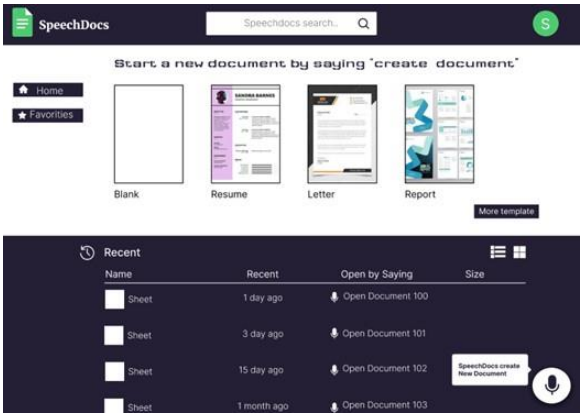

Fig 5. Dashboard Page

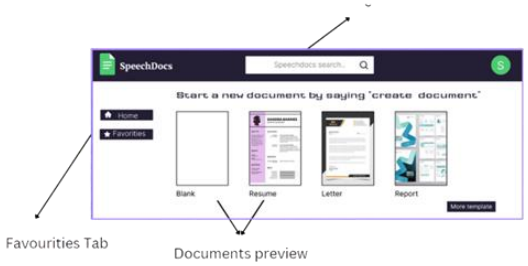

Fig 5 a. Dashboard top Section

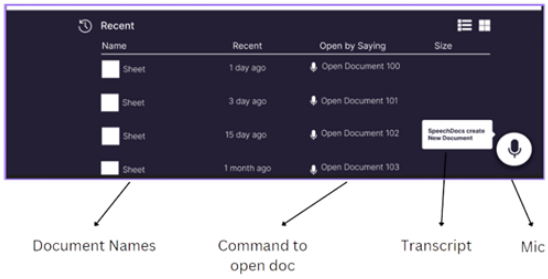

Fig 5 b. Dashboard Bottom Section

(B) Main Page Design

The main page design consists of navbar and main sheet. The navbar has different modes such as select mode, edit mode, etc. wherein each mode has commands associated with it which will be shown

equally distributed on left and right of the main sheet on request.

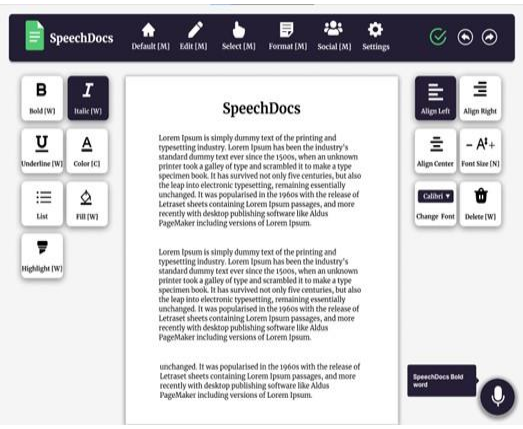

Fig 6. Main Page

Navbar consists of all different modes like default, edit, format social etc.

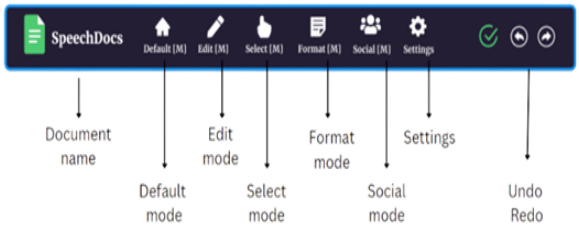

Fig 6 a. Main Page Navbar

Left and right section is equally distributed by commands. Each command is in form of a tile which consists of an icon and actual command which user needs to utter

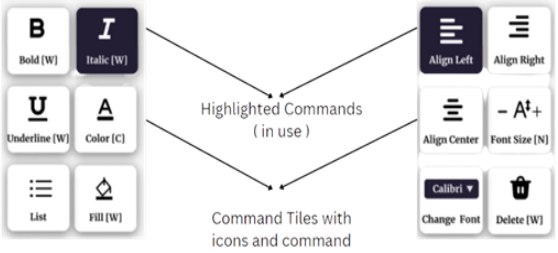

Fig 6 b. Main page Command Tiles

(C) Use Case Diagram

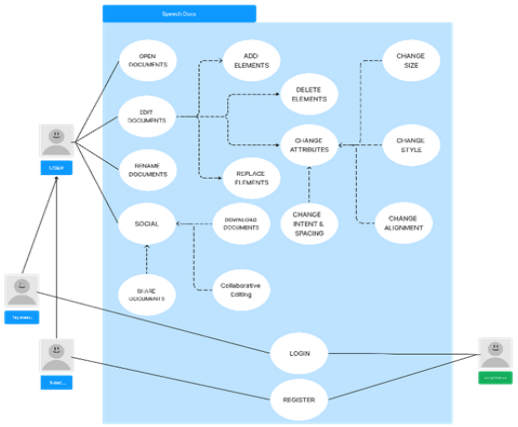

Fig 7. Use case Diagram

V. RESULT AND DISCUSSION

A basic functionality has been implemented where users can change titles, add words, remove words, share, and download documents, among other things. With the implementation of a small prototype, we have found that the ability to capture speech is much slower. It can misinterpret words if you don't speak clearly and when the user is in a noisy environment it sometimes fails to perform desired actions. But the few parts that are successful are the user will be able to navigate between pages by voice and a facial recognition authentication system will be used to ensure the security of their credentials. There will also be support for multi-language systems (mainly English and Hindi).

VI. CONCLUSION

In the past, it was only those with a profound understanding of word processing who benefited from the advantages of word processing; those without such knowledge and unsupportable conditions such as Arthritis in the hand, Parkinson's, Carpal Tunnel Syndrome, or Essential Tremor were denied the benefits. We present a solution to the above with a speechDocs where navigation to different pages and opening documents to editing documents are fully voice controlled. Also, to protect the user's credentials we have looked at facial recognition authentication systems. In order to reach more users, we will have an additive advantage to the software.

VII. ACKNOWLEDGEMENT

We would like to thank Dr. Prachi Janrao for all of his invaluable guidance and support throughout the project.

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Security and privacy policy of mobile device application management system

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Abstract. Using a variety of sensors, automatic activity recognition systems can continuously monitor a wide variety of physiological signals from sensors con-nected to the user or the user's surroundings. When applied to healthcare, this can greatly benefit areas like automated and intelligent monitoring of everyday ac-tivities for the elderly. This article represents a novel approach to analysing the data using Artificial intelligence. The data was collected from the smartphone's internal sensors using the feature ranking algorithm. These sensors collect data regarding human activities. Classify the collected information using random for-ests, ensemble learning, and lazy learning techniques. The suggested method may lead to intelligent and autonomous real-time development, as shown by extensive tests utilising a public database1 of human activity using smartphone inertial sen-sors. Human activity tracking for use in eHealth situations, including the elderly, the handicapped, and other populations with unique healthcare requirements.

Keywords: Security, random forecasting, machine learning, smartphones

1 Introduction:

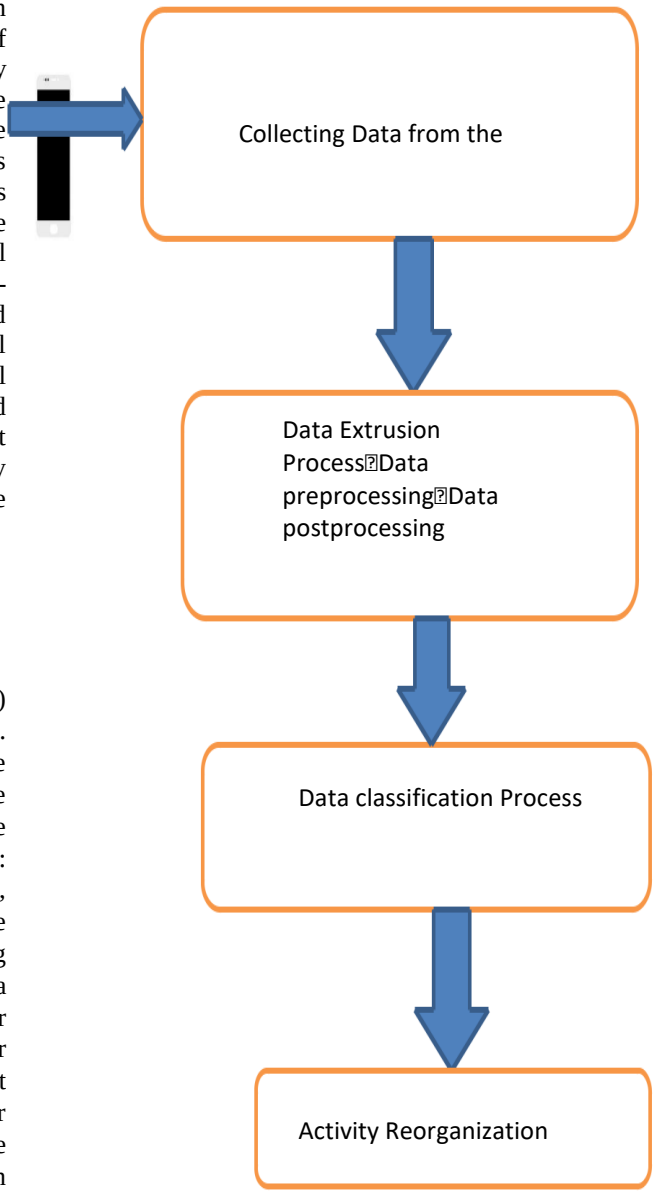
Most app developers and smartphone owners have helped propel the mobile application (app) ecosystem to the forefront of global economic growth. According to recent sta-tistics, the most downloaded apps in 2022 by users will be according to their require-ments. continuously monitor a wide variety of physiological signals from sensors con-nected to the user or the user's surroundings. When applied to healthcare, this can greatly benefit areas like automated and intelligent monitoring of everyday ac-tivities for the elderly. This article represents a novel approach to analysing the data using Artificial intelligence. The data was collected from the smartphone's internal sensors using the feature ranking algorithm. These sensors collect data regarding human activities. Classify the collected information using random for-ests, ensemble learning, and lazy learning techniques.

Studies show that although internet users are increasingly dependent on smart mobile devices (such as smartphones and tablets) for their day-to-day activities and demands, they may not always be aware of or able to influence the processing of per-sonal data using these tools. Moreover, it is frequently difficult to analyse apps' privacy and security features because of the complexity involved in understanding how they function because of their dynamic environment, reuse of software libraries, and inter-action with other networks and systems. Inadequate data protection and security proce-dures are often the result of app developers' lack of awareness, expertise, or understand-ing of how to properly arrange for and engineer privacy and security needs into their products, rather than any deliberate neglect of such standards.

The General Data Protection Regulation governs the collection, storage, and disclosure of personal information using applications (EU)

The present Data Protection Directive 95/46/EC [2] is being replaced by a new one that is immediately applicable in all Member States. While The General Data Protection Regulation (GDPR) strengthens the privacy and security guarantees estab-lished by the Data Protection Directive. offers supplementary safeguards that give users more say over their private information, is extremely difficult to do on a mobile device or the internet5 . Beyond the requirements of GDPR, this also applies to The EU's Di-rective on Privacy and Electronic Communications also has implications for mobile applications. Transmissions EU Directive 2002/58/EC (ePrivacy) [3] are being revised at the moment and compliant with the General Data Protection Regulation. In January this year, the European Commission proposed a new ePrivacy Regulation. Commission and is being discussed at the moment in the European Parliament and the Council. Ees-sential safeguards for users' personal information in mobile applications, including pro-cedures for ensuring the anonymity of users' data and the prevention of data breaches exchange of messages and information, installation of apps and files (cookies) on end-user gadgets and rules governing tracking's effect on users' privacy preferences. Combining these numbers with the blurring of barriers between personal and company-owned mobile devices, it's clear that mobile app analysis is becoming more vital for businesses. In reality, these applications may expose sensitive information about workers, which cybercriminals might use for social engineering, the practice of tricking people into giving up sensitive information to steal it, or even for exfiltrating data or installing

malware (malware). Companies are right to be wary of the ever-ex-panding cyber threat environment, which now includes mobile apps, due to the sensi-tivity of the data they collect from their customers (personally identifiable information, or PII). The term "mobile device management" refers to a method businesses use to deploy and control mobile devices like smartphones and tablets. Rules and an applica-tion make up this framework usually, with the latter used to manage policies that limit an employee's access to install mobile apps and enforce security measures. These reg-ulations are implemented to prevent unauthorised access to sensitive information, such as financial records, social security numbers, and intellectual property, and to ensure that malware is updated and cannot compromise systems (IP). An incident responder or mobile device manager may remotely erase all data on a lost or stolen employee's mobile device



Experimental validation with Activity recognition process:

We utilized a public activity recognition (AR) database1 for experimental validation of our method. This Thirty people between the ages of 18 and 50 have provided labelled data for this database. Every single individual performed. Wearing a smartphone belt case while doing six things, including but not limited to: walking on level surfaces, climbing stairs, swimming, playing a video game, and playing a board game sitting, standing, and lying down, as well as walking up and down stairs. In this case, we uti-lized a smartphone to sensor package with 3-axis linear acceleration measuring accel-erometer and angular velocity measuring gyroscope angular velocity, both at a fixed rate of 50Hz, which is more than enough for recording human motion. The two com-ponents of the database are the raw sensor data that has not been processed and the collection of features data that is processed ex

Figure 1: Frame work- Activity reorganization in step by ste

At first, 2.56-second fixed-width sliding windows with 50% overlap were used to sam-ple the noise filters of the raw data. There are 17 parameters, that may be extracted from the time- and frequency-domain analysis of accelerometer data.

Another data set has 2.32-second-long vectors with 552 features apiece. Each vector stores information about the interval, including the average, maximum, lowest acceleration and angular velocity along all three axes and other, more advanced features like the Fourier, transform and autoregressive coefficients. We utilised this dataset to test our activity recognition method's efficacy. Figure 1 depicts the block diagram for this dataset's processing. The preceding section will go on to discuss the relevant con-text.

3 Motivation of the research work:

There are several benefits of using cell phones for automated activity identifi-cation, including the convenience of the device's mobility and the absence of the need for bulky, unpleasant permanent equipment.Other well-established methods of activity identification include body sensor networks and dedicated hardware configurations. For example, While such sophisti-cated setups may improve the effectiveness of activity detection, it is unreasonable to expect individuals to wear them regularly in most residential settings due to the effort, time, and convenience involved in doing so. Smartphones have a leg up on the compe-tition for activity detection because of their portability, simplicity of use, and the ability to utilise the phone's many sensors. Smartphone sensor outputs need the development of practical machine learning and data mining technologies for automated and intelli-gent activity detection. While several machine learning approaches are developed, the best algorithm for recognising mobile phone activities remains unclear. It would be a massive boon to the eHealth field if automated activity identification systems could be constructed using the intelligent processing of numerous smartphone sensor character-istics. They focus on remote activity monitoring and recognition in the elderly and dis-ability care sectors. This article compares the naive Bayes classifier and the unsupervised k-means cluster-ing method. The comparison for activity recognition on several novel machine learning and data mining approaches in smartphones, Adopting the random forests and random committees on the decision tree method. A publicly available smartphone activity iden-tification database 1 reveals that integrating machine learning and data mining signifi-cantly increases recognition performance over earlier smartphone-based activity detec-tion methods. I'll explain the machine learning methods that allowed a mobile app-based activity recognition system.

Data Mining approach to classify the Activities:

In the next stage, work will organize in the form of data mining. Initially, based on the ranking system preprocessing is implemented. For preprocessing technique, Con-sider real-time smartphones (561 parts). In this case, the data is used to determine the relative value of various constituents, with less important ones being disregarded. In the setting of our very high-dimensional datasets, our attribute selection technique has performed exceptionally well, allowing us to employ almost half as many characteris-tics as before while maintaining the same level of recognition performance. A battery of tests was conducted using a range of feature rankings derived from an information-theory-based ranking technique. These varied from the use of a Naive Bayes classifier as a starting point to those of Decision Trees, Random Forests, Ensemble Learning, and Lazy Learning. Several different classifiers were evaluated for this work, and we offer summaries of each below.

4.1 Bayesian Classifier:

This classifier uses Bayes' theorem at its core to make inferences based on probabilities. Naive Bayes, the most straightforward Bayesian approach, is explained as a specific example of an algorithm that requires no modification for continuous data. Since it is supervised learning and easily trained, it provides a valuable starting point for evaluat-ing other methods in terms of accuracy and generalization.

4.2 K-Mean classifier approach:

In this case, the dataset may be unlabeled since clustering is an unsupervised learning technique. Instances are stored into two categories: those that are the same or connected and those that are distinct. K-Means is the most well-known and straightforward tech-nique for determining whether instances may classify based on some criteria. Because of its ease of use and the fact that it can process unlabeled data, it might serve as a benchmark against measuring the performance of other classifiers.

4.3 Decision tree-classifier approach:

The dependent variable, or the desired outcome for a new sample, is calculated using a decision tree classifier based on predictive machine-learning algorithms. Here, the internal nodes of the decision tree represent distinct qualities, and the branches between the nodes represent the range of values that each attribute may take in the data samples being analyzed. The terminal nodes further indicate the dependent variable's ultimate values (classification). In statistics, the word "dependent variable" refers to the variable whose value is being predicted; in this context, it is the attribute whose values are being anticipated. Consequently, the independent characteristics are the independent varia-bles in the dataset, contributing to predicting the dependent variable's value. The J48 Decision tree classifier employed in our tests has a straightforward algorithmic ap-proach. Whenever it has to categorize anything new, it must first generate a new deci-sion tree using the attribute values from the existing training data. Attributes that differentiate across samples are used to identify the next batch of items added to the train-ing set. This attribute gives us the most helpful data since it allows us to easily distin-guish between different occurrences of the data, which is essential for accurate catego-rization.

4.4 Random forecasting approach:

When it comes to ensemble learning techniques for classification and regression, Ran-dom Forests are a decision tree ensemble. Additionally, they may be seen as a kind of closest neighbor predictor, as they build many decision trees during training and use the class mean as their output. Random Forests is an ensemble of decision trees (a term used by Leo Breiman15). Through averaging and balancing the two extremes, Random Forests aim to mitigate bias and variation problems. In addition, there aren't many knobs and dials to fiddle with in a Random Forest; in most cases, you may get good results by just utilizing the default settings. Because of these benefits, Random Forests may frequently be used directly from the box to produce a decent, quick, and efficient model, without the requirement for extensive handcrafting or modelling in comparison to other classifiers.

- A time and frequency domain vector of 561 features. That describes its function.

Individual subject identification for the researcher conducting the study.

4.5 Random type forecasting approach:

As with other types of ensemble learning methods, the premise of the random commit-tee is that the addition of more classifiers will lead to better overall results. Each indi-vidual classifier in this sort of classifier is built from the same underlying data but with a distinct random number seed. To determine the final output class, it takes the mean of the predictions made by all of the basic classifiers.

4.6 Lazy learning classifier:

Classifiers based on lazy learning store the training instances during the training period and use them later for classification. The IBC classifier resembles the k-nearest neigh-bor classifier in many respects. However, there are ways to speed up the determining closest neighbors by utilising various search methods since most of the learning occurs during the classification phase when these models are often at their slowest. While this study used a linear search strategy, the performance may have been improved using kD-trees, commonly known as cover trees. As the measure of separation, we used Eu-clidean distance. There was no distance-based weighting applied, and just one neigh-bour was utilised.

5 Result:

Use the 2.56-second chunk of data from dataset 1 that has been pre-processed to include a collection of 561 characteristics to evaluate the efficacy of the recommended data mining approach for independently identifying human activities from smartphone data. Each track displays the following traits:

Body acceleration estimation and triaxial acceleration from the accelerometer.

- The gyroscope's reading of the triaxial angular velocity.

7

Table 1: Individual subject identification for the researcher conducting the study.

	Km	Nb	J48	RF	RC	IBK
2	40	50.45	55.32	56.62	61.1	53.12
8	80.8	48.25	62.32	62.01	61.23	60.18
16	81.82	46.57	68304	72.23	72.10	67.82
32	72.00	51.24	71.24	75.16	74.22	71.72
64	58.00	55.23	77.28	76.21	84.71	72.51
128	56.00	54.22	92.48	95.22	95.25	92.91
256	62.00	52.76	93.81	96.62	96.22	97.52
561	64.0	78.20	85	97.83	96.92	97.89

Num Feat	KM	NB	J48	RF	RC	IBK
2	15.1	0.0	0.9	7.3	14.4	0.0
8	20.6	0.0	7.4	16.8	17.7	0.0
16	37.4	0.3	11.4	19.7	23.4	0.0
32	67.9	0.9	25.7	25.7	25.4	0.0
64	119.4	1.7	38.0	29.1	31.5	0.0
128	217.0	4.4	64.6	31.7	30.7	0.0
256	457.5	3.3	52.7	20.1	25.7	0.1
561	582.1	5.8	247.4	14.7	27.0	0.5

Figure 2: Difference between the classifier

In Figure 2, we see the relative merits of various features, as measured by their contri-bution to the Model's performance and the amount of time spent on its construction under various classifier learning strategies. This chart displays the results of our
analysis of2,8,16,32,64,128,256, and 561 features (all features), ordered by infor-mation gain. About 10,000 samples were used in total throughout training and testing. Because there were so many samples in this dataset (10,000 total), we utilised fivefold cross validation to split it into separate training and testing sets. Figure 2 depicts each classifier's Accuracy in Classification and Model Building Time, while Tables 1-3 pro-vide additional metrics, including TPR, FPR, PR, RC, F-m, and ROC. Table III displays the confusion matrix for the best-performing IBk classifier with 128 and 256 ranked features, respectively.

The Naive Bayes Classifier takes the least amount of time (5.76 seconds) to finish building the model, and its 79% accuracy on the massive dataset is seen in Figure

2. Among the ensemble learning methods, however, random forests provide the best combination of accuracy (96.3% on average) and speed (14.65 seconds on average) when developing a model. The other classifiers in the ensemble learning system also perform well in classification accuracy (96%) (random committee and random sub-space). As an unsupervised method, K-Means clustering does poorly, with a classifica-tion accuracy of just 60% and a time to solution of 582 seconds.

In contrast, the slow-learning-based IBk classifier outperforms all other classifiers by a wide margin (90%+ accuracy for 128 and 256 features). To attain maximum perfor-mance, a smartphone-based activity identification system must trade between accuracy and the time it takes to create a model since real-time activity monitoring requires a model to be generated dynamically from the obtained data. Aside from TPR and FPR, other performance measures include Precision, Recall, and F-measure.

Since real-time activity monitoring necessitates the construction of a model dy-namically from the obtained data, an activity identification system implemented on a smartphone must strike a balance between accuracy and the time required to create the model. Additional measures such as false positive rate (FPR), false negative rate (FNR), precision, recall, F-measure, and ROC area should be considered when choosing an algorithm for an automated activity identification system. Table I displays these addi-tional indices of productivity.

Table-2: supplementary efficiency indicators

Features	TPR	FPR	PR	RC	F-m	ROC
IBK(256)	0.976	0.005	0.976	0.976	0.976	0.985
RC(256)	0.963	0.008	0.963	0.963	0.963	0.998
RF(256)	0.956	0.009	0.956	0.956	0.956	0.998
RC(128)	0.951	0.01	0.951	0.951	0.951	0.996
RF(128)	0.943	0.012	0.943	0.943	0.943	0.996
J48(256)	0.938	0.012	0.938	0.938	0.938	0.971
IBK(128)	0.93	0.015	0.93	0.93	0.93	0.957
J48(128)	0.915	0.017	0.915	0.915	0.915	0.96
RF(64)	0.837	0.035	0.839	0.837	0.838	0.969
RC(64)	0.837	0.035	0.839	0.837	0.838	0.969
IBK(64)	0.775	0.049	0.776	0.775	0.776	0.863
J48(64)	0.773	0.048	0.774	0.773	0.774	0.891
RC(32)	0.751	0.053	0.755	0.751	0.752	0.943
RF(32)	0.742	0.055	0.746	0.742	0.743	0.942
IBK(32)	0.717	0.06	0.72	0.717	0.718	0.826
RF(16)	0.713	0.061	0.716	0.713	0.714	0.929
RC(16)	0.711	0.061	0.714	0.711	0.712	0.923
J48(32)	0.702	0.063	0.701	0.702	0.701	0.857
J48(16)	0.69	0.065	0.69	0.69	0.689	0.873
IBK(16)	0.678	0.067	0.681	0.678	0.679	0.812
RF(8)	0.63	0.079	0.63	0.63	0.63	0.889
RC(8)	0.63	0.078	0.633	0.63	0.631	0.872
J48(8)	0.614	0.082	0.61	0.614	0.611	0.868
IBK(8)	0.602	0.084	0.606	0.602	0.603	0.791
J48(2)	0.563	0.092	0.565	0.563	0.562	0.888
NB(64)	0.561	0.093	0.57	0.561	0.515	0.878
RF(2)	0.556	0.093	0.558	0.556	0.557	0.876
NB(128)	0.553	0.09	0.644	0.553	0.523	0.928
NB(256)	0.539	0.092	0.662	0.539	0.505	0.928
IBK(2)	0.532	0.097	0.539	0.532	0.533	0.854
NB(32)	0.523	0.102	0.517	0.523	0.453	0.873
NB(2)	0.495	0.108	0.512	0.495	0.418	0.865
NB(16)	0.486	0.11	0.494	0.486	0.417	0.86
NB(8)	0.483	0.11	0.489	0.483	0.413	0.859

	RC-0	RC-1	RC-2	RC-3	RC-4	RC-5
AC-0	1717	3	2	0	0	0
AC-1	12	1513	19	0	0	0
AC-2	9	25	1372	0	0	0
AC-3	0	0	0	1471	235	71
AC-4	0	0	0	231	1658	17
AC-5	0	0	0	71	28	1845

9

Table-3: well developed

The top-performing IBk classifier's confusion matrix on datasets with 128 and 256 sorted features is shown in Table II. The confusion matrix (Actual Class (AC-0 to AC-5) versus Recognized Class) displays the classifier's ambiguities and misclassifications (RC-0 to RC-5). Class 1 (walking) and Class 6 (lying) exhibited the fewest discrepan-cies in the classifier's identification of the six activities tested. There is some ambiguity between sitting and standing, and it's downright impossible to differentiate between ascending and descending flights of steps. When compared to earlier attempts at activ-ity identification using a single smartphone worn at the waist, this is a significant ad-vancement.

6 Conclusion:

In this article, By using machine learning, identify smartphone activities. Based on the ranking theory, machine learning automatically takes actions and records. This work is validated using well-known techniques like Lazy learning, random forests, and ensem-ble learning. For analysis purposes, prepare datasets according to the classification technique. Due to the classification technique, the dataset will develop accurately, con-cerning time, and a well matrix will create. Data mining technique is implemented in different smartphone to analyse various activities. An unsupervised algorithm is needed to construct intense real-time work on smartphones. At end of the research IBk classi-fier performed well at 128 and 256 features.

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Crop/Plant Disease Detection Using Deep Learning Algorithms

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Abstract— **Crop diseases are a major threat to food security, but their rapid identification remains difficult in many parts of the world due to the lack of the necessary infrastructure. The combination of increasing global smartphone penetration and recent advances in computer vision made possible by deep learning has paved the way for smartphone-assisted disease diagnosis. Using a public dataset of 54,306 images of diseased and healthy plant leaves collected under controlled conditions, we train a deep convolutional neural network to identify 14 crop species and 26 diseases (or absence thereof). We employ latest advancements in computer vision field by using transformer based models and using techniques like one cycle learning rate policy and discriminative learning rates. Our project aims to achieve high accuracy when our model is tested on a set of images collected from trusted online sources i.e. taken under conditions different from the images used for training - the model. Moreover, real world datasets are very hard to collect and training our model with small datasets is the major challenge. Overall, the approach of training deep learning models on increasingly large and publicly available image datasets presents a clear path towards smartphone-assisted crop disease diagnosis on a massive global scale.**

Keywords)- — ***classification model, Convolution Neural Networks,*** **computer vision ,** ***infected crop. Neural network, Transformer, ResNET, efficentNET, VIT, plant disease detection***

I.INTRODUCTION

Agriculture and farming has been one of the oldest and most profitable professions until today's date. Computer and Technology has made an evolutionary change year by year in order to yield out maximum profit and also to reduce the human effort. Significant changes in farming techniques has been observed with increase in technology and have also led to the ease of farmers.

Although, there are still some factors leading to loss of cultivation and not only affecting the farmers wages and salaries but is also contributing to disruption of the eco- system. Some crop diseases are contagious and may also lead to infertility of the soil upon which the crop's foundation is based. These menace would gradually lead to poor fertility of the land and may no longer be hold enough moisture and other constituent nutrients required for an ideal growth. A huge amount of effort has been put in to reform the cultivation methods once again and make the work of the famers convenient to some extent this may not only inhibit the soil for withstanding the cultivation but also damage the plants in the nearby vicinity.

Infected plants can be hazardous to the consumer in a certain way wherein, they may not be fit enough for the consumption, these lost soil nutrients do not replenish quickly. Hence, not making them fit enough for harvesting throughout the year.

For the farmers, the ones who are experienced tend to solve the solution by adding appropriate fertilizers or any other remedy which would not be suffice the situation significantly and the crop has already been infected and these infected crops are sold which in turn breeds numerous diseases.

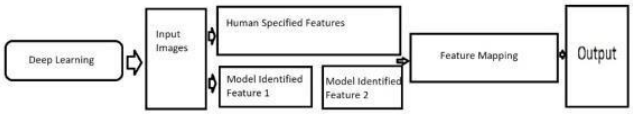

Figure 1: Deep Learning Approach

Therefore, to tackle this situation a technology has been introduced which would classify the infected crops using Convolution Neural Networks which comprises of several layers and each subsequent layer treats the previous layer's result as an input. This filtration goes through multiple stages before the final result is generated a diagrammatic representation i.e. Fig 1 illustrates the procedure.

Till now many researchers have shared multiple techniques for detecting disease from plant leaf using CNN. In the below section we have reviewed the others paper work and we have tried out to explain the recent advancement which are done in the CNN technique for disease detection. We hope our this work will be helpful for the people who are looking forward for the exploring of this field more.

Benefits of Convolution Neural Network for detection of crop disease:

1. ***Works well for internal representation of two dimensional images.***
2. ***It is self reliant and works well without any human intervention.***

We upon reviewing multiple researcher's paper have come up with few incites which would help us to identify which one is the best method of detection of crop disease.

II. LITERATURE SURVEY

In the paper[1], First, leaf images are captured, then image processing techniques are applied to extract features useful for disease detection.

A. Image analysis

To detect the disease, the image of the infected leaf needs to be examined in a series of ways. The input image is preprocessed and its features are extracted according to the dataset. Then, in order to classify the disease according to a specific data set, it is necessary to use some classification method.

B. Image capture

Image capture is the process of capturing and converting it to the desired output format. In this application, the analog image is first captured, then converted to a digital image for further processing.

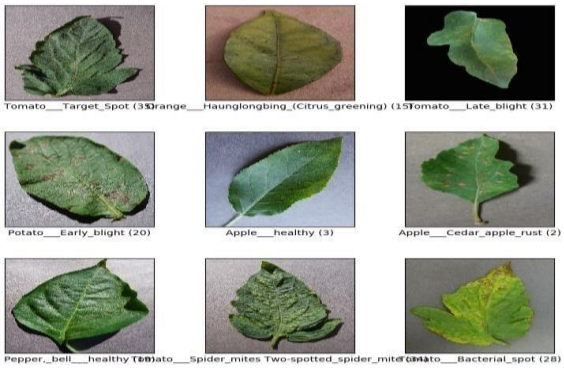

Figure 2: Training Dataset

C. Image preprocessing

The following pre-processing steps are performed on the captured image. Freeze frame or use active binarization, look-up table, or image plane separation to increase image contrast. Reduces image resolution degradation through binning. Rotate Image Converts a color image to a grayscale image.

D. Feature extraction

The goal of this phase is to extract features such as color and shape. Two geometric features, such as area and perimeter, are extracted from the binary segmentation image. Color feature is extracted from the color segmentation image. The color characteristics include the average gray value of the R /G/ B component, the distribution of the gray value of the R / G / B component, the R / G / B component, the color ratio in RGB color model, -H. / S / V component gray value average, H / S / Vgray value distribution H / S / V- component gray value component and skewness.

E. Leaf image classification

In the classification between the affected leaf, the classifier relied on Bayes' theorem, and SVM was used to distinguish between the classification and the affected leaf.] First, the captured images are classified into infected leaves and unaffected leaves. The color distribution is the same for the unaffected leaves, but the color distribution for the affected leaves is not uniform. This is because the pixel values of the affected leaves were completely different from the pixel values of the normal leaves.

The image quality of the leaf is improved by applying an averaging filter after the where image segmentation is performed by Otsu's threshold algorithm. After extracting features from a given leaf image, a recognizer is required to recognize the disease in the leaf image from the stored database. In this paper, we proposed a detection method using the back propagation network (BPN). Back propagation can train multilayer feed forward networks which consist of a forward pass and a backward pass as shown in Fig. 3. In the forward pass outputs are calculated and compared with preferred outputs.

Errors from preferred and actual output are calculated. In the backward pass this error is used to alter the weights in the network in order to reduce the dimension of the error. Forward and reverse paths are repeated until error is low. Normally, the user sets the value of the accepted error. When the trains the NN, it feeds the network a set of sample with inputs and desired outputs. If you choose a learning rate, your swing will help you adjust your weight.

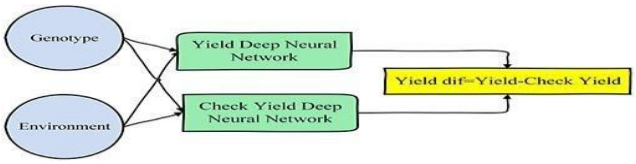

Figure 3: Crop Neural Network

The output layer contains neurons. Support Vector Machine (SVM) is a supervised machine learning algorithm that can be used for classification. This algorithm plots each data item as a point in n dimensional space n is the number of features you have with a feature value of for each leaf.

An approach based on image processing technology has been proposed in to help detect plant diseases. Disease detection is primarily the purpose of the proposed approach and can detect leaf disease with little computational effort. This proposed approach consists of four phases.

Accuracy is improved by using various image processing techniques such as image analysis, preprocessing, feature extraction and classification. Speed and accuracy are two main features of plant disease detection using deep learning techniques that must be achieved. With the proposed method, accuracy of up to 92% can be achieved. With the more featured SVM classifier, you can improve the recognition accuracy by significant amount. This approach can be used for applications such as disease classification of plant parts such as leaf .

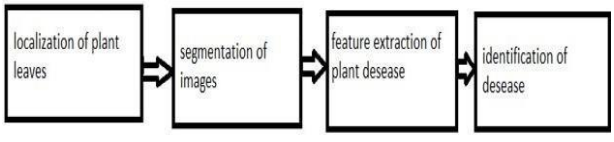

Figure 4: CNN Approach

III. PROBLEM STATEMENT

India being one of the major cultivating centres. Farmers grow varieties of crop in order to make out the most profit. But there is one of the factors which are yielding out low profit and that is crop disease which is not only hazardous but also contagious to the crops in the nearby vicinity. Hence spoiling the quality of the soil foundation .Hence a solution has been drawn out by creating an android application making using of neural networks and yielding out results for the same also making use of machine vision simultaneously.

Making use of CNN and also considering Vgg architecture with depths of 16 and 19 but it was found out to be vgg uses 3X3 convolution layers stack on top of each other and training those models where not feasible because of the issues with respect to convergence and training deeper networks Hence it was slow to train and consumed a lot of bandwidth .Hence to overcome these issues ResNet comes in ResNet does this by connecting nth layer to (n+x)th layer. This implies that Training of this form of network is easier than the other form of networks and also solves the problem of error rate as it decreases the error rate.

In [2] For early detection of disease, capture images taken days or weeks before plant disease becomes visually observable and train Model to detect plant disease early. It has been proposed to be used for. When implementing this framework, it is necessary to experiment with Combinations of different image bands, including bands beyond the visible spectrum, to determine the optimal band combination that can be used to model the deep learning train that can detect Plant diseases even before they are visible to the naked eye.

This is based on the assumption that the disease can be detected before it becomes visually observable, as the spectral reflectance of diseased leaves and canopies is known to be more pronounced in the invisible part of the spectrum. (Campbell & Wynne, 2011). In fact, recent research results show that infections in tomato Botrytis cinerea leaves can be detected 9 hours after infection (long before visual symptoms appear) using near-infrared and redrimmed sensors. (Fahrentrapp et al., 2019). As shown in 3.2, pre- illness Images should be categorized

Image Acquisition: In photo acquisition step, pix are different deep learning CNN architectures that is obtained thru excessive decision virtual digital digicam or from numerous reassets of internet .Few fashionable datasets like Plant Village, APS etc. also are to be had for the researchers The pix are amassed beneath wild, managed or out of control conditions.

Preprocessing: Preprocessing is a way of casting off noises or distortions in a photo to enhance its quality. Various preprocessing techniques consists of Contrast Stretching, Noise filtering and Histogram adjustments etc. “Various filters like low pass, excessive pass, etc. are implemented to cast off numerous kinds of noises

according to the time steps (e.g., days) captured before the illness becomes visually observable. This shows how healthy and diseased crops are displayed in natural colors and in a virtual false color composite of bands extracted from aerial images.

The first row (RGB view 1) shows an image of a healthy crop, and the Image in the second row (RGB view 2) also shows a healthy crop, except for the last image (TN). As Shows, diseased crops are displayed in natural colors (RGB). The third line, (False color view), is an example of what the second line looks like. A combination of virtual false color bands in which existing disease classes exist. In this view, the first three images (T0 to T2) represent a view of a healthy herd of, and the next three Images (T3 to T5) are displayed in false colors, thus indicating the disease class. Represented, is the last image. (TN) displays the same diseased crop on the second line as it appears in this fictitious false color view. As an example of, only one pre-disease class is shown here, but many other classes can be identified during model experimentation and training.

The trained disease Classification model should be continually updated to include "newly discovered" ones. Early stage illness class. 3.3 shows the key components of the proposed framework for early detection and continuous monitoring of plant health. Rounded rectangles indicate common Machine learning tasks, and connection arrows indicate user workflows.

The green Rounded rectangle represents the new disease early detection task developed by this Study. This framework is intended for use by, for example, regional and national Government agencies to monitor the health of a wide range of plants. Such institutions are expected to monitor this The Seasonal crops are in the growing season and the perennial crops are annually maintained in the health of the plants of various crops.

The agencies should use trained crop Classification models at the beginning of the growing season to identify and map the Areas where specific crops are sown, and then deploy trained crop diseases classification Models to images covering only those areas planted with the identified crops.

In [3] The basic “structure of plant ailment detection system” includes numerous stages defined ultimately as: photo acquisition, labelling and pre-processing of statistics accompanied with the aid of using statistics augmentation. After this section education and trying out of dataset executed thru numerous getting to know strategies and class thru deep Convolutional neural networks.

Data augmentation: Since maximum of the datasets aren't to be had easily. In order to create huge datasets, statistics augmentation strategies implemented at the smaller datasets for enhancement. Big datasets reduces the hassle of over fitting.

Training and Testing of statistics: Training and trying out of statistics consists of splitting of datasets into numerous train-check splits. The version is educated through numerous getting to know strategies like baseline education, great tuning or switch getting to know.

Classification: Classification of illnesses is primarily based totally at the predefined dataset values. “For class section, unique type of system getting to know strategies are being hired to allocate a category to a fixed of unclassified statistics”. The fundamental strategies used for class are Support Vector Machine (SVM), Neural Networks, Fuzzy Classifier, Linear Discriminant Analysis, KNN etc. Deep getting to know is a rising studies region with inside the area of system getting to know in addition to in convolutional neural network. It is a subset of system getting to know strategies. Various deep getting to know processes had been used for photo class and recognition. In deep getting to know, CNN is one of the maximum outstanding approach. It includes middle structures: a convolutional layer and a pooling layer. This paper concentrates in particular at the plants that have been categorized thru deep getting to know convolutional neural networks.

In [4] author has developed the model based on convolution neural network (CNN) for detecting the diseased plant images. They have taken the public dataset which is freely available on PlantVillage. 54,306 images of different plant including health and diseased dataset of 14 crop species on 26 diseased have been collected in this dataset.

When model was tested it gives the accuracy of 99.35% which is considered to be good accuracy overall. But when model was tested under different dataset compare with normal dataset it performs accuracy of 31.4% which was still good compare with traditional random selection.The model was developed using two AlexNet and GoogleNet. These architecture are most popular among CNN architectures for image processing and video processing. For getting the best accuracy different methods of training were also implemented that is TRAINING FROM SCRATCH for AlexNet and TRANSFER LEARNING for GoogleNet architecture. The transfer learning outperforms over training from scratch.

Three versions of plant image dataset was taken (color, greyscale, segmented) to test the model. And the 30 epochs(parameters) where used for feature extraction. The colored dataset gives the best accuracy compare with greyscale and segmented but to overcome the inherent biases of neural network in lightening conditions the model was tested on greyscale and segmented versions also. To check the role of a background on image dataset segmented version was taken. The segmented version performs good and gives greater accuracy as compared to grayscale version but perform less with colored version. And the grayscale version of dataset performs worst among all three version of dataset.

To test the models performance to any unseen data the four different trainingtesting approaches were implemented. That is 20%-80%(20% for training and 80% for testing), 40%-60%(40% for training and 60% for testing), 50%50%(50% for training and 50% for testing), 60%-40%(60% for training and 40% for testing) and 80%20%(80% for training and 20% for testing). the accuracy was found out for AlexNet architecture is 97.36%, 98.60%, 98.96%, 99.07%, 99.27% respectively and for the GoogleNet it was is 98.20%, 99.14 %, 99.16%, 99.24%, 99.34% respectively for the Colored version of dataset. We can see here as the training size increases the accuracy is also increased. And from here it can be seen that the GoogleNet architecture gives better result over the AlexNet architecture.

When the model was evaluated on the dataset other than PlantVillage it gives less accuracy of 31.4%. since the PlantVillage dataset taken under ideal condition the real leaf image will be directly taken in different circumstances in more complex environment. While the accuracy of 31.4% is still good with traditional random selection approach but more diverse image data can help to train the model. But when this model will be applied to different datasets then this will eventually increase it’s performance and the accuracy will also increase. and another limitation is model only performs on the single leaves images on the homogeneous background only while it should also perform on the plant leaf itself

In [4] the author has proposed a model based on RPN(reason propose network), chen-vese algorithm and transfer learning for developing the model for disease detection. RPN was used to localizing the leaves into complex background. Chen-vese algorithm for segmentation of images from RPN algorithm input and the transfer learning model which is pre- trained model on multiple diseased dataset with normal background for disease recognition. This model archives accuracy of 83.57%.

Around 1000 leaf image dataset in complex background is taken from the plant photo bank of China(PPBC) including many plant at various growth stage. And the PlantVillage public dataset is also being used here. And the transfer learning is pre-trained on 537 black rot, 1032 bacterial plaque disease, 293 rust and 2852 healthy leaves.

The plant disease recognition in the complex environment is performed with three steps.

1.desease leaves image segmentation.

2.feature extraction

3. disease identification

1. image segmentation : the segmentation of images in the complex background is a tedious task. So the author has also reviewed multiple approaches to overcome with this challenge. delta E-color difference algorithm can be applied for separating the infected area on diseased leaves.

some of the researchers have used the region of interest(ROI) for segmentation of images. And another approach would be the leaves can be divided into multiple parts with diseased spots as a parameter for the segmentation process.feature extraction: different different images have different texture, shape, motion-related attribute, color of leaves this puts up challenge for feature extraction of all the images. But several methods are easy to use and we also gets desired outputs.

- color and texture feature
- Dempster Shafer (D-S) theory for feature extraction and for prediction the result improved local binary pattern (LBP) for Greyscale image and processing over it.

Disease Identification: researchers have developed multiple methods to detect the disease info with images.

- Hybrid clustering For Detection
- CBIR(content-based image retrieval) for feature extraction and then SVM for classification.
- novel approaches such as with use of mobile device for image segmentation and them improved k-means clustering for disease information.
- trained CNN with 1632 corn images for detecting the disease of a corn leaf.
- improved CNN with AlexNet and VCG-16 net architecture for detecting the disease on maize leaves.

Bayesian discriminant method was used for classification of

This is the general flow of model which is suggested for detecting the disease on plant.

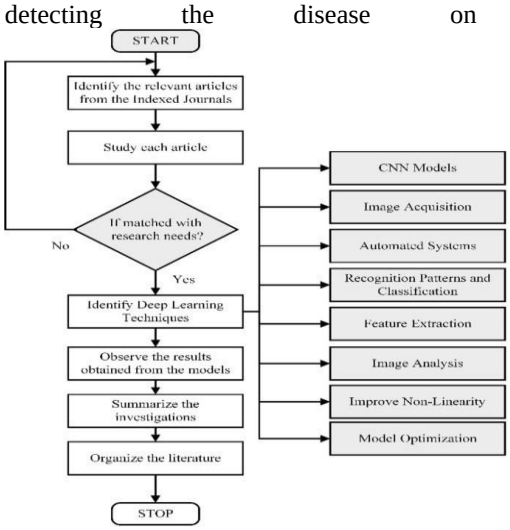

Figure 5: CNN Approach

Leaf localization: RPN algorithm is trained with convolution neural network to classify the boundary of image. Classification neural network is used to detect the leaf image present in picture is boundary or an object. Basically it uses intersection over union for detecting the boundary. If IOU is
0.5 then the image is object and for IOU greater then 0.5 will be background.

Leaf Segmentation: chen-vese algorithm is used here for the segmentation of leaf images.

Disease Identification: the model which is used for detecting the disease information is transfer learning. First it is pre- trained with the diseased images on simple background and then output of the previous method is tested for finding out the correct disease information.

RPN algorithm is used for the training of image dataset in complex environment and the CNN will be used for retrieving the diseased plant leaves and these inputs is given to chen-vese algorithm for the segmentation purpose and finally the output of these all steps is test under the transfer learning model for identifying the disease which is present on the leaf or plant.

In [6] the author has reviewed multiple research papers and presented current trends and difficulties which are present in the plant image disease detection with CNN.

In another method for the same apple leaf detection the BP neural network model was performed for classification and accuracy was found around 92.6%.with 63 parameter selected for feature extraction of rice leaf. And the

diseases. The model has perform the classification with 97.2% of accuracy.

Traditional methods can detect the diseases with good accuracy but they lack in detecting with more diverse dataset and also early detection of diseases was not specified in the traditional approaches. instead of taking whole leaf images the single spots or lensions can be used with augmented data. And when this applied on GoogleNet architecture the model is able to detect disease with accuracy of 94% which is greater than when using whole images 82%. another method was to focuses on diseases diseased area. And when Mask R-CNN model with [ResNet 50 or ResNet 101 feature extraction] was used to detect the diseases. the accuracy was found out to 92.01% on test dataset.transfer learning gives more accuracy over training from scratch on AlexNet architecture for detecting the diseases correctly. The accuracy can reach upto 95.53%.

Corn leaf diseases detection in the complex background with small sample dataset with CNN (VGG 16) on transfer learning model performs 95.33% of accuracy.

ResNet 50 pre-trained on ImageNet dataset when used for identifying the apple leaf diseases gives accuracy of 97% for simple background and accuracy of 51% for a complex background images. New DL architectures for leaf detection

When multiple CNN classifiers was combined and used the accuracy was high compare with single and double classifiers. And the accuracy was 97.8%.

for some tomato leaf with problems of having shadow, occlusion and light integrity on images the Deconvolutional Guided VGG network can identify plant diseases with 99.10% accuracy.

In ResNet18 architecture when convolutional 1 layer of ResNet18 is combined with multiple convolution kernel & SETNet module addition the model is able to solve low recognition issue of grapes due to different degree of diseases and this model achieves accuracy of 90.83%.another model which is developed on CNN with adding 3 convolutional layer, 3 pooling layer, 2 fully connected layer it is able to detect different diseases on tomato leaves. And this developed model has an accuracy of 91.2%.

IV. ACKNOWLEDGEMENT

We the students of TCET, with a collaborative effort with **Dr. Rashmi Thakur** we have been successful in designing a full length research paper with topic named **Crop Disease Detection Using Deep Learning.** We feel delighted and would also like to thank all the concerned faculties for teaching us the basic structure and overview of the Deep Learning models and convolutional neural network with the help of which we were able to draw out meaningful conclusions of the numerous authors around the world.

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One Framework to Detect Them All: A Cross-Industry Object Detection System Using Detectron

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Abstract -**Object detection and tracking is one of the most important and demanding fields in computer vision and have been widely distributed applied in various fields such as health care monitoring, autonomous control, anomaly detection and so on. With rapid development deep learning (DL) networks and GPU computing power, the performance of detectors and object trackers was very high improved. Understand the main development status of the object detection and monitoring of pipelines thoroughly, in this survey, we have critically analyzed the existing DL object network methods detection and tracking and described various reference datasets. This includes recent developments in granular DL models. We have primarily provided a comprehensive overview of the various species both general object detection models and specific object detection models. We have obtained various benchmarks to get the best ones detector, tracker and their combinations. In addition, we have stated traditional and new object detection and tracking applications showing its development trends. Finally, challenging problems, including the relevance of granular computing, in the domain mentioned are developed as a future scope of research along with some concerns**

I. INTRODUCTION

In recent years, object detection and tracking has gained increasing attention due to a wide range of applications and recent breakthrough research. In both real-world and academic applications, object detection and tracking are of equal importance. Imaging technology has made tremendous progress in recent years. Cameras are cheaper, smaller and better than ever before. At the same time, computing power IS increasing dramatically as proposed in [47]. In recent years, computing platforms have focused on parallelization, such as multi-core processing and graphics processing units (GPUs). Such a hardware version enables CV for object detection and tracking for real-time implementation. Rapid development in deep convolutional neural network (CNN) and improved GPU computing power are the main reasons for the rapid development of CV-based object detection and tracking.

In a detection network, a deep CNN is used as a backbone to extract key features from an input image/video. These features are used to locate and classify objects within the same frame. Then, in object tracking, these detected objects are tracked based on the proximity of the object from frame to frame. Object detection refers to scanning and searching for objects of certain classes (eg human, car and building) within an image/video.

Object detection can be done using either image processing techniques or DL networks. Image processing techniques usually do not require historical data for training and are unsupervised. However, these techniques are limited by various factors such as complex scenarios, lighting effect, occlusion effect, and interference effect. All these problems are better solved in DL-based object detection. The working principle of DL networks is inherently supervised and limited by the huge amount of training data and GPU computing power. Many reference datasets are already developed in the field of object detection, such as Caltech, KITTI, ImageNet, PASCAL VOC, MS COCO, and V5. Due to the availability of such a huge amount of data and the development of GPUs, object detection based on DL networks is widely accepted by researchers. Object detection is followed by object tracking. The goal of object tracking is to locate the trajectory of the detected object and connect it to it. An efficient and robust system design is required for object tracking in a domain-specific or general scenario. Recently developed DL networks meet this goal. For example, consider the research on DL networks for image classification that was conducted in the ILSVRC 2012 competition. Here, the error rate is reduced by 10% compared to conventional methods. Then, new deeper learning networks are gradually developed for image classification. They are well accepted by the human vision community due to their effectiveness Multiple Object Tracking (MOT) is Deep Learning in detecting and tracking multiple objects which is more complex than single object tracking and more applicable in real-time scenario. That is why research at STK is overwhelmed by researchers. Although DL has been observed to be effective for MOT problems, the tracking performance is purely based on the success of correct image localization and classification.

II. LITERATURE SURVEY OF OBJECT DETECTION AND TRACKING ALGORITHMS

In [1], Qiang Ling et.al, developed feedback-based object detection algorithm. It adopts dual layer updating model to update the background and segment the foreground with an adaptive threshold method and object tracking is treated as an object matching algorithm. [BACKGROUND MODEL BASED DETECTION AND TRACKING]

An algorithm for tracking multiple objects in the presence of partial object occlusion was proposed in . However this, algorithm may not successfully track feature points with different velocities[2]. Therefore, this algorithm needs a more flexible

representation of objects, and they also used a static camera to capture the video. [POINT DETECTION AND TRACKING].

In computer vision systems, the basis of object detection and tracking is the background structure. The traditional background modeling method often requires complex calculations and is sensitive to lighting changes. Therefore, a new hierarchical method based on coarse to fine textures for background modeling was proposed in [3]. It has the following advantages: (1) tolerance to illumination changes, (2) low computation, and (3) excellent description for each block when the multimode method is applied. This method is quite effective. [DETECTION BASED ON BACKGROUND MODELING].

Integrating a camera system into a mobile robot is very demanding and computationally intensive. High-quality image data only provides accurate information about the environment. However, it requires high computational demands [4]. Hannes Bistry and Jianwei Zhang proposed an object detection algorithm based on SIFT. They created a distributed SIFT vision algorithm, and the intelligent camera architecture can be used to integrate a complex vision algorithm. [SEGMENTATION BASED OBJECT DETECTION].

III. OBJECT DETECTION AND TRACKING

In this section, we briefly discuss various approaches, both conventional and DL-based, for the detection and tracking of multiple objects along with their characteristic features. As already mentioned, both object detection and tracking are important in the field of CV [3]. In general, object detection is performed in two steps: finding foreground entities (using features) that are hypothesized to be an object, and then validating these candidates (using a classifier). We divide object detection into three board categories; i) based on appearance, ii) based on movement and iii) based on DL. Appearance-based approaches use image processing techniques to recognize objects directly from images/video [3]. However, these approaches usually fail to detect occluded objects. Whereas in motion-based approaches, a sequence of images is used for object recognition. These methods may not work well for object detection in complex scenarios. DL-based approaches use either appearance features or motion features or a combination of these to detect objects in images/videos. Due to recent technological breakthroughs, DL-based object detection approaches has received much attention compared to appearance- or motion-based approaches. Deep CNNs are used as the backbone in DL-based object detectors to extract features from the input image/video. These features are used to classify objects. DL-based approaches have two categories: i) two-stage detectors [43] and ii) one-stage detectors [44]. In two-stage detectors, approximate object regions are first designed using deep features, and then these features are used for classification as well as bounding box regression for the object candidate. On the other hand, for single-stage detectors, bounding boxes are predicted on images without a region design step. This process consumes less time and therefore can be used in realtime devices. Two-stage detectors achieve high detection accuracy, while single-stage detectors have high speed. Different backbone networks (feature generation networks) used in DL-based object detection are: i) AlexNet [45], ii) ResNet [46], and iii) VGG16 [43], among others. With the development of backbone networks and the increasing capabilities of GPUs, remarkable progress has been made in the field of two-stage object detectors. Recently, the concept of granular computing has been incorporated into deep networks to greatly increase the computation speed and balance with the detection accuracy. Some such networks are granular CNNs [3] and granular RCNN .

IV. GENERIC OBJECT TRACKING

General object detectors aim to locate and classify objects in an image and mark them with rectangular bounding boxes to show certainty of existence. Generic object detectors are of two types: two-stage detectors and one-stage detectors. Two-stage detectors follow the traditional pipeline of object detection, i.e. object localization and its classification. While single-stage detectors treat the task of object detection as a regression/classification problem. For both detectors, the classification task is performed based on some features that are generated using a feature generation network, called a backbone network.

Recent advances in deep learning [1,2,3] and the availability of computing power [4,5] have revolutionized several fields such as computer vision and natural language processing (NLP). Object detection [6,7] is a well-developed field in computer vision [18]. Object tracking is typically the next process after object detection that receives an initial set of detected objects, inserts a unique identification (ID) for each of the initial detections, and then tracks the detected objects as they move between frames.

Multiple Object Tracking (MOT) is a subset of object tracking that is designed to track multiple objects in a video and represent them as a set of high-accuracy trajectories. However, object tracking usually has one big problem when the same object does not have the same ID in all frames, which is usually caused by ID switching and occlusion. ID switching is a phenomenon where an object X with an existing ID A is assigned a different ID B, which can be caused by many scenarios, such as a tracker assigns another object Y an ID A because it resembles object X. Another problem is occlusion, which is when another object partially or completely covers one object for a short period of time.

Figure 1 illustrates the MOT process. Initially, objects in the current frame are detected by the detector. The objects are then tracked as they are loaded into the MOT algorithm. Figure 2 then visualizes the process of tracking multiple tracked objects from the current frame to the next frame. Both figures show the MOT's tendency to accurately track a large number of objects

FIGURE 1

Figure 1. Using the MOT15 [8] reference dataset, ID allocation based MOT papers published in the last three years.

ID	Ref.	Year	Contributions
1	[9]	2021	• Offers a comprehensive review of object detection models. • Shows the development trends of both object detection and tracking. • Describes various comparative results for getting the best detector and tracker. • Categorizes deep learning based on object detection and tracking into three groups.
2	[10]	2020	• Reviews the previous deep learning-based MOT research in the past 3 years. • Divides previous papers into five main sections, which include detection, feature extraction and motion prediction, affinity computation, association/tracking, and other methods. • Shows the main MOT challenges.
3	[11]	2020	• Shows the key aspects in a multiple object tracking system. • Categorizes previous work according to various aspects, and explains the advances and drawbacks of each group. • Provides a discussion about the challenges of MOT research and some potential future directions.
4	[13]	2020	• Reviews the past five years of multi-object tracking systems. • Compares the results of online MOTs and public datasets environment in the deep learning model. • Focuses mainly on deep-learning-based approaches.

TABLE 1

In recent years, many new MOT studies have been proposed to address existing tracking issues such as real-time tracking, ID switching, and occlusion. In addition, deep learning is increasingly applied to MOT to improve its performance and robustness. Table 1 details the contributions of some previous surveys on MOT [18]. Overall, each survey focused on a specific MOT issue. Recently, Pal et al. focused on the deep learning method and explained detection and tracking separately so that readers can easily focus on their part of interest. However, due to the description of many parts related to detection, the description of tracking is insufficient.

On the other hand, Ciaparrone et al. reviewed deep learning-based methods, one of the core concepts of MOT, is explained. They use the described online methods that work in real time and batch detector to detect objects in the current frame first. The detected methods that can use global information and compare results are passed to the MOT algorithm to assign an identifier to experimental results. However, they only focused on MOT benchmarks and did not provide any comparisons for each object. other benchmarks. In another review, Luo et al. described the MOT methodology in two categories and the evaluation focused on the PETS2009-S2L1 sequence of the PETS benchmark. Finally, Kalake et al. reviewed MOT documents for the last 5 years.

Although they covered many aspects of MOT, it was difficult to determine an exact rating for each monitoring method due to limited evaluation

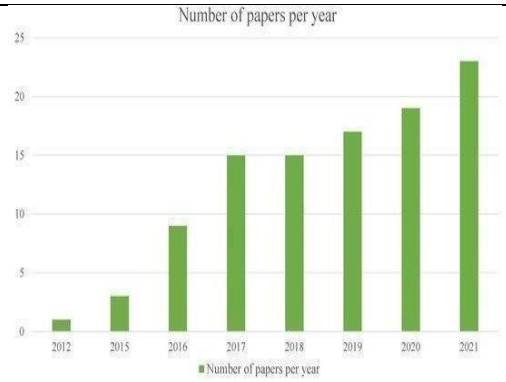
.

FIGURE 2

Figure 2. Object tracking visualization for
the next frame using the MOT algorithm on the MOT15 test dataset. Objects in the next frame are detected first. The detected result is passed to the MOT algorithm
to compare objects in the current frame with objects in the next
FIGURE 3

frame. Finally, based on the current frame, each object in the next

frame is assigned an ID as shown in [46]. **Figure 3**: Figure 3: Shows the total number of articles reviewed in this review.



In general, there is an increasing number of MOT articles presenting various deep learning-based MOT frameworks, new hypotheses, procedures, and applications. Previous surveys have partially addressed tracking, specifically the topic of MOT. However, some existing parts of MT were not covered in these reviews. For example (1) mostly

the surveys concentrated on the detection part rather than the tracking part, and (2) a limited number of benchmarks were mentioned. As a result, a comprehensive survey on recent MOT work is meaningful for stakeholders and researchers who want to integrate MOT into the existing systems or start new MOT research. This survey summarizes the previous work and covers many aspects of MOT. The main contributions are as follows.

V. THE EMERGENCE OF DEEP MODULAR LEARNING

Compared to other machine learning methods, deep learning is remarkably modular. This modularity gives it unprecedented capabilities that put Deep Learning head and shoulders above any other conventional Machine Learning approach. However, recent research points to even more modularity than before. It is likely that monolithic deep learning systems will soon become a thing of the past.

Before I discuss what's coming in the future, let me first discuss the concept of modularity. This is a concept familiar to software engineering, but the idea is not as commonly found in machine learning. In informatics, we build complex systems from modules. One module assembled from several simple modules. This allows us to build our digital world based only on NAND or NOR gates. Universal Boolean operators are necessary but not sufficient to build a complex system. Complex computing systems require modularity in order to have a manageable way to manage complexity.

Here are the six main design operators that must be supported in a modular system:

- Partitioning — Modules can be independent.
- Substituting — Modules can be substituted and swapped.
- Expansion – new modules can be added to create new solutions.
- Inverting — Hierarchical dependencies between modules can be rearranged.
- Porting — Modules can be used in different contexts.
- Excluding – Existing modules can be removed to create a usable solution.

These operators are generic in nature and are inherent to any modular design. They allow the modification of an existing structure to new structures in well-defined ways In the context of software, this can mean refactoring statements at the source code level, language construction at specification, or component models at construction. These operators are perfect in that they can generate any structure in your computer design. The six-statement definition focuses on functional invariance in the presence of design variations. More clearly, allows you to use these operators and does not affect the function as a whole as shown in . In the context of deep learning, modularity operators are accepted as follows

- Splitting — Pretrained autoencoders can be split and reused as layers in another network.
- Substitution — Through transfer learning, student networks can serve as substitutes for teacher networks.
- Extensions — New meshes can be added later to increase accuracy. You can combine training networks to improve generalization. In addition, neural network outputs can be used as neural inputs, which can be used as representations for other neural networks.
- Porting — A neural network can be "ported" to another context by replacing the upper layers. This works in cases where the

domains are similar enough. Further research on domain matching is needed to understand the limits of this method.

The two remaining modular operators are not available for current monolithic DL systems.

- Inverting — Layers in the network cannot be rearranged without catastrophic consequences. The layers of a monolithic DL system are too tightly coupled to allow this.
- Exclusion – There is no mechanism to “forget” or exclude functionality from a monolithic DL system.

However, despite these two drawbacks, DL systems have an unrivaled advantage over competing machine learning techniques. One of the reasons for the tight coupling of layers in a monolithic DL system can be traced back to Stochastic Gradient Descent (SGD). SGD works in lock-step mode with training. It is a very highly synchronized mechanism that requires coordination of behavior across all layers. However, this monolithic structure is replaced by an even more modular system. Here are two interesting events related to this. DeepMind has explored a method called "Synthetic Gradients" that points the way to looser layers. The method essentially inserts a proxy neural network between the layers to approximate gradient descent

A second development that may lead to greater modularity is the concept of generative adversarial networks (GANs). Typical GANs have two competing neural networks that are essentially separate but contribute to the global objective function. However, now in research we are seeing the emergence of more complex configurations such as this Where you have a ladder network of separate encoders, generators anddiscriminators. The general pattern is that all normal functions of neural networks have also been replaced by neural networks. In particular, the SGD algorithm and objective function have been replaced by neural networks. All analysis features are gone! This is what happens when you have deep meta-learning as shown in [45].

Another very impressive result, also recently published with the same name (i.e. StackGAN), shows how efficient multiple separate GANs can be: The task here is to take a text description as input and generate an image matching the description. Here we have two GANs staged one after the other. The second GAN is able to refine the fuzzy image into one with a higher resolution. Modular networks have the ability to factor capabilities that would otherwise be entangled in an end-to-end network. In software engineering, we have the concept of API. That is, a restrictive language that communicates between different modules. In the above scenario, a neural network that "learns to communicate" acts as
an API bridge between networks

We consider the problem of multiple agents sensing and acting in an environment to maximize their shared utility. In these environments, agents must learn communication protocols to share information needed to solve tasks. By adopting deep neural networks, we are able to demonstrate end-to-end learning protocols in complex environments inspired by communication puzzles and multi-agent computer vision problems with partial observability.

Another recent paper titled "Generative Adversarial Parallelism" explores this further in relation to GANs. In this work, the authors attempt to address the difficulties in training
GANs by extending the usual two-player generative adversarial games to a multiplayer game. They train many GAN-like variants in parallel while periodically swapping the discriminator and generator pairs. The motivation here is to achieve better separation between pairs. Much work remains to be done to determine whether separate interfaces between
networks lead to better generalization

VI. COMPARISON

ImageNet images typically have one large object [18]. Thus, our non-prediction-based methods, such as image-box, which treats the entire image as a bounding box, are suitable for ImageNet. To test whether our loss works with different distributions of multi-object images, we test it using the Conceptual Captions (CC) dataset. Even on this challenging dataset with multiple objects/labels per frame, Detic provides a gain of ∼2.6 points in new class detection over the best prediction-based methods. This suggests that our simpler Detic method can generalize to different types of image- tagged data. Overall, the results from Table 1 indicate that complex prediction-based methods that rely heavily on model prediction scores do not perform well for open dictionary detection. Among our non-prediction-based variants, max size loss consistently performs best and is the default for Detic in our following experiments

	IN-L		CC	
BOX SUPERVISED(BASELINE)	30.0±0 .4	16.3± 0.7	30.0±0. 4	16.3 ±0.7
YOLO9000	31.2±0 .3	20.4± 0.9	29.4±0. 1	15.9 ±0.6
WSDDN	29.8± 0.2	15.6 ±0.3	30.0±0 .1	16.5 ±0.8
Detic (Max-object-score)	32.2± 0.1	24.4 ±0.3	29.8±0 .1	18.2 ±0.6
Detic (Image-box)	32.4± 0.1	23.8 ±0.5	30.9±0 .1	19.5 ±0.5
Detic (Max-size)	32.4± 0.1	24.6 ±0.3	30.9±0 .2	19.5 ±0.3

VII. APPLICATIONS

Major One of the key safety concerns on construction sites is ensuring that workers wear the appropriate personal protective equipment (PPE), such as hard hats. However, monitoring compliance with PPE requirements can be a challenging task, particularly on large construction sites with many workers.

This technology could be used to address this challenge by automating the detection of hard hats worn by construction workers. By training a THIS model on images and videos of workers wearing hard hats, the model could accurately detect when a worker is not wearing a hard hat or is wearing it improperly. This would enable safety managers to quickly identify and address compliance issues, reducing the risk of injuries and accidents on the worksite.

In addition, This technology can be used to monitor the compliance of individuals with safety regulations, such as the wearing of safety gear, in both school and office settings. For example, in schools, This could be used to detect whether students are wearing safety goggles or lab coats in a chemistry lab. In offices, it could be used to ensure that employees are wearing safety gear, such as helmets and safety shoes, in manufacturing and construction areas.

Another potential application of This technology in schools and offices is for environmental monitoring. By analyzing images and videos of classrooms and office spaces, This models could be trained to detect potential safety hazards, such as overcrowding, blocked exits, or fire hazards. This could help safety managers and facilities personnel identify and address potential safety hazards before they become serious problems.

VIII. CONCLUSION

Major advances in deep learning methods have been made in the areas of image recognition, object detection, and person re-identification, which also benefit from the development of multi-object tracking. In this article, we summarize the deep learning-based multi-object tracking methods that rank high in public benchmarks. The contribution of this article lies in three aspects. First, the use of deep learning for multi-object tracking is organized, and the mechanisms of deep feature transfer, neural network embedding, and end-to-end network training are analyzed based on existing methods, and the rules for designing a new tracking framework are analyzed. they are inspired. Second, we examine the roles of deep networks in surveillance and investigate the training issues of these networks. Third, comparisons between these multi-object tracking methods are presented and reorganized according to common datasets and evaluations. Advantages and limitations of the methods are highlighted. From the analysis of the experimental evaluation, it can be seen that there is a lot of room for improving the tracking results using the deep learning paradigm. This document provides some useful insights. On the one hand, there are not enough labeled datasets to train satisfied tracking models under all conditions. A possible path can be paved by generative networks, which are excellent for supporting the generalization of deep learning models. On the other hand, to cope with adverse tracking results in a complex environment such as a moving platform, it is necessary for integrated network models to learn the features of these dynamic scenes. In addition, to further adapt to changing conditions, higher-order feature learning or online transfer features are expected for tracked object

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Weather forecast at micro level

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ABSTRACT -**This paper discusses a system that collects data in order to provide reliable weather updates and predictions. This study proposes a method that will collect data from a large number of users using an Android application and an Arduino- based device with a GPS system. Our system collects microlevel data from thousands of users and also gives meteorological information. The report explained how the system works, how it was implemented, how data was analyzed, and what work will be done in the future. Java was used to create the Android app, while Weka 3.8 was used to simulate data analysis.**

Keywords: -Weather forecasting, Quantitative data.

1. INTRODUCTION

Weather forecasting dates to the nineteenth century. Weather forecasting is defined as the analysis of atmospheric variables such as temperature, radiation, air pressure, wind speed, wind direction, humidity, and rainfall.

A large amount of data must be collected or generated in order to predict the weather. In addition, the information is jumbled. As a result, using meteorological data to predict the weather is a difficult process with too many variables to consider. These variables change in response to rapidly changing weather

conditions. To propose a weather forecasting algorithm, we must take into account the algorithm's unique properties, such as continuity, data intensity, and multidimensional and chaotic behaviors. Weather forecasting evolved from a human-intensive effort to a computational process, which necessitates the use of high-tech equipment. The precision of forecasts can be affected by a number of things. Season, geographic location, input data accuracy, weather classifications lead time, and validity time are only a few of the effective elements.

According to the National Oceanic and Atmospheric Administration (NOAA), the National Centers for Environmental Information (NCEI) is now the largest provider of weather data. Land-based stations, marine, radar, weather balloons, satellites, and paleoclimatic data are only a few examples of data sources. To obtain the most precise data, a variety of equipment are utilized to measure different columns of the atmosphere. The data is transmitted to the satellites from terrestrial weather stations that are typically hundreds of kilometers or even further apart.

2. TOOLS AND TECHNOLOGY

The key device required for developing the entire device is Arduino, which is a device that is designed in such a way that it contains a physically programmable circuit board.

On computers, software that runs an IDE and can be used to write and burn the code in the actual device Also included is the computer. interacts with the board and follows the steps which were written there. BMP180, DHT11, and other sensors are used in this project. Modules for GPS and RTC from Venus.

The Bluetooth module HC-05, which employs the Bluetooth Serial Port Protocol, was utilized to transmit data from the android phone to the server database. We used Bluetooth to accept data into the programmed and send it to the server because it

creates a wireless connection. The entire device's data will be transferred to the database. For that purpose, an Android application has been created that receives data over Bluetooth.

The time period selected for each string of value to transit from device to android and finally to the database is 5 seconds for quantitative measurement. As a result, each device may communicate 12 rows of data every minute and 720 rows per hour. The application is responsible for triggering the insert query.

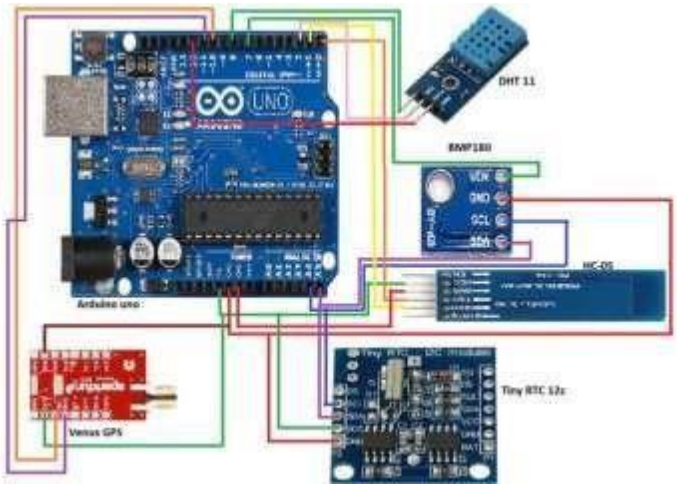


Figure 1: Connectivity between Arduino, Bluetooth and sensors.

I. Implementation and flow

Figure 1 depicts the connection between the devices. Each sensor has a corresponding piece of code in the Arduino code that generates the desired output. The portions of code that is burned in the Arduino device that receives and prints data for each device is represented below

1. BMP180

The section of code in responsible of reading the pressure from BMP180 is sensors_event_t event; bmp.getEvent(&event);

2. DHT11

The section of code in responsible of reading the temperature and humidity from DHT11 is float h = dht.readHumidity(); float t = dht.readTemperature();

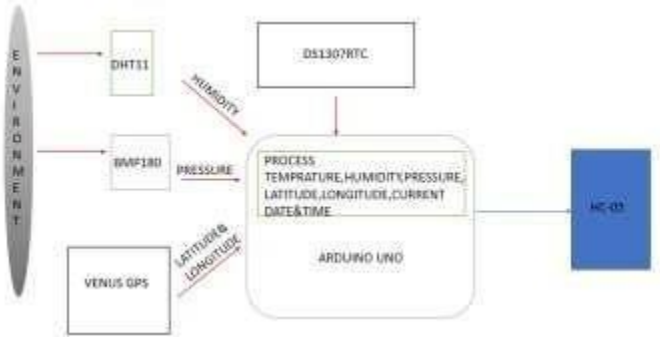
3.Printing string

The code that prints the text that is later used in the Android application to transfer data to the database is included.

```
Serial.print('#');
Serial.print(t); //temperature
Serial.print('+');
Serial.print(h); //humidity
Serial.print('+');
Serial.print(event.pressure); //pressure
Serial.print('+');
Serial.print('~');
```

4.Temperature and humidity are calculated using the "t" and "h" values, whereas pressure is calculated using "event pressure."

Dr. Dmitry Korkin says “The body networks such as disease systems are so complex and dense that they look like a big mess.” He is currently working on developing new ways to see these complex networks using HoloLens. HoloLens is also being used to reconfigure operating rooms so they can better handle the needs.



II .Literature Survey

On a global scale, a significant number of attempts have been undertaken by various researchers to reliably forecast Weather using various methods.

Techniques.

However, because of the nonlinear structure of

Accuracy of weather prediction obtained by these

Techniques are still in need of improvement. Ali, Lin, and others [1] created an ANN technique.to calculate the heat potential of tropical cyclones (TCHP) is a tool for calculating the Cyclone and Prediction of intensity. They calculated TCHP.1) an artificial neural network (ANN), 2) a two-layer neural network a multiple gravity model, and 3) a reduced gravity model. We used the regression technique and compared the results.

Estimates based on in-situ observations They discovered that out of the three approaches, The ANN method produced the best results. The findings point to the ANN's value. a method for calculating TCHP that is more accurate precision in the north

3. CONCLUSION

Unpredictable weather and being trapped in traffic have become a way of life for us. As a result, if we apply our approach, we can make our lives easier by forecasting road conditions. Data is now an indispensable part of our life. The application is simple to comprehend and operate. Users gain vital knowledge while also providing us with data. To prove that the data we collected have a high association, we used Data Mining tools such as Trees.M5P and Hierarchical Clustering. A tree and rules were built to forecast the data.

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Number Plate Recognition System using Tensor flow and EasyOCR

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Abstract: **There has been an increase in the number of vehicles on the road within the past two decades. Thus traffic control and vehicle owner identification has become a major problem, sometimes it becomes difficult to identify vehicle owners who violated traffic rules or caused unexpected accidents, etc. In order to overcome these problems, an intelligent and automated traffic monitoring system is required. The system should be able to detect Moving vehicles, Number plate detection and character recognition. And these records should be maintained for any further usage and referencing. The proposed system provides a method for detection and identification of vehicle number plates along with the functionality of storing these details on the cloud. The system basically has three steps: Getting the image from the videos through processing, Image processing till number plate segmentation and lastly character recognition and storage of the data on the cloud.**

Keywords- Number Plate Recognition (NPR), Optical character recognition, Automatic number plate recognition, Image Processing, Machine learning.

I. INTRODUCTION

The last few decades have seen a sharp increase in the number of vehicles all over the world.This situation has led to an increase in traffic congestion, and with it comes traffic problems. The modern city needs to build an effective and efficient automatic traffic system for the management of traffic law enforcement. Due to the difficulty in locating the owner of the car, numerous offences ranging from minor traffic infractions to major and violent felonies may go unpunished.The solution to it is monitoring done by computers using machine learning and image processing. The key factor to tackle this situation is number plate identification.Vehicle plate number recognition system was invented by the British in 1976 at the police scientific development branch in the UK. Through the use of a variety of techniques, such as image processing, character prediction, character segmentation, and character identification, the Number Plate Recognition system can identify characters on number plates. It helps in accomplishing some complex tasks like counting vehicles on highways, parking violation alerts, database management, blacklisted and stolen vehicle alerts etc.Management of vehicles and transportation are tedious and time-consuming tasks. If it is completely operated manually that could reflect enormous errors and difficulties. In recent years computer vision technology has made great strides in dealing directly with real world problems. This enables us to foresee a new era of machine vision applications. The aim is to explore the current challenges in machine vision applications and to stimulate the exchanges of knowledge in highly effective and practical machine vision techniques.

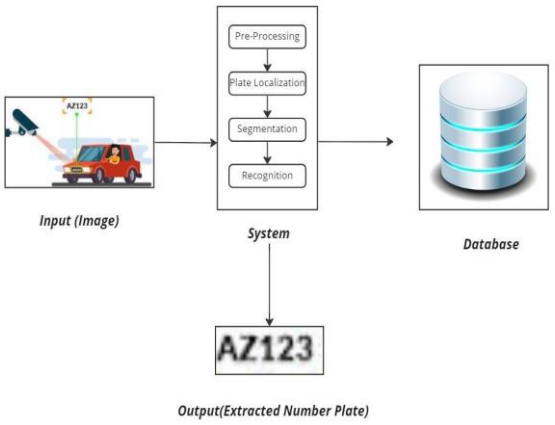

Figure 1: ANPR System

As in figure 1, the first step is to capture the image of the vehicles using any hardware capable such as cameras,etc. Then the second step is the processing part where various methods are applied to overcome the challenges of light, size, clarity of the number plates,etc. to produce the image of the number plate.In the third step character segmentation is done for the algorithm to be able to compare it with the characters.In the last step the character recognition is done using algorithms and methods that can produce result with the highest accuracy.

This paper focuses on the goal of providing a way to tackle vehicle identification and creating an automated and well documented number plate record system and thus keeping a shackle on traffic violations and any other crimes that can be prevented by using this technology.

II. Literature Survey

The following paper [1], provides us with the implementation and accuracy of Otsu method and K nearest neighbor (KNN) algorithm in the field of number plate recognition systems. The provided system uses Otsu method for converting RGB image into binary image and thereby extracting the characteristics of the image.Firstly, feature extraction is done by Otsu method that converts pixels into binary form. As the Otsu method is based on a pattern recognition process, it uses a binary vector without influencing the threshold value. Adjustments are made to the pixel values of images to get good results and better binary segmentation.Then, it uses KNN for classification and noise cancellation. It classifies this data by comparing neighborhood test data to training data. This system proved to be a great step in recognition of vehicle number plates. The following paper[2], provides us with a system using supervised K-means machine learning algorithm and Support Vector Machine (SVM). The proposed system uses K-means machine learning algorithm to segregate the characters into subgroups and then it is further classified using Support Vector Machine (SVM) which recognizes blurred license plate images and improves accuracy Support Vector Machine (SVM) which recognizes blurred license plate images and improves accuracy.The system proves to be helpful in overcoming problems such as the angle of the camera, the speed of the vehicle and the surrounding light and shadow. The usage of supervised K-means eases the classification of hard recognizable characters.

The following paper[3], gives a system that recognizes the number plate along with updating of the details related to the number plate on the server.The image of the vehicle number plate is extracted using various image processing techniques. Then the process of compartmentalizing the characters from the number plate is completed and lastly KNN is applied to extract the characters from the image. These extracted details are then stored on the server .

The following paper[4] focuses on the issue of Number plate recognition in India, it discusses the various issues that can arise in the process due to ranges of font sizes, different colors , double line number plates etc.It emphasizes on a lot of the problems that can be found in Indian road conditions and proposes a system using ANN (used for character recognition) and SVM (used to detect plate contour).The system also uses various algorithms to remove noise and enhance plate recognition. Neural networks are also used in the system for best results with easing lots of camera constraints.

The following paper[5], proposes a system that can tackle challenges such as unclear number plates, high speed vehicles and different traffic situations, which can result in increasing the difficulties in the process of extracting vehicle number plate's details.It also suggests about the hardware aspect along with the algorithms used for extraction. This system uses a dataset that includes images from various paths from different road, street and highway, daytime and nighttime, inclement weather environment and different number plate clarities. The system provides solutions to deal with the light, size, clarity of the number plates. The techniques and algorithms in the system along with the dataset helps in finding solutions to the number of problems faced while creating a number plate recognition system.

III. Problem Statement

The proposed paper focuses on tackling the issues faced during traffic and vehicle management via creating an automated system that can monitor and store the details of every vehicle passing through that checkpoint. Also the problem of vehicle record maintenance by creating a system which can maintain proper records of vehicles that could be used for any process such as speed tickets, robbed vehicle searches, etc. And all this could be done without any human intervention and thus limiting the errors that could be its product.

IV. Dataset

A comprehensive dataset with a wide variety of characteristics and an acceptable amount of data is necessary for the process of constructing an automated system for number plate identification, just as it is for any other machine learning project. There are several datasets available for Vehicle licence plate detection. The number of characteristics and the contrast of the data in these datasets varies. The dataset may include photographs from numerous pathways on different roads, streets, and highways, daytime and evening, adverse weather, and varying number plate clarities, among other things.

V. Methodology

The proposed system can be described through the process:

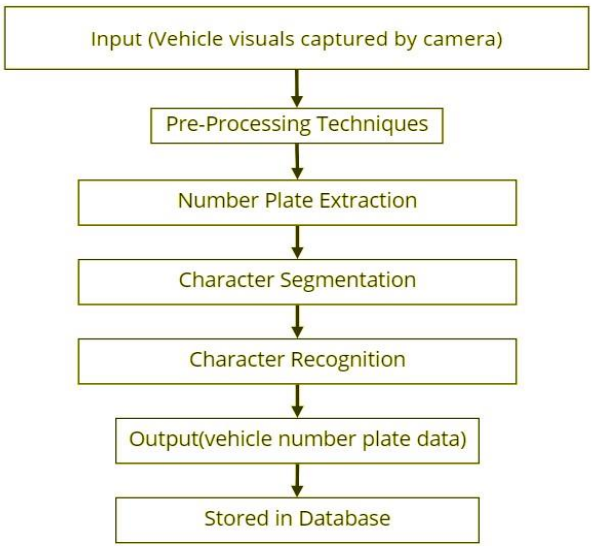

Figure 2: Methodology

1. Input: The input will be in the form of a video. These videos will be then converted in image form from frame to frame.These images then undergo a pre-processing process in the next step.

2. Pre-processing: The automatic number plate identification system has numerous difficulties, as was previously indicated. In order to improve the input image and make it more suited for the following processing processes, this step is crucial. Preprocessing starts with applying a minimal filter to the image in order to improve the dark values by expanding their region. This is mostly done to reduce the effect of the light diagonal strips that appear in the letters and edges and to make the characters and plate edges bold. Following this step, the image's saturation is increased to improve color separation. The image is then made grayscale. The contrast of the image is then increased to make the background distinct.

3. Localization of the Number Plate Region : The most crucial and significant step for ANPR systems is the successful extraction of the number plate from the picture or video. This stage determines where the licence plate is located, and the result is a sub-image that just shows the licence plate. There are two primary steps in this process. searching for a sizable bounding rectangle above the licence plate. This stage involves locating a rectangle that houses the licence plate (this rectangle might also include some excess pieces from the four sides), and this rectangle serves as the input to the following step for additional processing (removing the extra parts, character segmentation then recognition).The sub-image from the previous stage, which contains the licence plate with any additional elements, is used for the further processing. As a result of the camera's angular position during picture acquisition, the licence plate may be distorted. Furthermore, it is crucial to restore the plate's original skew so that it may be made to read correctly.

4. Character Segmentation: Character segmentation serves as a link between character recognition and number plate extraction. Multiple characters that are joined because of picture artefacts must be separated for per-character OCR; single characters that are fragmented because of artefacts must be connected. In this, various characters on a number plate region are divided into segments. Numerous factors, including variations in the illumination, plate frames, and rotation, are those that obstruct the segmentation process. Boundary box analysis is another name for a segmentation technique. This approach assigns characters to related components, which are then extracted via boundary box analysis. When the image's noise level is reduced, segmentation is finished.

5. Character Recognition:

characters are segmented, the next step is to recognize the characters.The character recognition step is accomplished by extracting the characteristics of characters and their various categorization procedures using feature extraction. EasyOCR is used to recognise characters from the license plate.

6. Data storage:

In this phase, the output from the character recognition stage is stored in the database together with a timestamp in order to maintain an exact record of the cars. This will make it easier to discover vehicles that have disobeyed traffic regulations or been linked to crimes since data can be retrieved more quickly and with less effort.

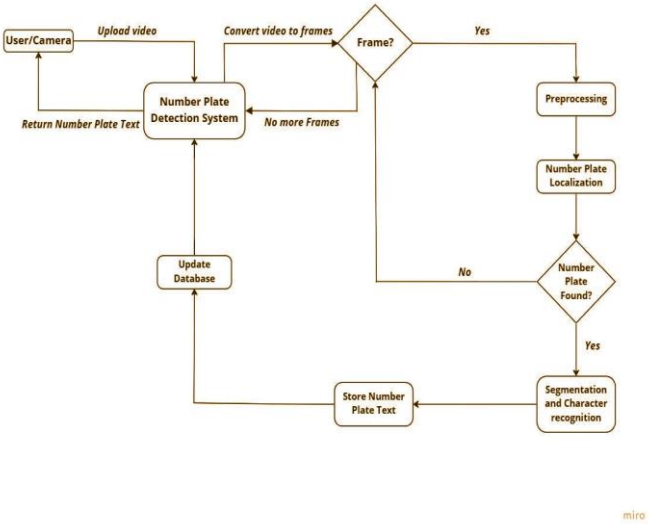

Figure 3: Flow of system

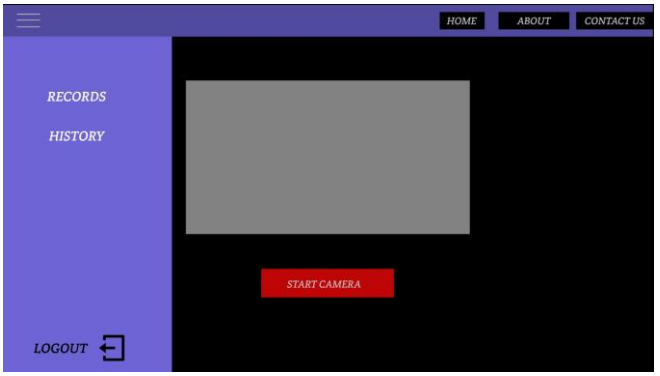

Figure 5: Dashboard

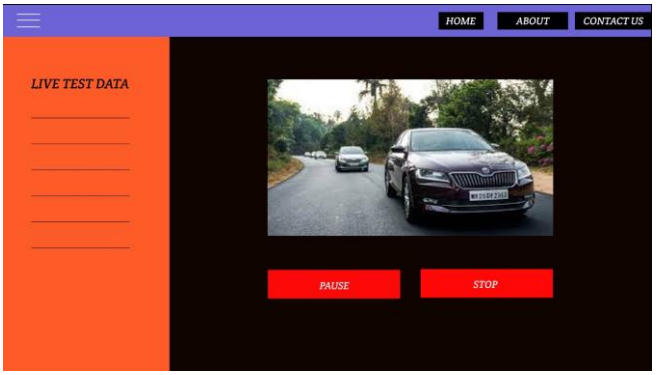

Figure 6: Live Recording Page

Observing the given figure 3 will help you comprehend how the system functions. The flowchart provides the flow of data from the image to the database of our system and the working of the system.

The Prototype of the UI of the proposed solution is given below:

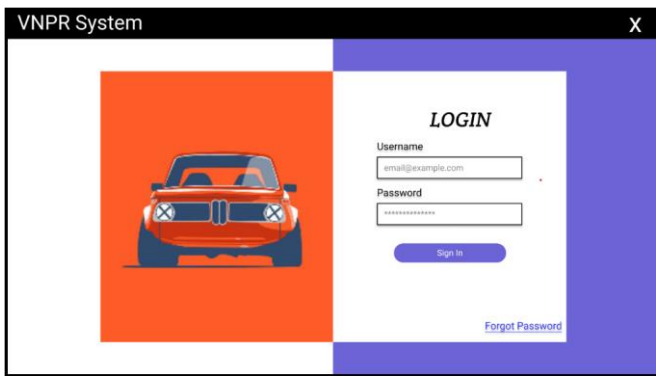

Figure 4-Log In page

Primarily , the system utilizes Python as the environment for data loading, data pre-processing, training and deployment. Numpy Library is used for performing Mathematical Operations and Matrix Operations. Pandas Library is used for dataset loading and pre-processing. Matplotlib Library is used for plotting graphs of training-validation curves, dataset visualizations, image plotting and other visualizations. Tensorflow is opted for building models of object detection and training of models.

The proposed system consists of primarily object detection which is done by the assistance of tensorflow object detection model to identify vehicles from the different frames of videos and then accompanys the number plate extraction of the vehicle.

The number plate extraction is further divided into two parts: the first part is concerned with number plate detection and the other for number plate identification. The first section uses the template matching approach to extract the number plate region from the recorded image of the car. There are three activities in the number plate identification section. (1) In the number plate region, the super resolution method is utilised to transform a low-resolution image to a high-resolution image. The picture is then converted from RGB to grayscale. (2) The bounding box approach is utilised for character segmentation. (3) Finally, EasyOCR is used to extract features from the segmented alphabets and numbers.

Additionally, the system after extracting the text from the number plate, saves the extracted number plate with current date and time, into the database.The database provide the user feasibility to look for a specific car by number plate and separate records for blacklisted vehicles.

VI. Result and Discussion

The dataset employed for the suggested system was a large dataset containing a range of photos with varying backgrounds, intensity, clarity, and so forth. As seen in figure 7, the technology produced an accuracy of roughly 90%, providing us with a superior outcome and correct number plates.

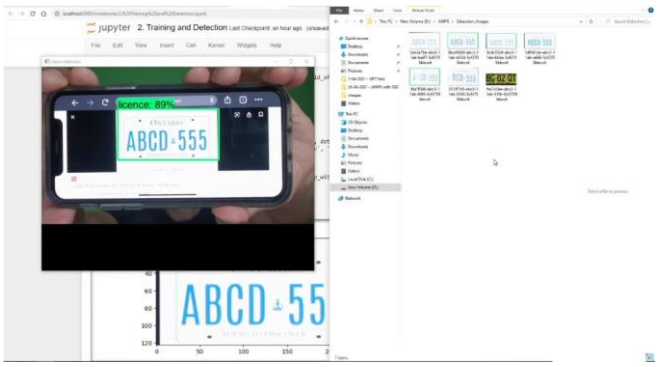

Figure 7. Results

The system is general enough to be capable of detecting and classifying vehicles while requiring only minimal scene-specific parameters, which can be obtained through training.

VII. Conclusion

Our work mainly proposes a system that can.extract the number plate and then can classify the characters of the number plate and then store it in the cloud.Firstly extraction of plate location, then separation of the plate characters individually by performing different pre-image processing techniques and segmentation, finally the segmented numbers is correlated with the standard templates in the library. It can be further exploited for vehicle owner identification, vehicle model identification traffic control, vehicle speed control and vehicle location tracking. It can be further extended as multilingual ANPR to identify the language of characters automatically based on the training data and various other features can be added.

VIII. Acknowledgment

I gratefully acknowledge the support, guidance and encouragement of my Guide Professor Ashwini Patil ma'am for this novel work.

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MedSync - Application for Remote Health Monitoring & Medical Services

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Abstract— **The Internet of Things (IoT) has opened up new avenues for medical patients through its applications. The IoT app plays a crucial role in enhancing medical performance. This paper focuses on a real-time remote monitoring system that leverages IoT technology and has practical applications, low power consumption. Due to the increasing number of people requiring healthcare each year, traditional in-person monitoring systems within hospitals can create unhealthy environments for patients, especially those with serious health conditions. IoT and modern electronic devices offer a promising solution to this challenge. This study proposes using IoT platforms to remotely monitor ECG signals, heart rate, SPO2, blood pressure, and body temperature in patients. The symptoms are measured and processed using high-speed microcontrollers. The results of the study are displayed on a smart mobile app.**

Keywords—***IOT, Healthcare, Medsync, realtime-health monitoring, Microcontroller, ECG, Cloud.***

I. INTRODUCTION

In this modern world, it's becoming increasingly difficult to manage one's health. Health care is a crucial aspect of life that helps prevent, diagnose, and treat health problems. Although it's available through healthcare professionals, the cost of postoperative care and post-hospital care is high and it's important to monitor a patient's recovery even after they've been discharged. By incorporating the Internet of Things (IoT) into healthcare, we can enhance patient care, minimize human error, and maintain a constant watch over health conditions. The aim of this paper is to present a real-time health monitoring system that utilizes IoT and a mobile application. The system comprises of various sensors such as a temperature sensor, ECG sensor, pulse oximetry sensor, that monitor different health parameters such as body temperature, electrocardiogram, heart rate, and oxygen saturation levels. The same data is easily accessible to users on the MedSync Mobile application.

The paper is divided into nine sections, starting with an preface. The coming section contains problem statement & objects. The review of applicable literature outlined in section three, followed by the methodology in section four. Section five details the hardware, software conditions and flowchart. The working of the system are bandied in section six, with the results in section seven. The future scope is given in section eight followed by conclusion in the final section nine.

II. PROBLEM STATEMENT

Health monitoring has become crucial in today's world due to the growing concern about health issues. People are facing numerous health problems due to their hectic and stressful lifestyles. With an increasing number of patients in hospitals and skyrocketing doctor fees, it has become more challenging for individuals to receive adequate medical care, especially for those who are unable to pay or who don't know the costs until after their treatment.

Remote health monitoring offers a solution to this issue by providing an opportunity for individuals to monitor their health at home. This is especially beneficial for elderly or chronically ill patients who would like to avoid hospital stays. The system should be capable of collecting data on heart disease diagnosis, blood pressure, body temperature, and other parameters.

This health monitoring program offers better health care through self-monitoring and consultation with specialists. The customized app will be accessible and easy to use for individuals of all ages. The user-friendly interface of the app will be crucial to its success.

The proposed paper has the following objectives:

1. To remotely measure body temperature, blood pressure, and pulse rate using wearable sensors.
2. To transmit the gathered data to the relevant hospital and doctor.
3. To ensure that the sensor data is easily readable, allowing anyone to understand the individual's health status without any technical knowledge.
4. To provide a fast-responding alert mechanism and timely medical assistance for critically ill patients.
5. To make the proposed health monitoring system compatible with multiple wearable sensors to gather medical data on pulse rate, blood pressure, body temperature, ECG, and other parameters.

III. LITERATURE SURVERY

This paper [1] outlines a proposed approach that utilizes smart phones as a key device in health monitoring. The author highlights the various types of sensors commonly included in smart phones, such as accelerometer, GPS tracker, and temperature sensor, which are useful in collecting health information.

In paper [2], the author suggests a sensor-based health monitoring system that gathers health status data through an electronic signal and alerts the patient through an alarm. This system makes use of body temperature sensors, heart rate sensors, and temperature sensors.

Paper [3] proposes cost-effective research to create a photoplethysmography (PPG) sensor using a combination of LED and photodiode. The sensor is capable of measuring a

variety of blood volume, including heartbeats, to diagnose atrial fibrillation.

The author in paper [4] focuses on the study of various methods used to monitor patient health and the limitations of medical care through the internet of things. The paper also provides information on existing health monitoring programs for chronic patients or those who are at risk of illness.

In paper [5], the author suggests a system that combines temperature, circulatory difficulty, and patient stroke rate to monitor patient health. The system uses data from ten patients to assess their condition and informs the patient of necessary action.

Paper [6] proposes research on microcontrollers, commonly used equipment in health monitoring systems, as a means of rapidly processing raw sensor data. The proposed system is an Arduino-based parameter monitoring system controlled by a smart phone app.

Paper [7] outlines a proposed remote health measurement system that can measure bio signals, such as heart rate and body temperature, in real time with high resolution. The system is flexible and can be applied in various areas. In paper [8], the author conducts a comprehensive literature review on ECG feature extraction, resulting in a wellorganized health monitoring system. This system enables physicians to monitor patient health parameters, such as fever and heart rate, using ZigBee technology.

Paper [9] outlines a proposed IoT-based patient monitoring system that continuously monitors a patient's heart rate through an ECG sensor implanted in the patient's chest. The system is capable of quickly detecting unusual conditions for the benefit of the patient.

Finally, paper [10] proposes a health monitoring system using IoT and Raspberry Pi. The system is capable of detecting any unusual conditions in the patient's health and communicating it to their relatives. The proposed system is easy to understand and use for both the patient and the doctor.

IV. METHODOLOGY

The proposed system is to record various sensory information and present it to users in an easy-to-use interface. Recorded data that can be accessed through the app will show that the reading is within the normal range. It will also inform the user and their contacts regarding medication requirements such as dosage, meal time etc. In the next section, the building blocks will be specified.

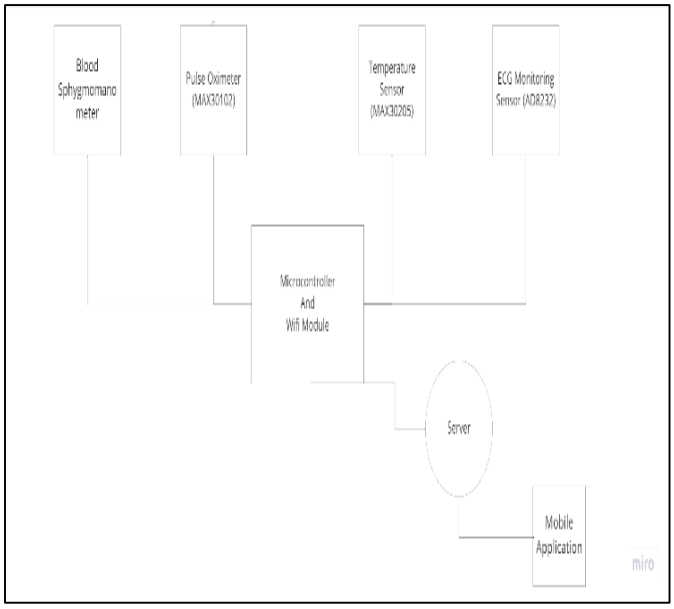


Fig.1 Block diagram of smart mobile App for remote health monitoring system

The proposed system consists of sensors that monitor various health parameters, namely heart rate, blood pressure, electrocardiogram (ECG), body temperature and oxygen saturation (SpO2).

V. HARDWARE AND SOFTWARE REQUIREMENTS

A. Hardware Requirements

The proposed system requires a sphygmomanometer (for measuring blood pressure), temperature sensor, ECG sensor, and pulse oximeter, along with the MedSync App as the software for implementation.

a. Blood Sphygmomanometer

A blood pressure sensor (shown in figure 2), also known as a sphygmomanometer, is a device used to measure the pressure of blood flow in the arteries. This information is critical in determining an individual's cardiovascular health and is used to diagnose and monitor conditions such as hypertension, heart disease, and stroke. With the increasing prevalence of cardiovascular diseases and the importance of maintaining cardiovascular health, the use of blood pressure sensors has become increasingly widespread. Today, blood pressure sensors come in a variety of forms, ranging from traditional manual devices to digital and wearable devices that provide real-time monitoring and tracking. These sensors play a vital role in the early detection and management of cardiovascular conditions, enabling individuals to take proactive measures to maintain their heart health.

Fig.2 Blood sphygmomanometer sensor [15]

b. Pulse Oximeter (MAX30102)

The MAX30102 pulse oximeter is a small, low-power, and portable device used to measure an individual's oxygen saturation levels and pulse rate. This information is critical in determining the individual's respiratory health and is used to diagnose and monitor conditions such as sleep apnea, chronic obstructive pulmonary disease (COPD), and pneumonia. In today's world, where respiratory health has become increasingly important due to the COVID-19 pandemic and other respiratory illnesses, the use of pulse oximeters has become widespread.

The MAX30102 is particularly popular due to its compact size, ease of use, and compatibility with a variety of devices such as smartphones and laptops. It enables individuals to monitor their respiratory health from the comfort of their homes and provides critical information to healthcare providers in the early detection and management of respiratory conditions.

Fig.3 Pulse Oximeter Sensor [14]

c. Temperature Sensor (MAX30205)

The MAX30205 temperature sensor is a small, low-power device used to measure temperature. It is a critical component in a wide range of applications, from consumer electronics and wearable devices to industrial and medical applications. In today's world, temperature measurement has become increasingly important in the context of the COVID-19 pandemic and other infectious diseases, as elevated body temperature is one of the most common symptoms. The MAX30205 is particularly useful in these applications due to its high accuracy, small size, and low power consumption, making it ideal for use in handheld devices, wearable devices, and other compact systems. It also has the ability to interface with a variety of microcontrollers and microprocessors, making it a versatile component in a range of applications. The MAX30205 temperature sensor plays a critical role in ensuring the accurate and reliable measurement of temperature, enabling individuals and healthcare providers to make informed decisions about their health and well-being.

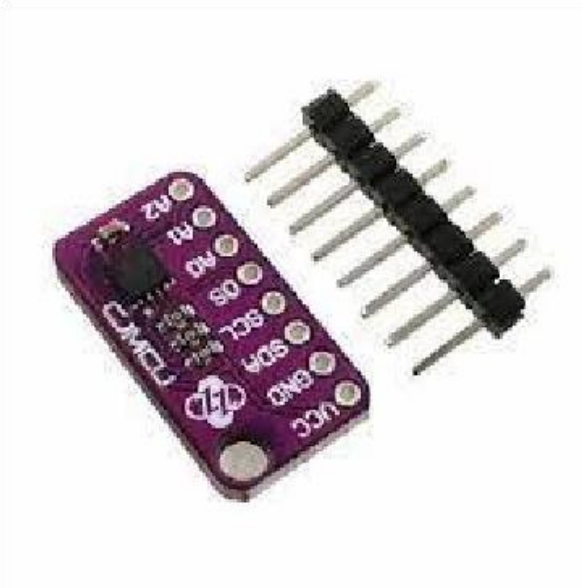


Fig.4 Temperature Sensor [13]

d. ECG Monitoring Sensor (AD8232)

The AD8232 ECG Monitoring Sensor is a vital component in today's healthcare world. It is an integrated circuit that allows for the measurement of the electrical activity of the heart in real-time, providing critical information for the diagnosis and treatment of heart conditions. The compact design of the AD8232 makes it ideal for portable or wearable devices, enabling healthcare professionals to continuously monitor their patients' heart activity in both clinical and home settings.

With the rise of telemedicine, ECG monitoring has become increasingly important for remote patient monitoring, reducing the need for in-person visits and allowing for more timely and effective treatment. The AD8232 ECG Monitoring Sensor plays a vital role in improving patient outcomes and health monitoring.

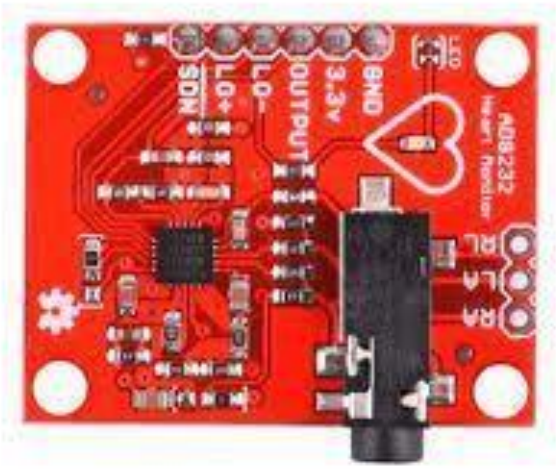


Fig.5 AD8232 Sensor [12]

e- Micro-Controller

The Raspberry Pi is a low-cost, small sized computer or a microcontroller that was first introduced in 2012. Raspberry Pi has the processing power of a desktop computer and can run a variety of operating systems, including Linux and Windows. It has a range of inputs and outputs, including USB ports, GPIO pins, and an HDMI port, allowing it to be connected to a variety of sensors, cameras, and other devices. The Raspberry Pi's versatility, affordability, and ease of use have made it a popular choice for a wide range of applications, from home media centers to robotics and the Internet of Things (IoT).

The Raspberry Pi microcontroller is widely used in health tech devices due to its small size, low cost, and high processing power. Its versatility and open-source nature make it an attractive platform for developers to create health monitoring systems, wearable devices, and other health tech applications. Focusing on this product it can be used to collect , process and transmit vital signs data to healthcare professionals, or as the brain of a wearable device that tracks fitness and health metrics. The Raspberry Pi can also be integrated with other sensors and devices to create comprehensive health monitoring systems, providing valuable information for diagnosing and treating various health conditions. Its widespread use in health tech devices demonstrates its versatility and the growing importance of technology in the healthcare industry.

Fig.6 Raspberry PI Microcontroller [11]

B. Software Requirements

a. Python

Python is a high-level, interpreted programming language that was first released in 1991. It is known for its simple and easy-to-read syntax, making it a popular choice for beginners and experienced programmers alike. Python is used in a wide range of applications, including web development, scientific computing, data analysis, and artificial intelligence. The language's standard library includes a vast collection of modules and tools, which makes it easy to perform complex tasks with minimal code. Additionally, Python has an active and supportive community, which contributes to its ongoing development and improvement.

One of the main advantages of python is its versatility and ability to handle a variety of tasks with ease. It has a large number of libraries and frameworks that can be used for machine learning, data analysis, web development, and more. Python's simple syntax and high-level abstractions make it easy for programmers to express concepts and ideas clearly, making it easier to maintain and read code. The language is also platform-independent, meaning that code written in Python can be run on different operating systems without modification. These and other factors have made Python one of the most popular programming languages in the world, and it continues to be a go-to choice for many developers and organizations.

b. MEDSYNC APP

MedSync is a cross-platform mobile application that integrates various Health-tech sensors and devices under a single roof. The app connects to the cloud to fetch and process the data received from the sensors and microcontroller. This data is then analyzed by the app and presented to the user in an easy-to-read dashboard format. The app also summarizes the data and sends it to the user's doctor, making it easy for both the user and the doctor to keep track of the user's vital signs. This continuous monitoring allows for early detection and management of potential health

issues, improving the overall healthcare experience for the user. The integration of various healthtech devices and sensors through MedSync makes it a valuable tool for anyone looking to keep track of their health and well-being.

VI. WORKING OF SYSTEM

The system for real-time monitoring connects sensors to a Raspberry Pi microcontroller, which is also connected to a Wi-Fi Shield for internet connectivity. The microcontroller is powered by an external battery and is linked to the hearing unit's components and WIFI Module. The sensors gather the user's vital information and send it to the microcontroller. The end product is a real-time monitoring system.

The mentioned system captures the user's sensory readings through an app and adjusts them based on time variation. The system then forwards these readings to the cloud via a microcontroller where they are evaluated. Using cloud computing, the analyzed data is then conveyed to the user's android and iOS apps and kept for individual supervision. The app can instantly alert the patient in case of an emergency, and the user's physician can receive the information to monitor their condition and provide a realtime analysis of their vitals.

The MedSync app presents the measured parameters, such as blood pressure, pulse rate, body temperature, and ECG of an individual. The sensor details are continuously updated on the mobile application. The MedSync app enables us to monitor our body parameters regularly. Even from afar, the doctor can recommend medications using the app and even book tests for the user for any diagnosis.

The mobile app includes a user interface that enables individuals to manage their medication schedules and set reminders for when they need to take their medications. The app's notifications inform the user when it's time to take their medicine. This feature can help people remember to take their medication on time, which can be crucial for managing chronic conditions, avoiding adverse health outcomes, and staying on top of complex medication regimens.

The app may also provide additional information about the medications, such as possible side effects, interactions with other drugs or foods, and other relevant details to help individuals stay informed and make informed decisions about their health.

VII. RESULT & DISCUSSION

The real-life health monitoring system for a range of health metrics, including blood pressure, heart rate, body temperature, and ECG collected by nerve endings, is designed in this suggested study. Temperature and SpO2 sensor details are sent to cloud . Details of the cardiovascular measurement are shown on the app. The remote display of the estimated physical parameters in the MedSync app is displayed in Figure 7. The MedSync App, depicted in Figure 8, also displays ECG sensor details. Overall, real-time health monitoring systems have the potential to transform healthcare by providing continuous monitoring and early detection of health issues, improving patient outcomes, increasing patient engagement, reducing healthcare costs, improving healthcare delivery, and enhancing public health.

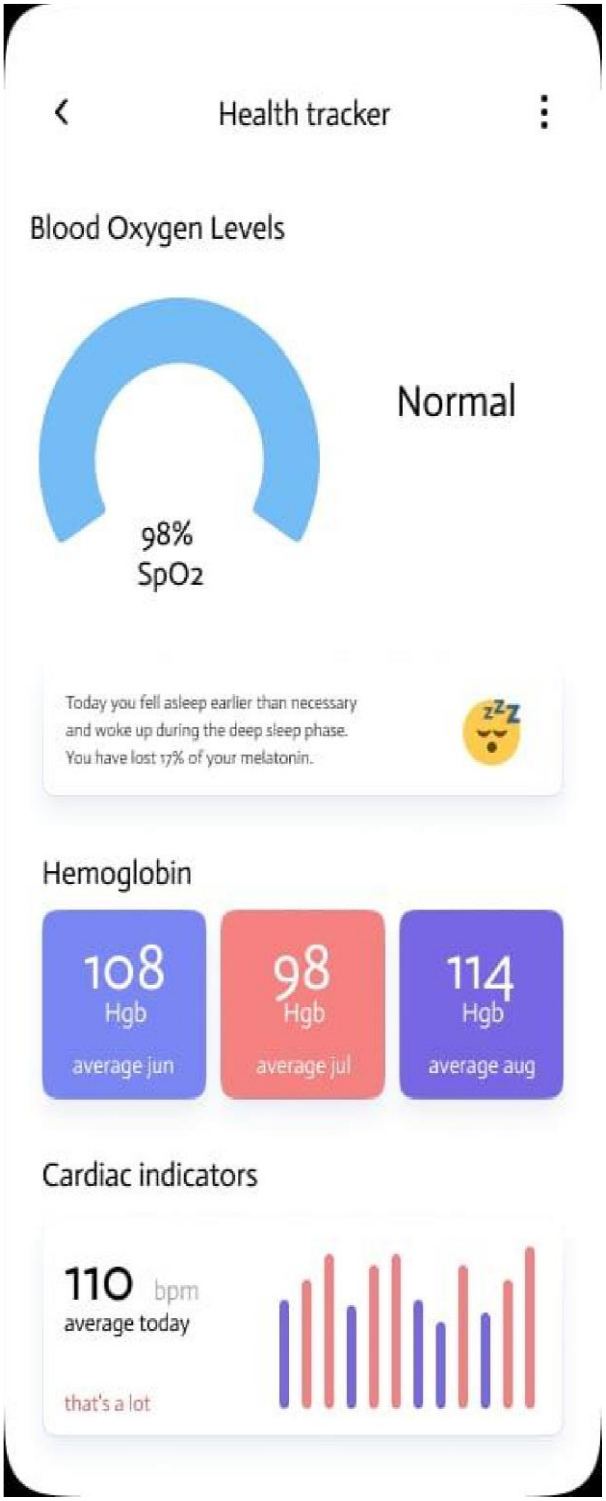
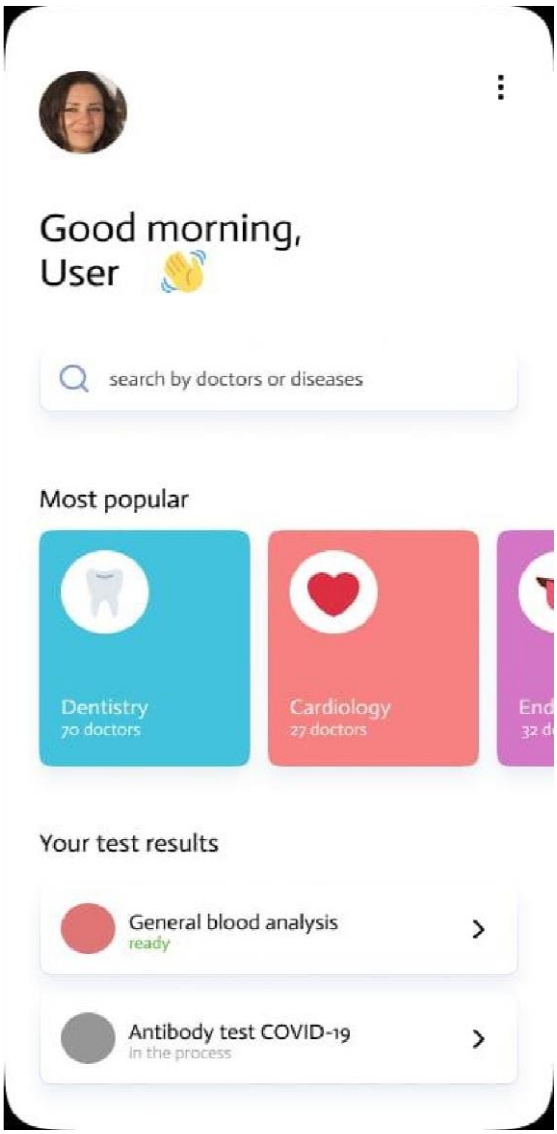


Fig 7 Various health parameters shown on Medsync app remotely

Fig 8 Detailed results on Medsync app



VIII. FUTURE SCOPE

The primary benefit is a relatively straightforward user interface attempting to provide hassle-free personalized healthcare. The power of Artificial Intelligence (AI) and Machine Learning (ML) algorithms can be leveraged to analyze data and detect patterns and anomalies through realtime data in order to forecast future human health situations. It is obvious that putting an alarm system in place will aid in the early identification of uncommon occurrences of cardiovascular disease and the mitigation of its negative effects.

IX. CONCLSION

An IoT-based remote health monitoring system that is affordable, portable, and energy-efficient has produced positive results. The system uses sensors in addition to an ESP32 microcontroller and the MedSync App. With the aid of Wi-Fi shield, the bodily parameters of a person are sensed by sensors, and the sensor details are shown on the MedSync mobile application, which comes preinstalled on iOS or Android devices. Senior adults in particular benefit greatly from the proposed system because it allows them to regularly check their health while remaining in the comfort of their own homes. It can improve patient outcomes, increase access to healthcare, and enable personalized and proactive care. By using our products, doctors can prevent serious lifethreatening situations for their patients by acting quickly.

ACKNOWLEDGMENT

We warmly recognize our Mentor, Dr. Vidyadhari Singh, for her assistance and direction in assisting us in successfully going forward while developing the solution.

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App Development for Vaccination Tracking and Record words

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Abstract— ***One of the most promising areas for mHealth is in vaccination and doctor's appointment scheduling. Vaccines are one of the most effective ways to prevent the spread of infectious diseases, but access to information about available vaccines and scheduling options can be challenging for many individuals. Similarly, regular doctor's appointments are crucial for maintaining overall health and well-being, but scheduling and attending appointments can be difficult for some individuals.*** ***This research aims to explore the potential benefits and challenges of an android application for vaccination and doctor's appointment. The app aims to provide users with easy access to information on available vaccines, scheduling options, and nearby vaccination clinic. Additionally, the app allows users to book appointments with doctors, view their vaccination records, and receive reminders for upcoming vaccinations. The study will investigate the user experience and usability of the application, examine the effectiveness of the app in increasing vaccination rates and reducing missed doctor's appointments, assess the security and privacy of personal health information stored in the app, and study the impact of the app on healthcare systems and providers. The findings of this research will provide valuable insight into the potential of mobile technology to improve healthcare accessibility and outcomes.***

Keywords—***Vaccine, Medical record, certification, Medicine suggestions.***

I. INTRODUCTION

Vaccination is an important tool to handle the pandemics and hence it is very important to ensure mass vaccination wherever possible. The concept of herd immunity is used to tackle infectious diseases using mass immunization. Recently, the coronavirus pandemic has made the need for a proper system of vaccination more important. Record of vaccination can be managed using a centralized ledger and physical proof of vaccination can be provided to individuals. But in that case, there is a question about the integrity of the records of vaccination, also, various enforcing authorities can manipulate the data or records as they have the authority over the records. The world will be in the utmost need of a mechanism that stores the immunity status of a person with guaranteed security and verifies the vaccination status of a person wherever needed. This paper attempts to address the above-mentioned challenge of storing the vaccination status data and verifying the immunity status of a person at different checkpoints, wherever necessary, to establish a security system for the people to create a trusted vaccination report.

II. LITERATURE SURVEY

Maintenance of proper vaccination has been a challenge since long and continuous developments have been made to come up with new solutions. Initially, records were stored physically with physical records of vaccination provided to individuals but the problem with such a solution is the integrity of the data and because of this, various enforcement agencies, like governments, ask for certificates from individuals. Studied the need for standardization and simplification of vaccination records. The authors also emphasized on the need to have a digital universal record for vaccination so that it is easier to provide a universally accepted record wherever necessary. Even though the need for a standardized system is important, there are always concerns of data security while storing centrally and hence a decentralized system is a more suitable one. Groom et al. Studies how having knowledge of vaccination records effects on increasing the vaccination rates.

A literature survey on android applications for vaccination and doctor's appointment would involve reviewing existing research on the topic to gain a deeper understanding of the potential benefits and challenges of this type of technology. Some potential areas of focus for a literature survey on this topic could include: The usability and user experience of android applications for vaccination and doctor's appointment scheduling. Studies have shown that user-centered design can increase the effectiveness of mHealth applications.

The effectiveness of android applications in increasing vaccination rates and reducing missed doctor's appointments. Research has shown that mobile technology can be an effective tool for promoting vaccination and preventive health behaviors. The security and privacy of

personal health information stored in android applications. Studies have found that privacy concerns are a significant barrier to the adoption of mHealth applications and

Current System	Overview	Gap
A study piloting maternal use of Immunize CA, a Pan-Canadian immunizatio n app.	To evaluate if the use of an app could change beliefs and behaviors related to vaccination, users were asked to attempt surveys before and after 6 months of using the app.	Integration with medical treatment was not attended to in any way.
Vaccine Prioritization Using Bluetooth Exposure Notification	An app was developed to use Bluetooth exposure for contact tracing, and based on	The accuracy of the user data was not checked very thoroughly.

Apps	that, prioritizing vaccination for people.	
An Intelligent Baby Care System Based on Smart Phone Application.	This app was built with modules about information, benefits, and schedules of vaccines, along with age groups. The users are reminded about upcoming vaccines using push notifications.	The confidentiality and safety of the users were not protected.
Vaxign: the first webbased vaccine design program for reverse vaccinology and applications for vaccine development.	This app integrated opensource tools and developed modules with user-centric interfaces. Users can add their vaccine information and questions which would be processed by PHP/HTML/SQL. The result is the given to the user.	This website that provides information about vaccinations was developed using obsolete technology, and because it makes extensive use of open-source software, the user data it contains is extremely vulnerable to being exploited.
Smartphone app uses loyalty point incentives and push notifications to encourage influenza vaccine.	A quiz was developed in the app, about the influenza vaccine to educate the users about its importance. If the users were within 200m of a pharmacy, they would be informed via notifications and visiting would give bonus points.	This application did not concentrate on the process of vaccination as a whole and did not integrate itself with any healthcare systems in order to validate the data it collected. Instead, its primary focus was on a single vaccine.
Vaccipack, A Mobile App to Promote Human Papillomavirus Vaccine Uptake Among Adolescents aged 11 to 14 Years: Development and Usability Study.	An app was developed, consisting of a vaccine tracker. Basic details about the vaccine were also included. Additionally, 26 stories were included in the app, to promote vaccination	When building this programme, user demographics were not taken into consideration at any point.
Immunization and technology among newcomers: A need assessment survey for a vaccinetracking App.	Refugees attending a healthcare camp in Canada were requested to attempt a survey that had 17 questions about languages, homeland, demographics, and vaccination history if known.	The user interface of the programme is rather complicated, and it does not give any information on the most recent vaccines or provide any vaccination recommendations to the user based on their age group.

Table 1. Literature Survey

that robust security and privacy measures are essential to ensure the protection of personal health information. The impact of android applications on healthcare systems and providers. Research has shown that mHealth applications can lead to more efficient use of healthcare resources, but it is also important to consider the potential challenges and limitations of this technology.

Adoption and engagement of android applications by marginalized communities. Studies have shown that mHealth applications tend to be adopted more by higherincome and younger individuals, thus it is important to consider the accessibility of the app for low-income, elderly, and other marginalized communities. Some examples of relevant studies in this area include A study that found that an mHealth application for vaccination scheduling increased vaccination rates among participants. Another study that found that mHealth interventions, such as text message reminders, improved vaccination rates among adolescents Research that found that mHealth interventions for vaccination and doctor's appointment scheduling improved health outcomes and reduced healthcare costs.

Overall, the literature on android applications for vaccination and doctor's appointment suggests that mobile technology has the potential to improve healthcare accessibility and outcomes, but that it is important to consider the potential challenges and limitations of this technology to ensure that it is used in an effective and responsible manner.

In addition to the studies mentioned previously, other research has also highlighted the potential of android applications to improve vaccination rates and reduce missed doctor's appointments. For example:

A study published in the Journal of Medical Internet Research (JMIR) found that an mHealth application for vaccination scheduling increased vaccination rates among participants and improved self-reported vaccination knowledge.

Another study, published in the Journal of Medical Systems, found that mHealth interventions, such as text message reminders, improved vaccination rates among adolescents and increased the likelihood of completing the vaccination series.

A study published in the Journal of Medical Internet Research (JMIR) found that an mHealth application for vaccination scheduling improved vaccination rates and reduced healthcare costs.

A study published in the Journal of Medical Systems found that mHealth interventions for vaccination and doctor's appointment scheduling improved health outcomes and reduced healthcare costs.

Other research has also highlighted the importance of usercentered design in the development of android applications for vaccination and doctor's appointment scheduling. For example:

A study published in the Journal of Medical Internet Research (JMIR) found that user-centered design principles can be used to improve the usability and user experience of mHealth applications and increase the likelihood of adoption.

Another study published in the Journal of Medical Systems found that user-centered design can be used to improve the effectiveness of mHealth applications for vaccination and doctor's appointment scheduling.

It is also important to consider the privacy and security of personal health information stored in android applications. Research on this topic has highlighted the importance of robust security and privacy measures to ensure the protection of personal health information. For example:

A study published in the Journal of Medical Internet Research (JMIR) found that privacy concerns are a significant barrier to the adoption of mHealth applications and that robust security and privacy measures are essential to ensure the protection of personal health information.

Overall, the literature on android applications for vaccination and doctor's appointment suggests that mobile technology has the potential to improve healthcare accessibility and outcomes, but it is important to consider the potential challenges and limitations of this technology to ensure that it is used in an effective and responsible manner. It is also important to ensure the accessibility of the app for low-

III. PROBLEM STATEMENT

The biggest flaw in today's medicine sector is that most vaccines are administered during childhood. Vaccination records are important documents to be kept for a lifetime, but the documentation of immunization events is poorly standardized. At the point of care, paper records are often unavailable, making it impossible to obtain accurate vaccination histories. Vaccination records should include batch specifications to allow the tracking of licensed vaccines in cases of recall.

Key issues

- Standardized vaccination records are needed on a global level.
- Standardized vaccination records should income, elderly, and other marginalized communities.

be universal, safe, flexible, durable, and available in emergency situations.

- To increase accessibility the whole appointment system is being converted to a digital system to get rid of the conventional method of sitting in line for long hours waiting for turns.
- Simplified digital vaccination records provide significant advantage over paperbased systems, including universal access in cases of emergency.
- User-centered vaccination records should empower patients to keep track of their vaccination record and to ask for professional advice, when needed.
- Regulatory agencies and standards organizations should be involved in the development of digital records to ensure semantic interoperability.

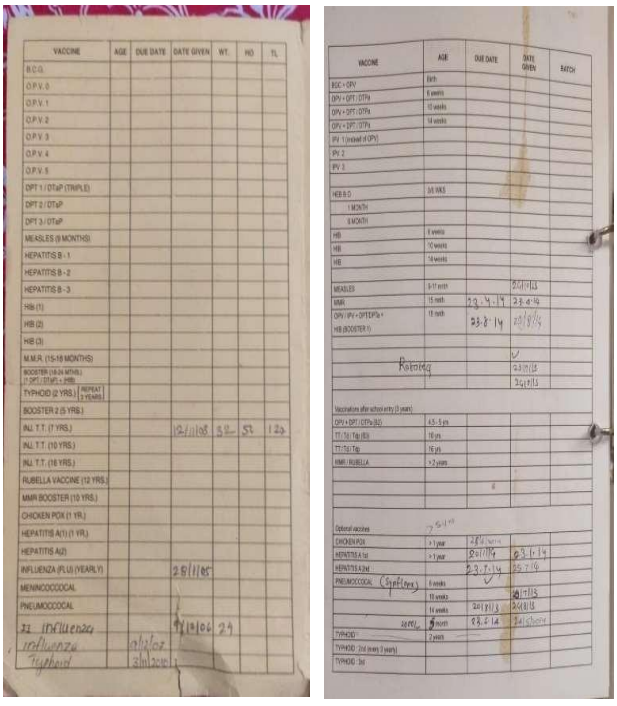


Fig 1. Vaccination Card

IV. Methodology

User testing, surveys, and statistical analysis will all figure into this study's approach. In order to gauge how well the application works for its intended audience, user testing will be carried out. In order to gauge the app's success in boosting vaccination rates and decreasing missed doctor's visits, surveys will be sent out to users. The privacy and confidentiality of users' health records will be evaluated through data analysis, and the app's effect on healthcare delivery and financing will be investigated through empirical research. The study's findings will be used to inform the app's ongoing development and pinpoint potential trouble spots. The overarching goal of this research is to add to the expanding body of literature on healthcare's adoption of mobile technologies and to provide insightful information for healthcare professionals and policymakers.

V. Data Collection And Visualization

This research aims to explore the potential benefits and challenges of an android application for vaccination and doctor's appointment. The following research questions will guide the study:

How usable and user-friendly is the android application for vaccination and doctor's appointment scheduling?

How effective is the android application in increasing vaccination rates and reducing missed doctor's appointments?

How secure and private is personal health information stored in the android application?

What is the impact of the android application on healthcare systems and providers?
Methodology:

The methodology for this research will include a combination of user testing, surveys, and data analysis. User testing will be conducted to evaluate the usability and user experience of the application. Surveys will be distributed to gather feedback from users on the effectiveness of the app in increasing vaccination rates and reducing missed doctor's appointments. Data analysis will be performed to assess the security and privacy of personal health information stored in the app, and to study the impact of the app on healthcare systems and providers.

The sample for the study will be chosen according to the inclusion criteria. Participants will be recruited through various channels such as social media, flyers, etc. Data collection will be performed through user testing, surveys, and analyzing data from the application.

The findings of this research will provide valuable insight into the potential of mobile technology to improve healthcare accessibility and outcomes. The results of this research will be used to identify areas for improvement and guide future development of the application.

The data is collected from questionnaire which was created in google forms and circulated to various aspects of people. The following are the questions asked in the survey:

- Age:

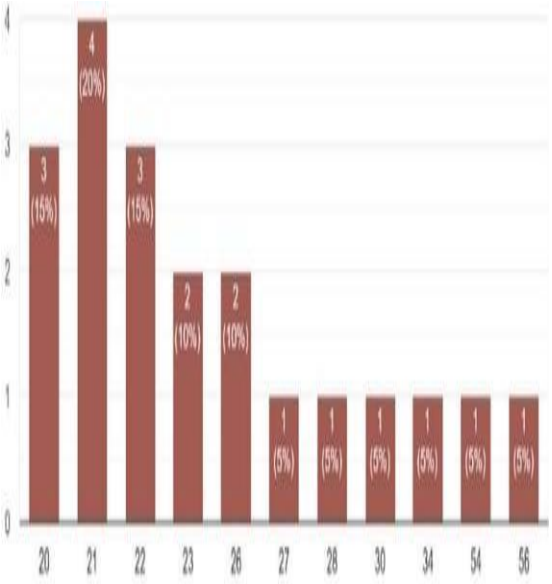
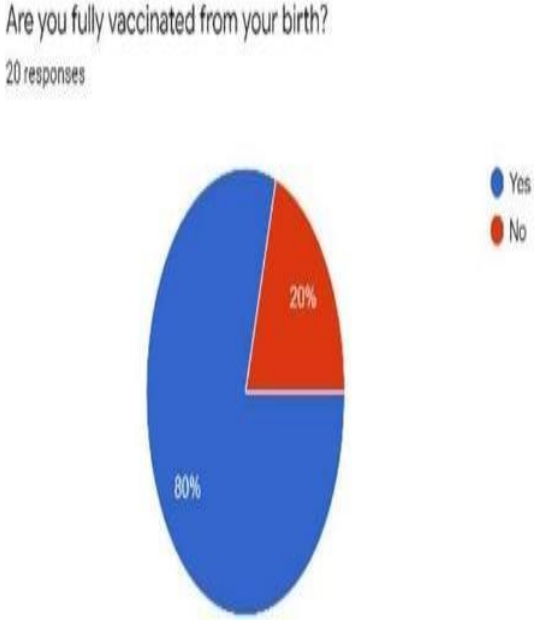


Fig 2

- Are you fully vaccinated from birth?



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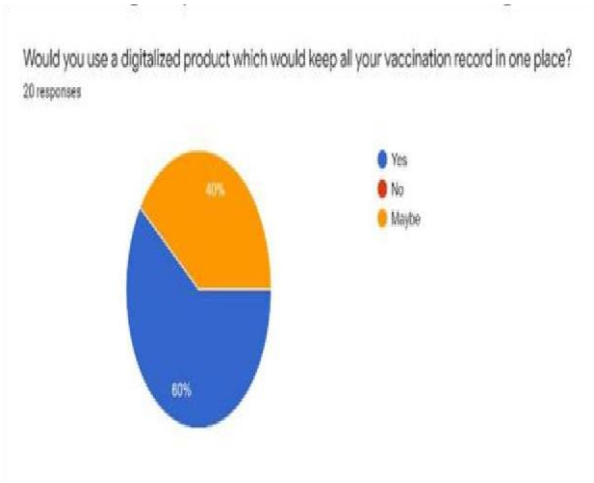


Fig 5

VI. PROPOSED SYSTEM

- Do you keep any type of record for your vaccination?

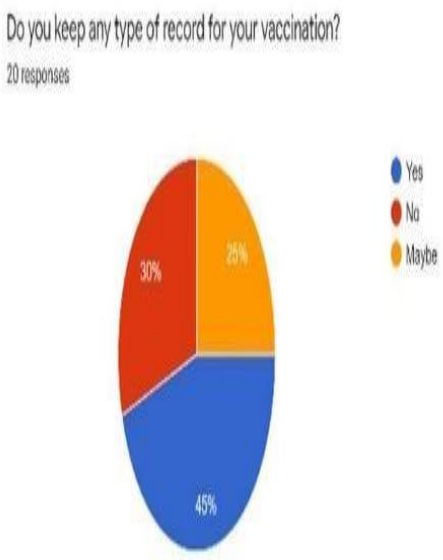
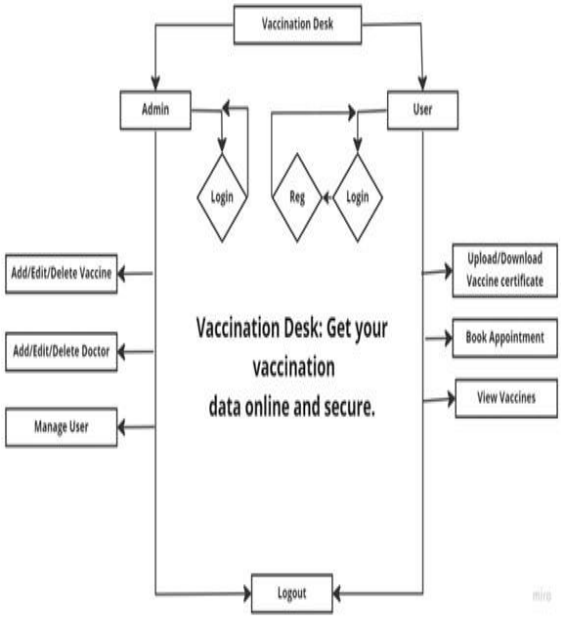


Fig 4



- Would you use a digitalized product which would keep all your vaccination record in one place?
- This The proposed system for an android application on vaccination and doctor's appointment scheduling would aim to provide users with easy access to information on available vaccines, scheduling options, and nearby vaccination clinics. Additionally, the app would allow users to book appointments with doctors, view their vaccination records, and receive reminders for upcoming vaccinations.

The system would be designed with a user-centered approach, focusing on usability and user experience to ensure that it is easy for users to navigate and understand. The system would include the following features:

- A booking feature that allows users to schedule appointments with doctors and vaccination clinics.
- A reminder feature that sends notifications to users about upcoming vaccinations and doctor's appointments.

- A record feature that allows users to view their vaccination records and track their vaccination status.
- A security and privacy feature that ensures the protection of personal health information stored in the app.
- A feedback feature that allows users to provide feedback on the app and its features.

The proposed system would be designed to be easy to use and navigate, providing accurate and reliable information to users. Additionally, the system would be designed with security and privacy in mind, to ensure the protection of personal health information stored in the app. The system would be tested and evaluated in real-world settings to ensure that it meets the needs of users and healthcare providers. The system would be continuously monitored and evaluated to identify areas for improvement and guide future development.

Fig 6: Block Diagram

Fig 7: Phases of Implementation

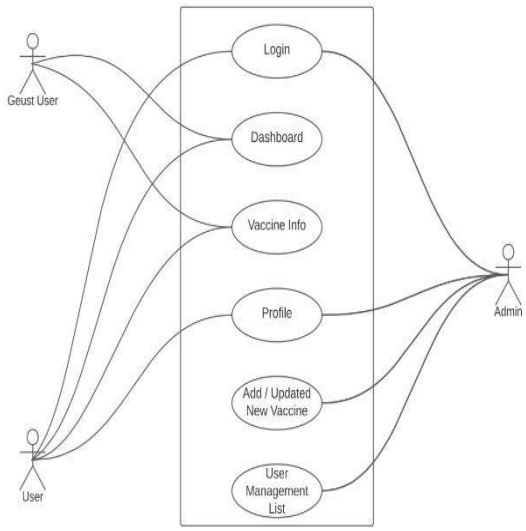


Fig 8: Use Case Diagram

VI.

VI.

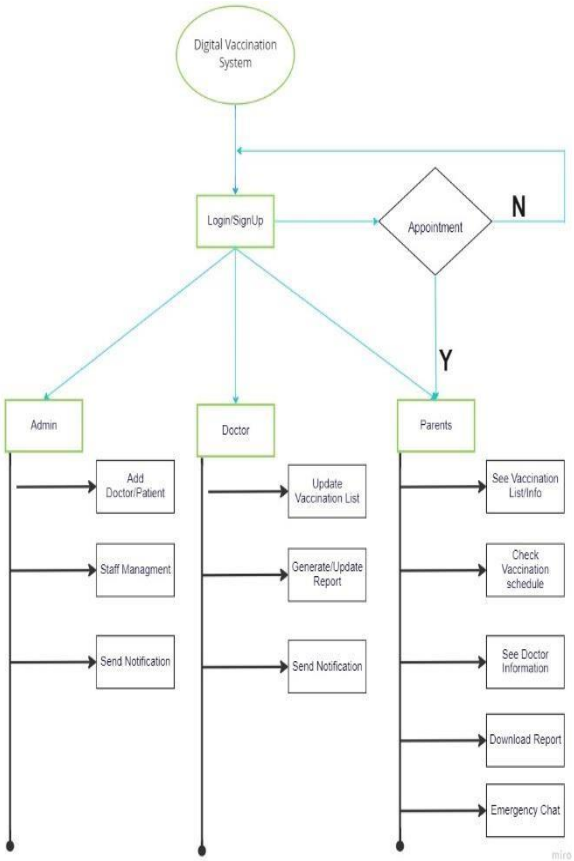
MODEL EVALUATION AND RESULT

This paper was intended to explain the full functionality of our application. It shows the bifurcations in our implementation based on working and internal securities which will lastly lead to better user experience. The highlight features of our product would be safe preservation of our client's vaccination records and make availability to our users would be our topmost priority.

This application would also try to reach its max capacity to make aware of the new vaccination coming up to the market. The last attraction in this product would a live chat-bot setup to serve the emergency setup and contact the doctor in case of urgent matter which may turn to events in past to late-nights almost eliminate waiting in queue for their turn and can arrive just prior to their allotted or selected time. The old conventional methods would still be available to the users till they get used to the updated system.

The distinguishing factor which sets our product out of the current market would be a feature to introduce new clinics as well as doctor to the application as they subscribe and approve of our service and facilities provided by us. This would make it more authenticated as more and more verified doctors approve this application and help us to make aware of the new vaccination coming up to the market.

The diagram ahead will show full functionality of our product, this current design shows us all the services



provided is divided into three major parts. Each having its own unique features.

Fig 9: Architecture Diagram

VII. ACKNOWLEDGMENT

I gratefully acknowledge the support, guidance, and encouragement of my Dissertation Guide Associate Professor Dr. Harshali Patil ma'am for this novel work.

IX. CONCLUSION

This research aims to explore the potential benefits and challenges of an android application for vaccination and doctor's appointment. The app aims to provide users with easy access to information on available vaccines, scheduling options, and nearby vaccination clinics. Additionally, the app allows users to book appointments with doctors, view their vaccination records, and receive reminders for upcoming vaccinations. The study will investigate the user experience and usability of the application, examine the effectiveness of the app in increasing vaccination rates and reducing missed doctor's appointments, assess the security and privacy of personal health information stored in the app, and study the impact of the app on healthcare systems and

providers. The methodology for this research will include a combination of user testing, surveys, and data analysis.

The widespread adoption of smartphones and mobile devices has had a significant impact on many aspects of daily life, including healthcare. An android application for vaccination and doctor's appointment scheduling could have a significant impact on improving vaccination rates and reducing missed doctor's appointments. However, there are also potential challenges to the development and use of this type of application, such as privacy concerns, the need for accurate and reliable information, and the impact on healthcare systems and providers. This research will provide valuable insights for healthcare professionals and policymakers and contribute to the growing body of literature on the use of mobile technology in healthcare.

VIII. FUTURE SCOPE

Our existing solution has room for development and enhancement in the form of additional features, such as Aadhar verification for the user, which will help prevent any fraudulent activity with the user's paperwork. Even a degree verification might be provided for the physicians, allowing them to accept a charge receipt for any user once they have received their vaccination dosage.

More additional features which could be included for enhancement of our product would be as follows:

- Improving the user experience of the application, such as through personalized recommendations and reminders.
- Integration with existing healthcare systems and databases to improve data accuracy and accessibility.
- Development of algorithms to predict vaccine efficacy and side-effects based on demographic and health data.
- Analysis of the impact of the application on vaccine uptake and hesitancy, and the development of strategies to address these challenges.
- The application of machine learning techniques to optimize vaccine distribution and allocation, and to predict and prevent outbreaks.
- Examination of ethical, privacy and security concerns related to the storage and use of personal health information in the application.
- Study of the impact of the application on vulnerable populations, such as rural or lowincome communities.

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“MentoCare: Mental Healthcare System for Public”

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***Abstract*— Even in the 21st century, Mental Health remains a taboo despite the fact that Mental Health directly affects our emotional, psychological and social well-being. Previous surveys conducted on public health suggest that people with disabilities (PWDs) have higher risk of morbidity and mortality as compared to adults without disabilities. The inordinate levels of poor mental health observed in people with disabilities in contrast to those without accentuate the importance of delivering timely mental health screening and treatment/intervention during and after the COVID-19 pandemic to such people. We aim to create a platform that will provide early screening, psychological support, mental well-being and support from mental health experts. The aim is to help people who are suffering from stress, anxiety, depression, panic attacks, post-traumatic stress disorders, substance abuse, suicidal ideation, pandemic-induced psychological issues, and other mental health emergencies. It will provide people in need of assistance across the country with first-stage advice, counselling, and referrals in various languages according to their convenience. The emphasis will also be on user friendliness of the UI to engage more users and maximize the benefits obtained from the system The project also focuses on creating an audio- sign language converter that recognizes and comprehends speech ultimately converting it into analogous Indian sign form for PWD.**

Keywords—Mental Health, professional assistance, disability, PWD, user interface design

I. INTRODUCTION

The World Health Organisation (WHO) perceives mental health as a “State of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community” [1]. Therefore, mental health goes far beyond the mere absence of a mental health condition. It spans over a wide complex spectrum and each person may experience it differently with differences in levels of distress, symptoms and other social and cultural outcomes. Mental health conditions include mental disorders and psychological maladies as well as other mental states associated with significant distress, trauma, dysfunction, or risk of selfharm. People who are suffering from mental health issues are more likely to experience morbidity or lower levels of mental happiness. Exposure to unfavorable social, economic, political and environmental conditions including poverty, violence, inequality, substance abuse, pollution and environmental deprivation can increase people’s risk of experiencing mental health disorders [2].

Mental health risks can evince themselves at different stages of life, but those that occur during developmentally significant

phases, especially early childhood, are particularly detrimental. For example, authoritarian parenting and physical punishments are known to undermine the health of children. Similarly, bullying can severely affect a child's mental health and lead them to lose their self-confidence. It is observed that symptoms related to emotional disorder are mostly seen in children [3]. It

is also responsible for disability among adolescents as well as children. An important and critical stage of human’s life is last years of childhood and adolescence, wherein changes pertaining to physique, cognition and psychology take place. This is a matter of concern, and extreme care should be taken so that a complete development of individual’s personality takes place. As per 2011 census, about 2.21% population of India has some kind of disability, which indicates 2.68 crore people in India are disabled. Out of total 62.32 crore male Indian citizens, about 1.5 crores are disabled and out of total 58.76 crore female Indian citizens, about 1.18 crore are disabled. Under RPWD Act 2016 a total of 21 types of disabilities are recognized of which 19% people are known to have vision related disabilities, another 19% people have auditory disabilities, 7% people have speech impediments, 20% of people have locomotor disabilities, 6% people are affected by mental retardation, 3% of people are suffering from mental illnesses, 8% people have multiple disabilities and around 18% people have other types of disabilities [4]. Surveys regarding mental health suggest that issues experienced by people with disabilities is 5 times higher than a normal adult [5]. According to a study, an estimated 17.4 million adults i.e., 32.9% adults who were physically disabled, experienced mental health issues frequently, where for past 30 days for 14 or more days they experienced mental distress. This is associated with more than required use of mental health services, presence of a chronic disease, limitations due to their physical disability, etc. [6].

The data thus emphasizes the need for professionals to provide mental health services and to attend to their emotional needs. Despite the urgency, there is a dearth of such programs and facilities that foster well-being and positive emotions [7]. In this respect, modern technology and multimedia devices can be employed to considerably improve the quality of life of people with mental health issues and include them in the society. The Internet offers various benefits for users and researchers alike, such as ease of use, a greater disclosure for individuals and better access to people. However, existing technical solutions applied so far in such devices only partially fulfill the needs of people with disability. Some studies have shown the usage of Internet

in school settings to support the screening, detection and identification of mental disorders, showing that the Internet can play a significant role in facilitation of promotion, prevention and interventions of mental health in adolescents [8]. There has been an increase in the number of people with mental disorders, but, a shortage of online screening or therapy programs that prevent mental disorders and promote mental health in adolescents and people with disabilities. This stresses on the need for development of a system which involves routine check-ups to the prevention of mental distress and the promotion of psychological and emotional well-being in both adolescents and people with disabilities by providing a screening assessment that can be conducted by schools, family or pediatric physicians prior to consulting psychologists or psychiatrists [10]. Therefore, there is a requirement that such cases should be handled with an approach that is specifically designed for them. Since, there is a dearth of online screening and mental health assessment tools especially the ones that cater to the needs of adolescents and those that make such tools easy to use for people with disability, we aim to create a web app that focusses on the user friendliness and provides a one stop destination for users that involves all the activities starting from early mental health screening to consultation with professionals.

OBJECTIVES:

This project aims to serve the following purposes:

1. To implement improved Healthcare system using AI and ML.
2. To make a user-friendly system
3. To make best mental health services available at the fingertips of users.
4. To create awareness among people about mental health through blogs and social forums.
5. To connect patients with experts for diagnosis.
6. To make communication easier by incorporating audio-sign language translator.

II. RELATED WORK

Gathering related information in the form of research papers is an essential step in research that helps to understand the perspectives of various authors and the research conducted by them. It helps in deriving insights and generate better ideas considering the previous research results and outcomes. Lately, there has been an increase in the research for potential applications of technology-based applications in the healthcare domain ranging from physical to mental health conditions. Surveys suggest that consumers are increasingly opting for technology-based applications or at least try out new health apps. As per an international consumer survey of adults conducted in 2018, about 50% of the participants reported to having used a health app which indicated a threefold increase in the utilization of health apps since 2014 [17]. Surveys that specifically focus on mental health apps suggested that the usage is around 10% of total participants coming from different population groups [18, 19]. Health apps seem to be extensively consumer-driven based on the fact that people discover such apps through social media, personal searches, and word of mouth, rather than professional recommendations [20]. Currently, mental health professionals are trying to understand how apps can be incorporated into clinical practice. In this respect, the gaps identified can help us to enhance the application.

In paper [9], the authors have focused on secondary schools because they think that it is an ideal setting to recognize young people undergoing mental health problems such as anxiety, depression, eating disorder, sleeping disorder etc. According to their research, current methods for identifying mental health problems highly depend on paper-based assessments which are very lengthy, time-consuming and for the school it is very difficult to manage such data. So, they have proposed a prototype for a web app named Artemis-A which uses computerized adaptive testing technology that reduces the time of the mental health assessment and gives schools a feasible and easy way for assessing mental health among students. The purpose of this research was to build the web app with stakeholders' consultation to enhance the user experience, to conduct usability testing and to finalize the app design and functionalities and check if the app is suitable and acceptable in schools. The findings indicated that young generation students found the app visually appealing and easy to operate. However, school staff found the app difficult to use so they suggested that few more features should be added to the app which would provide them more flexibility for data visualization.

In paper [10], the authors have proposed a system for detection of mental health in children and adolescents. In this paper, the authors have focused on the bi-dimensional model which conceives psychological problems and psychological wellbeing as two parts of mental health that provide a comprehensive grasp of individuals unlike the unidimensional model that determines mental health based the presence/absence of psychological problems. Further, the authors have proposed The DetectaWeb Project which is a web-based assessment for early detection of mental health issues in children and adolescents and aims to provide a web-based platform for screening of both psychological problems and personal strengths and also analyze key determinants of mental health issues. The paper focusses on developing a system only based on data samples collected from a region in Spain hence, its external validity is limited. Also, in the system the assessments are conducted on LimeSurvey platform which is an online platform for the creation and implementation of online surveys. The collected data is then transformed using SPSS statistical software for further analysis. This indicates a lack of user friendliness and a systemic user interface of the application.

In paper [11], the authors have discussed about big data in healthcare especially in management, analysis and future developments. The authors feel that visualization of big data in a user-friendly manner will be a critical factor for development of the society. They have developed technically advanced applications and software that can utilize fast and cost-efficient high-end computational power for such tasks. As per the authors, big data analytics leverage the gap within structured and unstructured data sources. The gaps identified are that revolution in healthcare is further needed to group together bioinformatics, health informatics and analytics to promote personalized and more effective treatments. New strategies and technologies

should be developed to understand the nature (structured, semi-structured, unstructured), complexity (dimensions and attributes) and volume of the data to derive meaningful information.

In paper [12], the authors have developed a web based mental health detection and get cured application. This solution is user friendly which makes it easy to use by people of any and every age group. The method used for screening the mental health issues makes it easy for the user to get the possible cures for their mental health issues. It asks certain questions and based on the algorithm and previous data on which they have trained their model, the possible cures are suggested. Its improvement can be done by focusing on people with disabilities. The scope of functionality can be increased so that users can also take expert advice and other related benefits.

Reference [13] has explored the ways of achieving student wellbeing and used various machine learning algorithms for the prediction based on the data of commercial capability in university students. This paper investigates the mental disorders among university students across various courses. 30 out of 100 students reported mental disorders which is in line with the work that university students are at higher chances of depression and anxiety.
The paper discovered three predictive modelling techniques Decision Trees, KNN and SVM for prediction of mental disorders based on the features in the dataset. The performance metrics deemed Decision Trees as the most suitable algorithm for this prediction problem in the current dataset. The drawback was the data size which is considerably small consisting of 219 rows affecting the performance of the predictive techniques. However, this could be enhanced using the appropriate dataset that will justify the performance. The results indicate the choice of major and gender has a noteworthy impact on a student's comfort. Thus, Decision Trees perform better than KNN and SVM giving an accuracy and F1-score of 0.64 and 0.61 respectively as shown below:

Model	Accuracy	Precision	Recall	F1-Score	AUC
DT	0.64	0.61	0.62	0.61	0.65
KNN	0.59	0.45	0.56	0.49	0.61
SVM	0.44	0.31	0.25	0.26	0.0

Figure 1. Predictive Table with evaluation scores as obtained from the experiment.

In the paper [14], the authors have proposed a web-based application on which people can express their emotional state of mind anonymously, without any fear of being judged. The authors believe that Indian society has made it difficult for younger generation people to express their mental status by continuously neglecting mental health issue. In this paper, the authors came up with an application which is suitable for all age groups and can be used by anyone. A questionnaire has been used to collect data from users. All the collected data is added to dataset. Further, the data collected helps to determine the severity of user's condition using technology like Machine Learning. Based on the severity of the user's condition, appropriate treatments are recommended to the user. Overall, various machine learning algorithms have been used for predicting the severity of the condition. In future, Doctors can also be recommended in this application to better treat the user's mental health.

III. PROPOSED METHODOLOGY

The identification of mental health disorders is considered difficult due to the considerable symptom overlap between the disability and mental health conditions and the problems faced while distinguishing between the conditions [21]. The review also highlighted how research being conducted behind app development has been insufficient. As per studies conducted, majority of mental health apps available for download are not supported by any evidence-based research and may not be following prescribed treatment guidelines.
Considering these aspects, the Project aims to provide early screening, psychological support, mental well-being and support from mental health experts in adolescents and PWDs by rendering the ability to detect and intervene prematurely and to prevent future mental disorders, as well as to promote mental well-being.

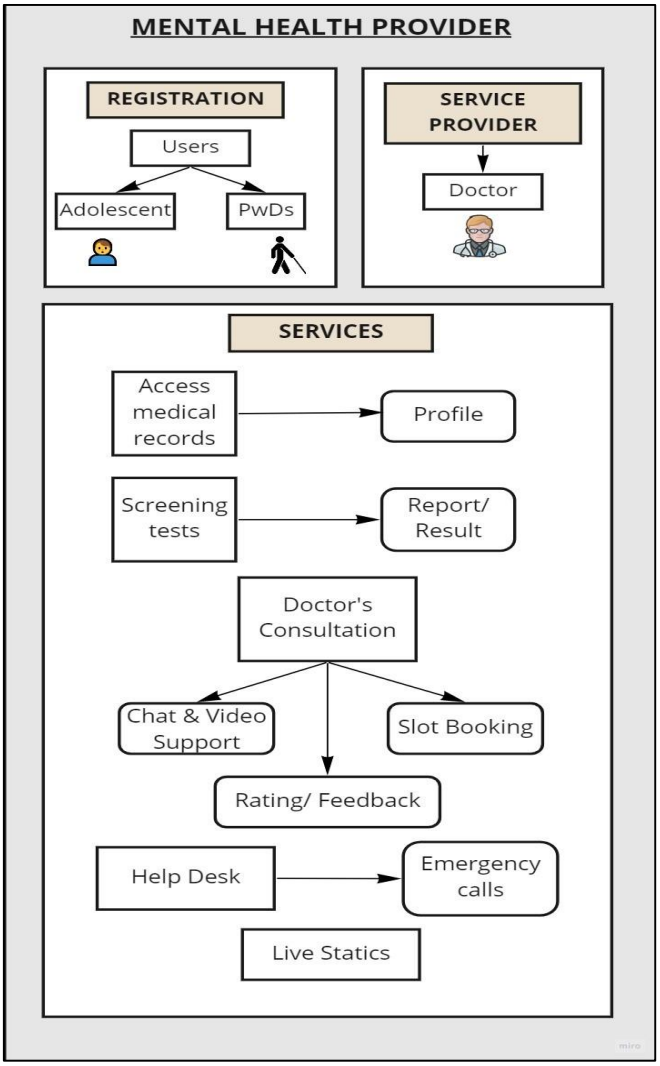


Figure 2. Flow of the proposed system

After studying and gaining knowledge on our topic through literature survey, we were able to design and think about the

proposed methodology. This survey has helped us go beyond our limits and come up with a solution that can eradicate as many gaps as identified by us.

Our aim is to focus on ML or other AI technologies that could help address a number of challenges, by improving access to quality healthcare, particularly for adolescents and PWDs also keeping in mind low-income groups; addressing the scarcity or non-availability of skilled mental health professionals; improving the access and increasing awareness about various mental health conditions and mental well-being; and enabling the delivery of personalized healthcare, at scale also considering the current pandemic situation.

Our idea is to design a platform that will provide early screening, psychological support, mental well-being and support from mental health experts. The aim is to help people who are suffering from stress, anxiety, depression, panic attacks, post-traumatic stress disorders, substance abuse, suicidal ideation, pandemic-induced psychological issues, and other mental health emergencies. It will serve as a lifeline, providing adolescents and people with disabilities in need of assistance across the country with first-stage advice, counselling, and referrals in various languages as per their convenience.

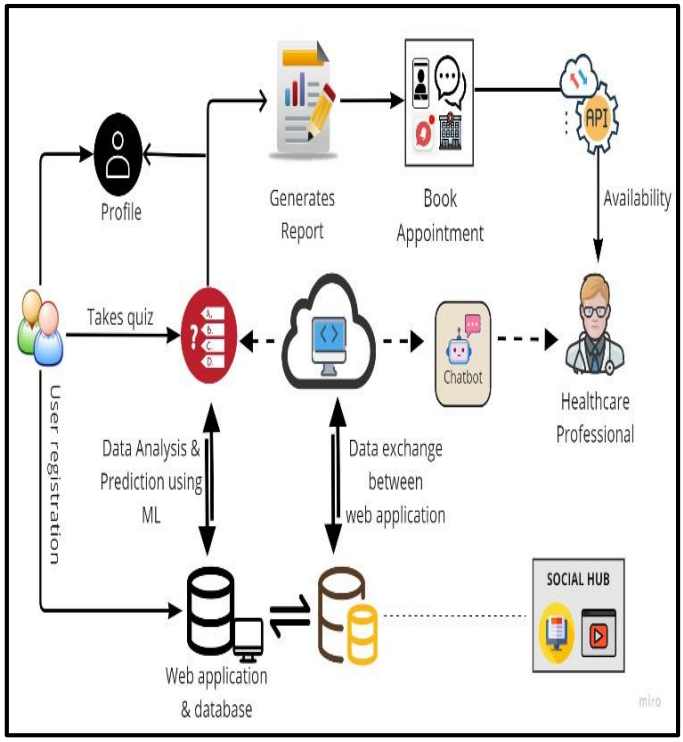


Figure 3. Architecture of the proposed system

A web-based portal will be designed using python frameworks for a smooth experience by the users. The system will consist of various sections, each depicting its own importance in regards to mental health.
The system will be implemented using HTML, CSS, Bootstrap, JavaScript for frontend and Python Flask for backend. We will be using APIs to provide the facility of audio-video calls. Also, planning to design chatbot for assistance using Microsoft Azure.

We are going to collect mental health problems related live data on which we will apply various Machine Learning algorithms and predict suggestive features before-hand as a precautionary measure to help youngsters. The entire system will be deployed on the cloud server – Heroku for ease of access.

IV. RESULTS & DISCUSSIONS

There is a need for further research for developing cogent and regulated measures of mental health problems among adolescents and people with disabilities (PWD). Concomitant mental health disorders are more prevalent in the disabled population as compared to the normal population. Mental health disorders result in reduced functioning and an increased need of assistance in everyday life be it at home, at school, or at work, in addition to difficulties due to the disability itself. These impediments are associated with reduced quality of life for the person and the family. Consequently, careful assessment of mental health should be an essential goal for benefit all people with disabilities and should be incorporated into clinical practice. Though there are a large number of apps that exist currently, the evidence base is scarce, especially for adolescents and PWDs. But a well-designed, appropriately tested, evidencebased system would prove to be very effective for detection of mental health disorders.

Figma is a collaborative interface design tool which helps to brainstorm ideas into virtual reality. This gives a blueprint of the whole system before its execution. Below is the prototype for our proposed system that has been designed using Figma.

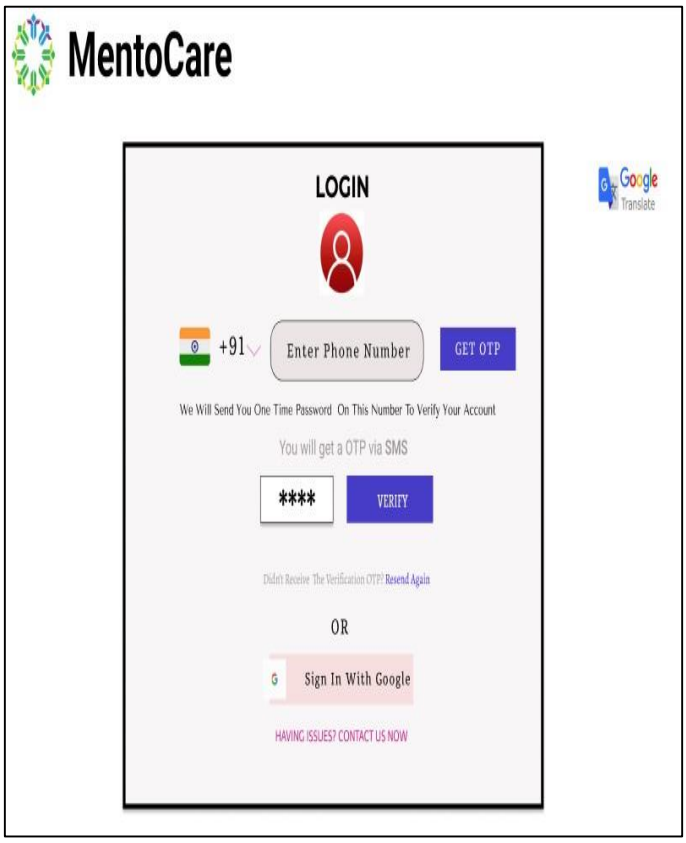


Figure 4. User's Registration page

The users will have hassle-free access to the system - On the login page, we will give an option for google translate so that the user can login in their native language conveniently through OTP verification.

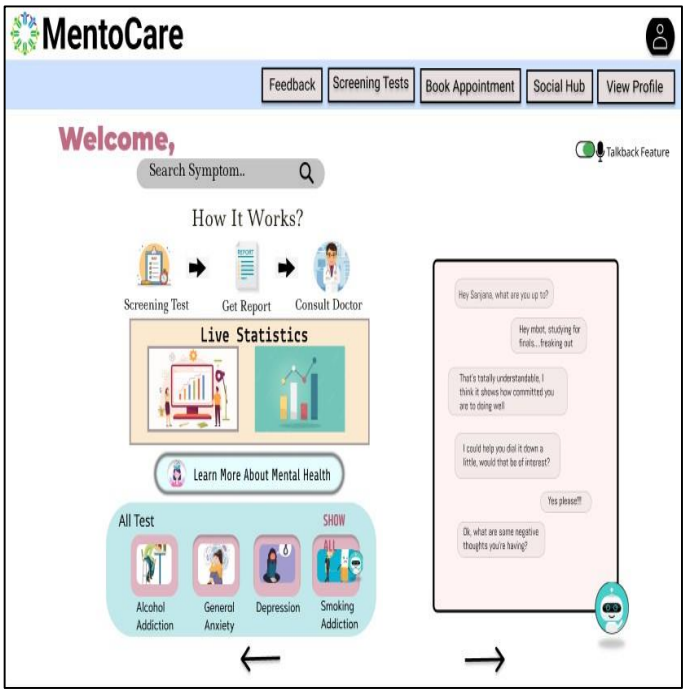


Figure 5. Home page

User friendly interface – Our main focus is to build an application which has user friendly interface. All age groups should be easily able to use the application.

Audio-sign language conversion – A unique feature incorporated to help PWDs communicate. It takes in live audio or speech recording as an input, converts it into text and then displays the corresponding Indian Sign Language images or GIFs accordingly.

Given below is the flowchart for an easy understanding of the processes:

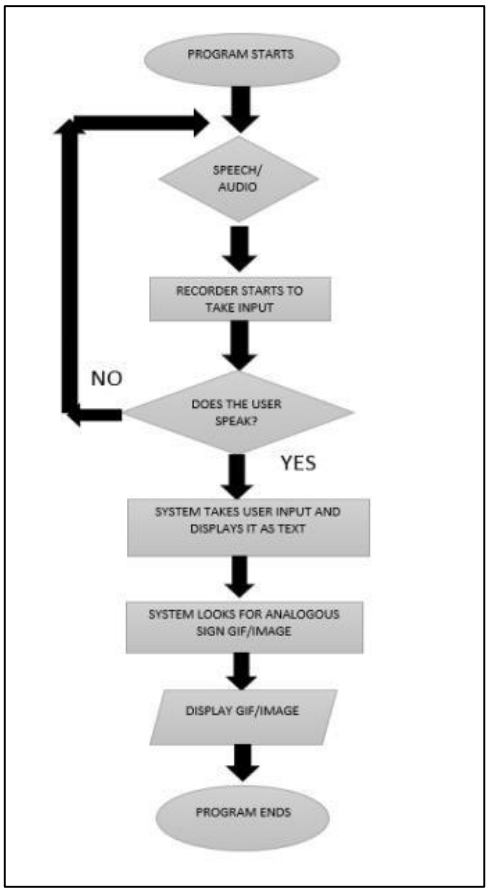


Fig 6. Flowchart representation of the audio to sign converter.

Chatbot - The chatbot will be designed for basic help i.e., basic solution of user's problem will be provided.

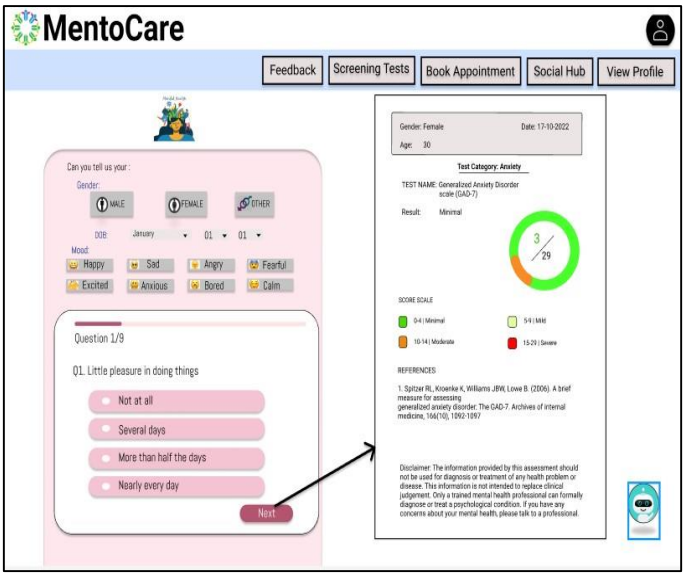
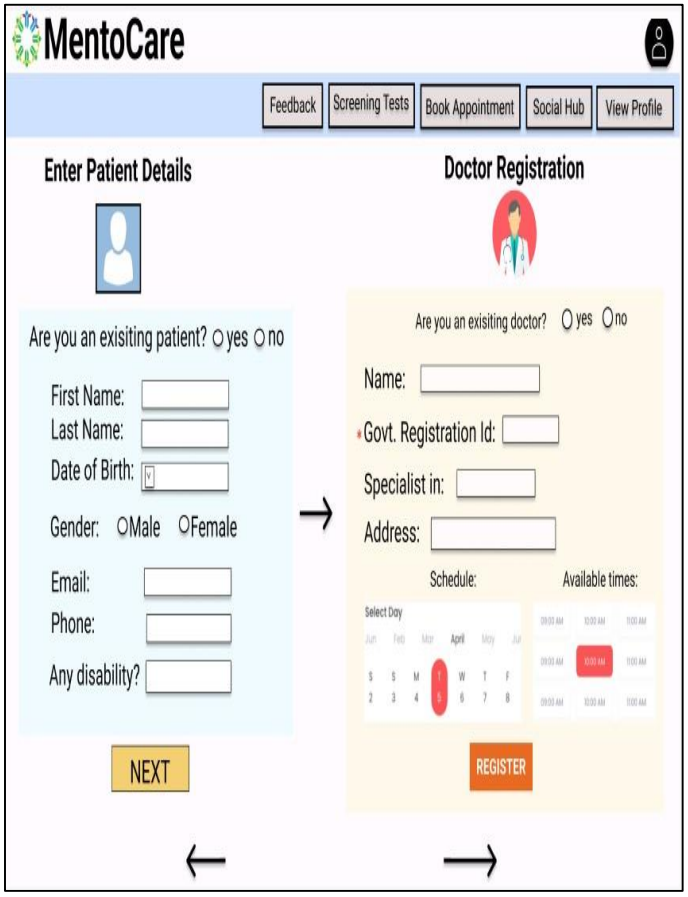


Figure 7. Screening test page

Screening test quiz – This section will contain various tests like - depression, anxiety etc. The test will start with a general questionnaire based on the responses of which the user will be redirected to a questionnaire pertaining to specific mental health issues. After ending the test, the user will get their report.

Report Generation – Based on the test given by the user, a report will be generated. This report will consist of the score, test's name, patient's basic details and reference.



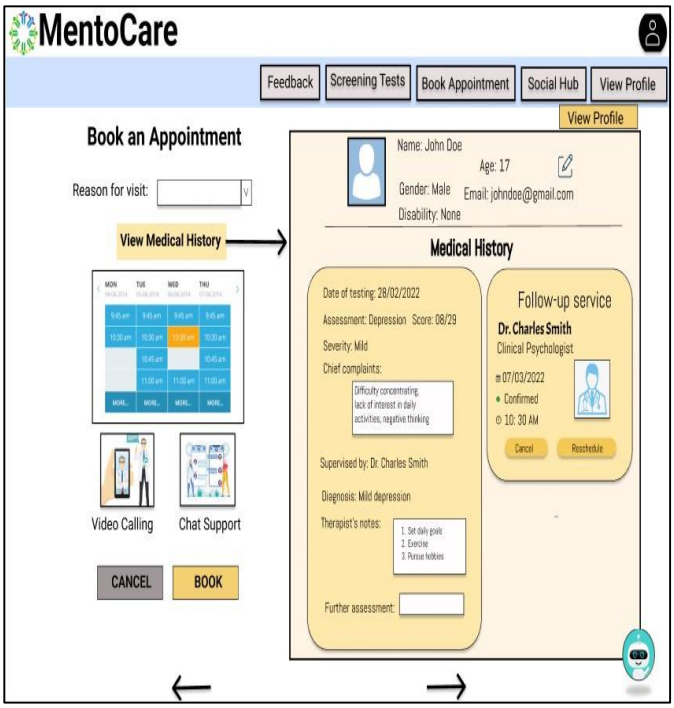
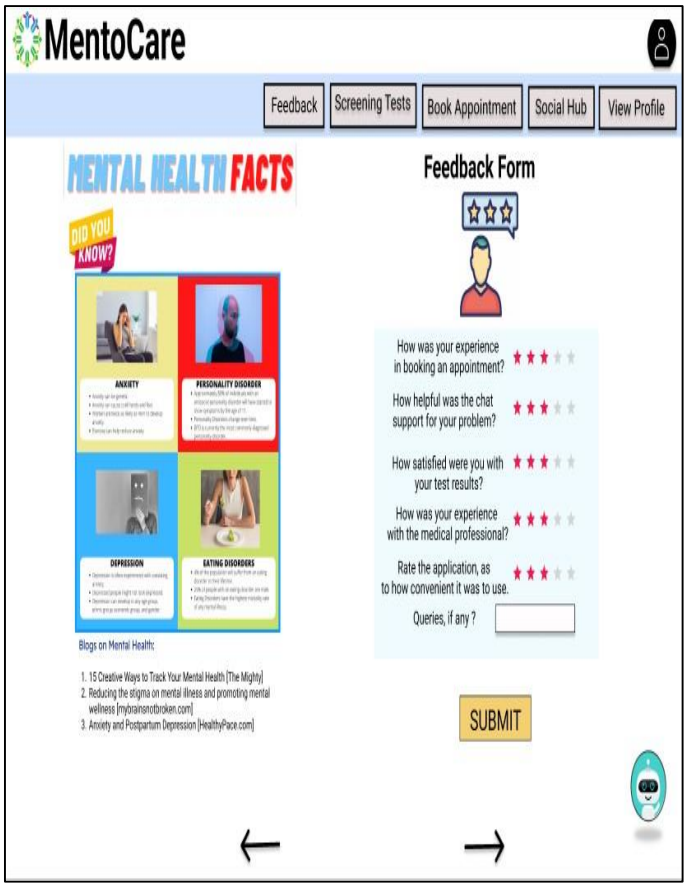


Figure 8. Appointment Booking page

Connect to doctors – After getting the auto generated report, the user can book an appointment. The appointment booking part will be done using API. The user can consult doctor by live chat, video and audio call facility. We will try to incorporate audio-sign language translator in live chatting to make communication easier for wide range of users.

Figure 9. Doctor's Registration page

Appointment booking - The users can get in touch with doctors



App name	MentoCare	Dr. Mind	MoodMission	Headspace
Supports (Target audience)	PWDs, Adolescents and general public	All age groups	people dealing with stress, anxiety, or depression	For novice meditators and people new to the concept of mindfulness
Attractive features	Talkback feature for PWDs, Social Hub to learn more about symptoms, Chatbot for solving basic queries	Get help from nearby centers, Share test results with friends and family	In-app rewards, CBT based activities in the form of missions	Progress tracking, guided meditation tracks, online forums
Doctor consultation facility	Yes	No	No	No
Cost structure	All the features are free, but Doctor consultation is paid	Free	Paid	Paid (Discount for students)
Offline features (If any)	Screening tests, Emergency helpline	Read about different mental health problems	Missions can be used offline once downloaded.	Sessions can be viewed offline once downloaded.
Gaps	- No help from nearby centers	- Not very user-friendly for adolescents & PWDs -Only available in standard languages	- Activities limited to missions - Time consuming activities - No professional help	- No mood assessment ratings - Exercises may feel repetitive - May not be very appropriate for clinical usage

Figure 11: Comparison of various existing apps with the proposed system

by submitting the required details as per their convenience.

Figure 10. Social Hub and Feedback page

Social Hub – This section will consist of various blogs and videos related to mental health. Users can visit this section to get a broader idea about mental health and its symptoms. Also, users can share their stories or experiences and connect to people having similar mental issues.

Discussion Forum – Feedbacks are very important part of any system as it gives us glimpse inside our user's mind, and we can use the feedback to improve the user experience. In this section users and patients can give application feedback. In this section users and patients can give feedback of doctor's consultation and also the application's feedback.

Thus, we have also compared our proposed system with the existing ones and tried to finalize a solution that can overcome the problems with the existing apps.V. CONCLUSION AND FUTURE SCOPE Web apps have the potential to act as a safe and effective medium for detection and treatment of a wide range of mental health conditions provided the approaches followed for screening and treatment are evidence-based. Consequently, the use of an online assessment tools lays out several advantages such as cost reduction, increase in accessibility, evidence-based assessments and counselling. Apart from this due consideration is required of the patient data privacy and security, clinical approval and safety of the app content [27]. Our proposed methodology will be useful for a wide range of community. It will be an inclusive approach that will provide mental health facilities by keeping in mind the concerns of PWDs as well. Through our system we will try to provide a healthy environment which will give mental peace to the users, where doctors can be easily connected to the patients. Patients can easily approach the best mental health facilities at their fingertips. This platform can act as a tool for early screening, to determine the symptoms and severity, to decide which professional has to be referred to for treatment, to learn more about mental health conditions and well-being in a more inclusive way than what was conventionally followed. This will ensure less damage and an improvement at earliest to the mental health of patients. We will try to keep the UI user-friendly. Efforts will be needed to improve the user friendliness of the application along with incorporation of quality content of data to increase the engagement of users to maximize the benefits of the application. Although, proper integration of these online tools with the existing methods is important, technical implementations are never the largest barriers and digital healthcare tools already exist in the market [28]. In spite of the extensive research and progress in the field of Artificial Intelligence (AI) and Machine Learning (ML), the implementation of ML to solve real world problems is often perplexing. There is also a need to understand the risks and challenges involved in the incorporation of ML in healthcare and try to bridge the gap between ML and Healthcare. ML is currently doing miracles in healthcare systems as well [29]. Thus, we will try to incorporate this to help our users get better first aid results. The implementation of digital tools in enhancing patient care, reducing machine runtime, and minimizing care expenses have given an impetus to growth of technology in healthcare industry. When it comes to our healthcare industry, especially in the matter of life and death, the promise of technology to improve healthcare outcomes are very interesting and fascinating.

The usage of technology is associated with a number of moral and social issues pertaining to the lack of transparency and trustworthiness among the general mass. Many issues amongst these superimpose with the issues raised by the use of data and healthcare technologies more broadly. A key challenge for future governance of digital tools will be ensuring that it is developed and used in a way that is clear and suited with the public interest, whilst driving innovation in the sector. This match of demand and supply coupled with development will enable both fields to advance significantly in the foreseeable future, which will ultimately ameliorate the quality of life of people in the society.

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Automated Assessment of Mental Disorder using Speech as Biomarker

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Abstract - **Mental health illnesses are a worldwide concern that affects one out of every four people at some point in their lives. Depression is a prevalent mental illness. This paper explores the use of human voice as a valuable indicator for automated mental health assessment, particularly with regard to depression. There are several barriers to getting mental health checkups, including cost and stigma. In order to learn how voice signal behave in terms of frequency and amplitude, speech signals were processed to create spectrograms. To categorise individuals based on their traits, speech signal patterns of depressed and non-depressed individuals were examined. As a result, mental health assessments can be automated using the Convolutional Neural Network model, a machine learning technology that uses speech samples as a biomarker to enhance diagnosis and therapy. It can help in early detection of signs of depression and take the necessary actions in order to become mentally healthy.**

Keywords—Speech, Biomarker, Acoustic feature, CNN, Machine Learning, STFT

I. Introduction

According to the World Health Organization (WHO), more than 300 million people worldwide suffer from depression [1], and the number is rising, particularly among the elderly. Depression, also known as Major Depressive Disorder (MDD), is a mental illness characterised by a persistent bad mood, low self-esteem, loss of interest, low energy, and pain with no obvious reason. It has an adverse effect on a person's family, job, sleep, and food habits. According to [2] ,half of all completed suicides are linked to depression and other mood disorders in extreme circumstances. As a result, many researchers have focused on building mechanisms to diagnose and prevent this mental condition so that psychiatrists and psychologists can help patients as effectively as possible.

Currently, the assessment and monitoring of psychiatric illnesses is based mostly on reports from affected individuals or their carers on an as-needed basis. Patients' retrospective recall biases (e.g., to downplay or overestimate symptoms), cognitive limitations (e.g., remembering of incidents and environment, causal inference), and social stigma all play a role in these reports. Individuals with mental diseases require immediate objective diagnosis, long-term monitoring, and evidence-based interventions, especially those who are unable to receive standard psychological or psychiatric services owing to geographic, financial, or logistical limitations. Remote assessments and improved personalization of care would be made possible by this systematic and objective assessment, which would improve clinical services across the medical practise.[18]

The majority of us communicate without comprehending the degree of coordination required to do so. Speaking entails more than just moving the lips. It's a highly organised display of human communication that expresses thought, intent and emotion.

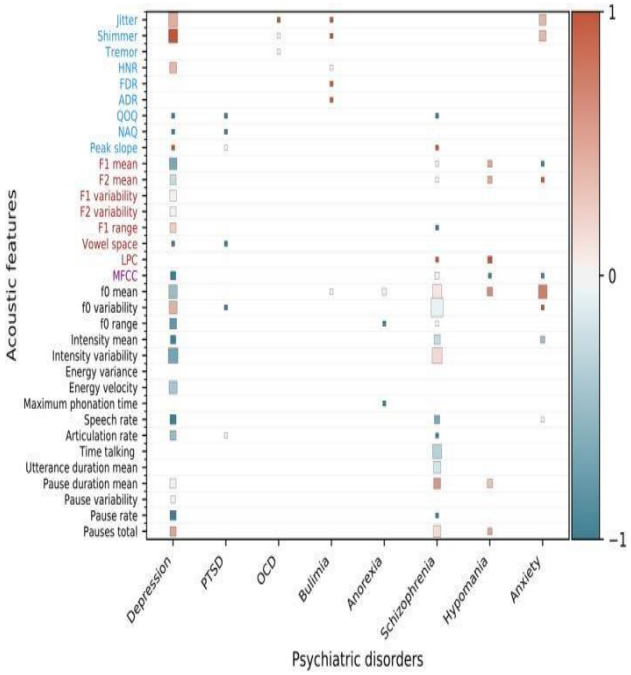

Fig . 1 . Acoustic Features [18]

II. Literature survey

Depression and human behaviour have been linked in studies. A shift in the brain's basal ganglia causes a reduction in motor coordination (also known as laryngeal control), which is one of depression's features. Malyska and Quatieri [3] showed that vocal source qualities can be employed as biomarkers of depression severity and that voice quality carries information about a person's mental condition. They proposed that commonly used voice quality measures in depression detection, such as jitter, shimmer, small cycle-tocycle variations in glottal pulse amplitude in voiced regions, harmonic-to-noise ratio, and the ratio of harmonics to inharmonic components, could be borrowed from signalprocessing methodologies. These characteristics were linked to the vibration of the vocal folds, which was influenced by vocal fold tension and subglottal pressure. The study of laryngeal biomarkers and psychomotor retardation assessment led to a better understanding of the

neurophysiological foundation for changes in voice quality associated with depression and human speech deterioration.

Several additional scholars have described how depression affects common paralinguistic speech characteristics and how this knowledge might be used in categorization and prediction systems. [4] . Automatic depression detection (ADD) methods have the capacity to quantify these connections. The 2017 AVEC "Real-life Depression and Affect Recognition Workshop and
Challenge," hosted by the Association for Computing Machinery, focused on scientific research into depression. [5] . At this conference, Yang et al. [6] suggested a threesectioned hybrid multi-modal depression recognition and categorization framework: the depression scale of the patient health questionnaire (PHQ-8)[7] score based on audio and video features; depression/non-depression categorization based on text data; and multimodal regression for ultimate depression prediction In terms of PHQ-8 score estimations, this method performed better than the baseline values, as evaluated by the mean absolute error (MAE)[8] with an MAE of 4.359 and an RMSE of 5.400, and the root-meansquare error (RMSE). The other outcomes were also satisfactory.

Text-based classification accuracy was 84.21 percent for female patients and 81.25 percent for male individuals using graph vectors and support vector machine (SVM) [9] models. [10] Yang et al. suggested a deep convolutional neural network (CNN)-based multi-modal fusion architecture [11]. Their methodology took into account audio, video, and text streams, and it outperformed the baseline in terms of predicting PHQ-8 scores from audio, video, and text data (MAE 3.980, RMSE 4.653). Multimodal techniques based on various neural network topologies appear to be more effective than single-modal approaches, and they are a promising topic for future research.

During the 2018 Interspeech Conference, another set of intriguing discoveries was presented. Afshan and colleagues (Afshan et al.)[12] The study looked at how efficient speech quality factors are at detecting depression. They suggested combining voice quality features with Mel-frequency cepstral coefficients (MFCCs) [13] , which indicated that it was better at recognising depression. As a result, they were able to attain a 77 percent accuracy rate even though the test utterances were only 10 seconds long. When the test utterances were 1.8 minutes long, the accuracy was as high as 95%. Hanai and his colleagues [14] proposed a model for detecting depression based on audio and text transcription sequences. They tested a long short-term memory (LSTM) model and a regularised logistic regression model (with and without conditioning on the type of questions given). [15] (without knowing the types of questions that triggered the responses, and utilising the sequences of responses) They also looked at a multi-modal LSTM model that included both audio and text. The researchers discovered that when classifying for a binary result, context-free modelling of the interviews based on text characteristics performed better than audio features (depressed vs. non-depressed). Audio features, on the other hand, were more accurate in predicting the multi-class depression score (MAE 5.01 vs. 7.02). Audio features outperformed text features with perfect rates of precision when the model was weighted according to the queries asked (F1 of 0.67 vs. 0.44). (1.00). When audio was dependent on the question being asked, the general performance of the audio improved (F1 0.67 vs. 0.50). The multi-modal paradigm, according to these researchers, produced the best results (F1 0.77 and recall 0.83). Sequence models also performed the best in terms of multi-class classification.

Using deep convolutional neural networks, this research presents a unique method for automated speech-based depression screening. We offer extensive tests on the distress analysis interview corpus (DAIC) to demonstrate the use of our categorization system and to assess the outcomes.

III. Methodology

The paper focuses on the automated assessment of mental disorder using speech as biomarker. For which, we used a CNN(convolutional neural network architecture) which helps in analyzing and studying the patterns in the voice signals of depressed and non-depressed individuals.

A. Data Source

The DAIC-WOZ dataset is part of a larger corpus called the Distress Analysis Interview Corpus (DAIC) (Gratch et al., 2014), which contains clinical interviews to help diagnose psychological distress conditions like anxiety, depression, and post-traumatic stress disorder. These interviews were part of a wider project to develop a computer agent that conducts interviews and detects verbal and nonverbal signs of mental illness (DeVault et al., 2014). The Wizard-of-Oz interviews were performed by an animated virtual interviewer named Ellie, who was controlled by a human interviewer in another room, and the data collected included audio and video recordings as well as lengthy questionnaire replies. A range of verbal and nonverbal elements have been transcribed and annotated in the data.

B. Data Description

Clinical interviews in the DAIC database are intended to aid in the diagnosis of psychological distress illnesses such as anxiety, depression, and posttraumatic stress. The bundle contains 92 GB of material in the form of a zip file with 189 folders. There are 300 to 492 session recordings in total. A text transcription of the recording, participant audio files, and face features are all included in each file in the archive, which represents a single session. The audio files were recorded at 16 kHz with a Sennheiser HSP 4-EW-3 head mounted microphone. Ellie, an animated virtual interviewer operated by a human interviewer in another room, performed the interviews. Each session lasts between 7 and 33 minutes (with an average of 16 mins). Using a standardised selfassessed subjective depression scale, PHQ-8, the level of depression was labelled with a single value every recording.

Because audio files contain minor quantities of bleedover from the virtual interviewer, we're considering using transcript files to solve this problem during processing. Identifiable utterances are scrubbed from audio recordings, i.e. the waveform is blank out at the appropriate periods; these occurrences will be identified using transcript files and the keyword "scrubbed entry." Scrubbed entries in feature files are likewise zeroed out.

Fig . 2. Ellie, the virtual Interviewer [20]

C. Methodology

A physical quantity that changes over time, space, or other independent variables is referred to as a signal. A signal is a function that transmits information about a phenomenon in signal processing. Signal filtering is the main pre-processing step while dealing with signals. The raw signal contains a variety of sounds, making it unusable for performing sophisticated analysis. As part of the preprocessing procedure, we added a filter to the signal to lower the noise which could be used for analysis.

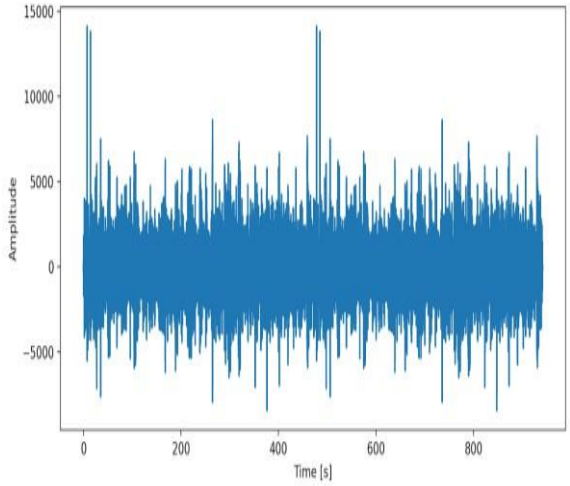

Fig . 3. Raw audio signal

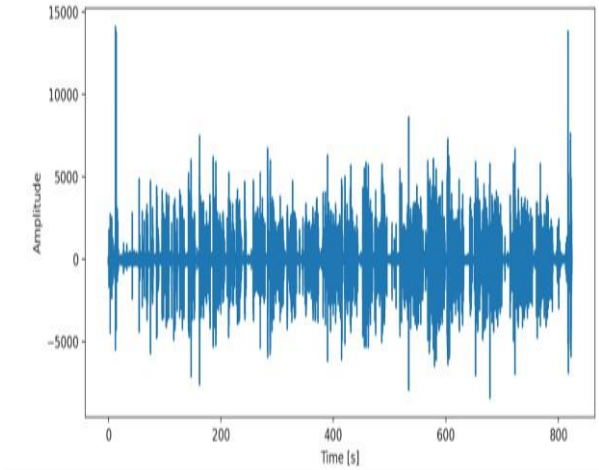

Fig . 4. Filtered audio signal

After pre-processing audio signals which shows magnitude of amplitude over time, we applied the fourier transformation where the frequency is on the x-axis and the magnitude is a function of the frequency itself, causes us to move into the frequency domain. Fourier transformation involves breaking down a periodic sound into a collection of sine waves that all vibrate and oscillate at various frequencies. It is extremely amazing that we can sum up a variety of sine waves at various frequencies to depict a fairly complex sound as long as it is periodic.

The Short Time Fourier Transform, or STFT, computes many Fourier transforms at various intervals in order to preserve information about time and the evolution of sound. As a result, the number of samples in a frame determines the different intervals at which the Fourier transform is performed. Hence, we applied STFT and generated spectrogram which helps in analyzing speech signals in terms of frequency and time.

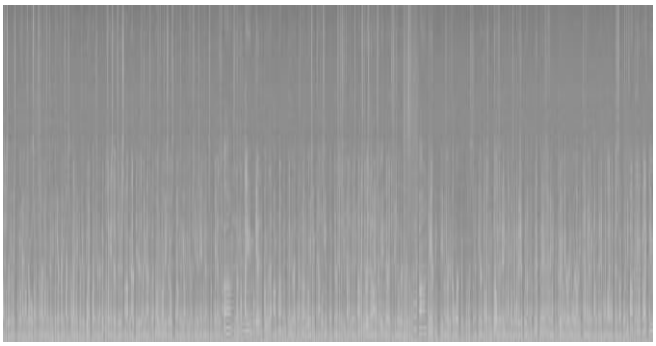

Fig . 5. Spectrogram after applying STFT

The spectrogram of signals which are generated after applying stft are used to train the machine which learns different patterns in the waves and analyzes them. We are using CNN architecture for predicting the depression level of an Individual. In CNN architecture, last layer will be replaced by the number of classes as an output to display the mental health disorder level.

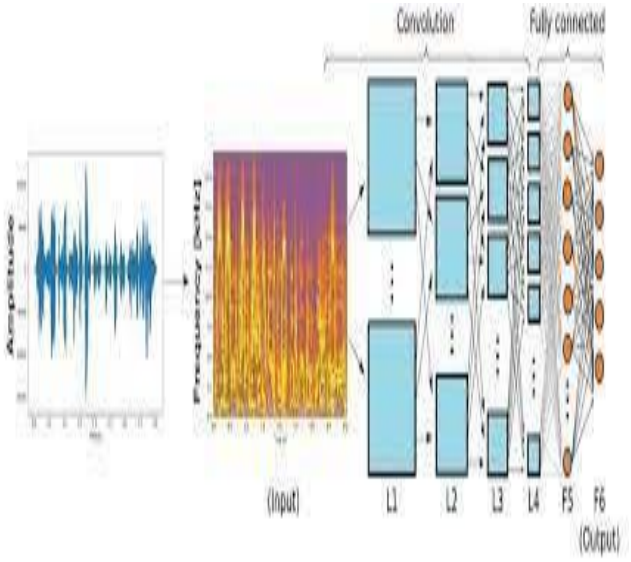

Fig . 6. Basic Structure of CNN architecture [21]

Futhermore, fine tuning will also be done in order to enhance the accuracy of model. From the output layer of CNN model we will get the level of depression of an Individual. In order to reduce the loss error and false negative, we will take the mean of multiple classification output. We will have a voice chatbot which will continuously communicate with individual. Hence, we will take the voice samples from multiple time stamp and predict the mental state and finally will take the mean of all the outputs in order to detect the level of Depression of an Individual.

IV. Model Evaluation

Since the dataset is biased where we have more samples of non-depressed individuals as compared of depressed individuals, the accuracy will not be a perfect matrix for evaluating model accuracy. Therefor, for Evaluating our proposed model classification Results, we will be using Confusion Matrix, F1 Score, Precision and Recall matrices alongwith the loss function curve to evaluate the model. Result and discussion.

V. Result and Discussion

After studying all the possibilities to detect the mental health state, we came to conclusion that Speech is the best biomarker which could be used for state prediction. Also, the given Mathematical Model and proposed CNN architecture will be able to classify the states with good accuracy as per the different studies. The audio signals are analyzed in order to find the patterns in the depressed and non-depressed individuals. The audio signals are filtered to remove noise and other speaker's audio. Only the targeted user's audio is extracted and processed to find the pattern in his/her speech signals. Hence, after analyzing signals we can classify depressed and non-depressed individuals accurately.

VI. Conclusion and Future Scope

With the findings of the experiments and the results of the systemic evaluation, we can conclude that using the suggested model, acoustic feature measurement from speech can discriminate psychiatric patients from healthy individuals. We are now concentrating on depression level classification, which might be expanded to include stress and anxiety levels classification in the future using acoustic features.

Acknowledgment

We warmly recognise our Mentor, Ms. Shiwani Gupta, for her assistance and direction in assisting us in successfully going forward while developing the solution.

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Maximizing Profit in Hydroponic Farming: A ROI Calculator Analysis

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Abstract—**This paper presents a methodology for developing an ROI calculator for hydroponic farms and applies it to a hypothetical farm project. The results show that the project has a positive ROI, with a payback period of less than two years. The findings of this research can help farmers and investors make informed decisions about investing in hydroponic farming.**

Keywords—***Hydroponic, ROI, Investment, Gross Income, Operating Cost***

I. Introduction

The project aims to explore the potential of hydroponics as a large-scale commercial alternative to traditional agriculture in India. Hydroponics, which involves growing plants without soil and delivering nutrients and water straight to the roots, can increase production yields and provide consistent, high-quality produce. The project will examine various funding options, including government support, and analyze the risk involved in implementing hydroponics as a disruptive method of agriculture. The focus will be on assessing the financial viability of hydroponic farming ventures by analyzing the return on investment and cost of debt. The project will also consider the capital structure and weighted average cost of capital when evaluating the least cost of debt that can be paid by the company. hydroponics is a rapidly evolving technology that offers a sustainable and efficient method of growing plants. With the ability to deliver nutrients and water directly to the roots, hydroponic farming can increase production yields and provide consistent, high-quality produce. However, as with any business venture, maximizing profit is a crucial aspect. In this technical paper, we will explore the different factors that contribute to maximizing profit in hydroponic farming. Specifically, we will focus on the development of a return on investment (ROI) calculator to analyze the financial viability of hydroponic farming projects. By analyzing the different costs associated with hydroponic farming and comparing them to potential revenue, the ROI calculator will provide valuable insights into the profitability of hydroponic farming ventures. The paper aims to provide a comprehensive analysis of the profitability of hydroponic farming and offer practical solutions for maximizing profit in this emerging industry.

II. Background

A. History and Contributions from Plant Physiology

Hydroponics is a type of horticulture, a method that uses nutrient mineral solutions instead of tillage. The oldest examples of hydroponics date as far back as the paintings on the walls of the Egyptian temple Deir El Bahari, more than four thousand years old. During the VI century BCE, in Babylon, hydroponics was used to grow mostly ornate plants. In pre-Columbian America, around the X and XI centuries CE, the Mexican Aztecculture developed the chinampa to grow crops on the shallow lake beds in the Valley of Mexico and believed to have been practiced throughout Mesoamerica.

B. Hydroponic Cultivation Techniques

The Hydroponics, unlike traditional farming, does not require soil to grow food. In this technique, plants are grown either on natural or man-made substrates, where the roots easily extract the nutrients from a prepared nutrient solution. There are different methods for growing food using hydroponics, and their application depends on the specific plant, local climate, and budget, among other factors. Most systems comprise a storage tank for the nutrient solution and an aerator, as illustrated in Figure 1.

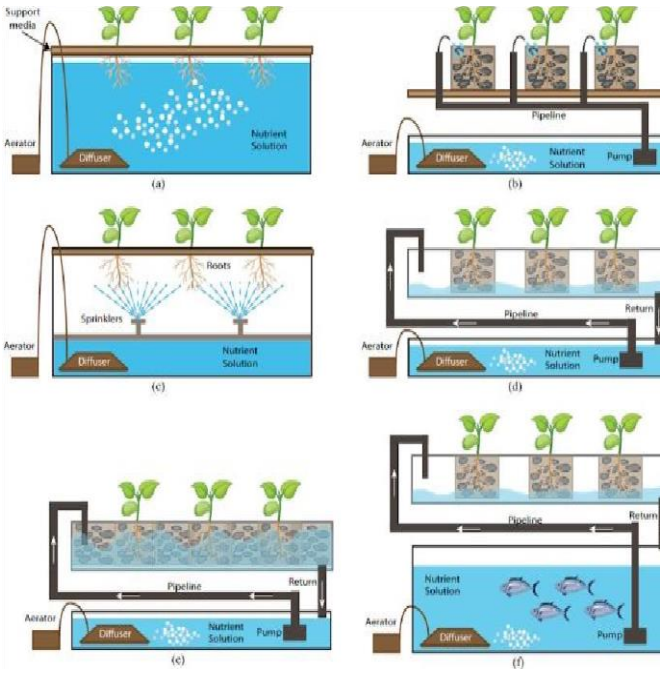

Figure 1. Different types of hydroponic systems. (a) Deep Water Culture. (b) Drip System. (c) Aeroponics. (d) Nutrient Film Technique (NFT). (e) Ebb and flow. (f) Aquaponics.

a. *Floating Root System or Deep Water Culture (DWC)*:

In this system, the root of the plant is immersed in the nutrient solution, while the rest of it is supported above water level using polystyrene, cork bark or wood, among other materials (Figure 1a).

b. *Drip Irrigation:*

This method is best suited for tomato and pepper-like crops. In this case, the nutrient solution is pumped directly to the roots of the plants with regulated flow. The solution is administered at predetermined time intervals and, for closed systems, the leftover solution is returned to the storage tank (Figure 1b).

c. *Aeroponics:*

Tubers and roots are ideal to grow using aeroponics. In this configuration, the plants, with their roots hanging down in the air, get their nutrients from periodic spraying by a system of sprinkles. The main advantage of this technique is that it does not require an airing system as oxygen is carried along with the sprayed nutrient solution (Figure 1c).

d. *Nutrient Film Tchnique:*

This method, also known as NFT, is like the floating root system, except that the plant roots are not completely submerged in the nourishing solution, but in a liquid stream flowing through a piping system. Although NFT requires smaller amounts of nutrient solution than the floating root nitrification and denitrification, allows the recycling of water from the fish tank, forming a balanced micro-ecosystem.

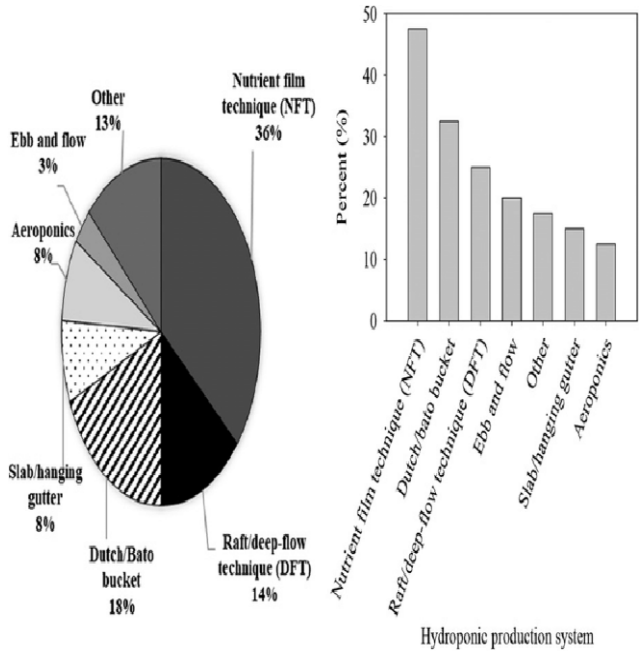

Figure 2. Proportion of Hydroponic production system.

system, it requires additional energy and components to operate. The excess solution returns to the storage tank by gravity and the flow of nutrient solution can be continuous or periodic (Figure 1d).

e. *Ebb and Flow:*

Plants are placed in a tray, which is periodically filled with nutrient-rich water pumped from a reservoir below. The system uses gravity to return the water to the reservoir and reuse it (Figure 1e).

f. *Aquaponics:*

This technique exploits the symbiosis of flora and fauna to achieve an efficient system in which fish feces afford the nutritional requirements of the plants. The absorption of nutrients by plants, combined with the microbial process of

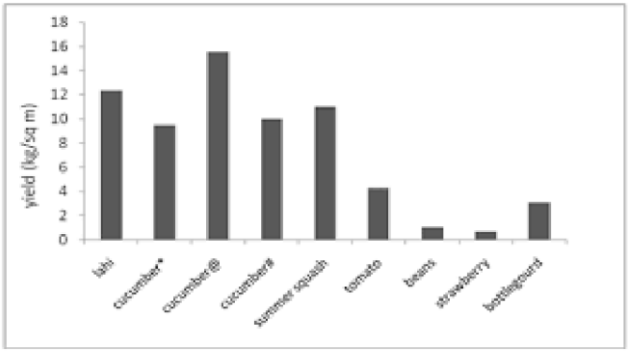

Figure 3. Vegetable Cultivation under Hydroponics.

Table No. 1: Source of nutrients

KNO3	N, K	VERY SOLUBLE SALT
POT PHOSP MONOBASIC (KH2PO4)	P, K	CORRECT PHOSPHOROUS DEFINE
MGSO4	S, MG	PURE SOLT
IRON CHELATEE	FE, CIT	BEST SOURCE OF IRON
BORIC ACID	B	BEST SOURCE OF BORON
CALCIUM NITRATE	N, CA	VERY SOLUBLE SOLT

Table No. 2: Hydroponic kit cost (approximate cost in India)

NS20 (PLANTS/FRAME = 10) AREA = 4.5 Sq. feet	RS 6000 (1 PIECE)
NS 40	RS 12000
NS 60	RS 18000
NS 80	RS 23000

A frame NFT – 32,000 Plant/frame – 100 plants

Table No. 3: List of Crops

TYPE OF CROPS	NAME OF CROPS
VEGETABLES	TOMATO, CHILLI, BEET, CABBAGE, ETC.
FRUIT	STRAWBERRY
CONDIMENTS	MINT, PARSLEY
FLOWER	MARIGOLD
MEDICINAL	ALOE VERA
FODDER	BARLEY, SORGHUM
LEAFY	LRTTUCE

III. PROPOSED SYSTEM

A. Survey of Literature

For this project, we referred to some research papers about digital solutions for the problems regarding hydroponic farming. Most of the papers proposed AI-based data analysis of crops and predicts future prices. These papers with their work and identified gaps are discussed in the table below.

We also studied some existing applications which are very useful to people in the age group. These applications were majorly focused on the entertainment and healthcare of the elders. Some of them, which are relevant to the proposed solution are listed in the table below.

The above survey showed that there are many solutions provided for older adults, but they lack some or other things every time. Also, all the solutions focus on one problem at a time. study aimed to analyse production costs, incomes, breakeven point ,business efficiency, and inancial feasibility of a hydroponic vegetable business.

The total production cost for hydroponic vegetable production is Rp319,420,734 per hectare and the amount of income is Rp 688,579,266 or 68.31% of the value of revenue. R/C ratio is 3.16, which means the hydroponic vegetable cultivation business is efficient.but, the paper research is based on limited data sources and only conversation provided, no data usage.[1] paper is based on the financial analysis of Lively'Hood Farm. research is based on both the hydroponic and soil-based revenue calculations. Lively'Hood Farm will not be able to sell 100% of the produce it generates. percentage is expected to be higher in the early years of the business while the Farm is still establishing its brand and attracting customers.[2] In this paper the study is performed using a literature review, theoretical design of a system, and scenario-based assessment of hydroponic lettuce production. the hypothetical hydroponic system was feasible, and the economic factor was not a barrier. electricity generated through wind power was the primary type of energy to meet the demand of the system. the study focused on the case of only lettuce production in Sweden using a hydroponic system.[3] This study is focus on funding and risk analysis of hydroponics. The farmers in India are partly affected by this process but the company is taking care of the welfare part of farmers to some extent. government provides subsidies to farmers and startups in order to benefit to them. The company is not so good position but the future of company is bright as it is highly diversified and technically advanced.[4] Review focuses on hydroponics and the Technologies Associated for Medium- and Small-Scale Operations. review intends to close the gap between both fields, delving into the basics of hydroponics as a necessary step for the technologist to understand the needs of medium and small-size operations.[5]

B. Proposed work

The goal of a farmer in running a farming business is to establish a combination in the branch of farming that can later provide maximum income because income has the function to meet daily needs and can provide satisfaction to farmers, so they can continue their activities. revenue is the difference between revenue and total costs used during the production process. Income in farming is divided into two, namely gross income and net income.

a. Gross income is revenue that has not been reduced by production costs or what is usually referred to as revenue.

b. Net income is revenue that has been reduced by production costs.

The amount of income received by farmers depends on the amount of revenue and expenditure during the production process. Revenue in farming is the total income received by producers from production activities that have been carried out or have generated money that has not been reduced by costs incurred during production. Revenue is obtained from the multiplication of production results with product selling prices.

IV. IMPLEMENTATION

As stated in the introduction, several factors like human population growth and farmland degradation drive the global demand for more grains and food, pushing for higher yield and efficiency farming techniques, such as precision and urban agriculture. The restriction of space for cultivation in urban environments has called for efficient forms of cultivation. Based on hydroponics, technological innovation, and state of the art scientific knowledge, methods like vertical and indoor cultivation have extended rapidly, as attested by the market size and growth rate (CAGR 11.3%) of hydroponics, valued at USD 9.5 billion in 2020, and projected to reach USD 17.9 billion by 2026 , thanks to the growing acceptance of indoor farming, and innovative technological advances.

A. Operating Environment

The End Framework will be a form that works as a calculator for front users. data about crops and total cost which includes variable cost as well as fixed cost are fully verified by industries and companies. data will be fetch in form of APIs and for upgradation of data their will be administration penal.

The end-end framework must be optimized, so that it can work for calculating total cost as well as profit margin. The framework must take data about crop, life-cycle and number of plants as an input and provide the total estimated profit and loss, dependent on the plants and overall cost of implementation.

It has been assumed that all models provided by the user, to be integrated into ROI Calculator, have been written using NodeJS, and have functions, which takes list of inputs and provide the outcomes, as an result. It is also assumed, that the crops dataset, in case of calculation, has been verified by industries already, and can be updated with changes of prices.

B. Technology Used for Application

For this project, we have decided to work with the following technologies:

a. IONIC-ReactJS

b. NodeJS: Backend Process

c. MongoDB :Database Design and APIs

C. Methodology

a) Hydroponic technology has many advantages, including saving land or space, saving fertilizer and water ,being environmentally friendly, growing plants faster, quality of crop yields can be maintained, and quantity can be further increased. But the consequences, hydroponic vegetable business requires high costs in its production. The investment costs and operational costs required such as labour, the provision of irrigation facilities require a lot of costs, so the types of vegetables cultivated and the selling price of hydroponic vegetables are important to be considered by the hydroponic vegetable business man. Analysis of costs and income of farming is one way to compare costs and income from production process activities. Farming is said to be successful if the farm can fulfil the obligation to pay for the tools used, labour costs and can maintain the sustainability of the business.

The formulas for return on investment (ROI) on crops for hydroponic farming are as follows:

1. Initial investment costs: This is the total cost of setting up the hydroponic system, including equipment, materials, and labor. This can be calculated as:
Initial Investment Costs = Equipment Costs + Material Costs + Labor Costs

2. Operating costs: These are the ongoing costs of running the hydroponic system, including electricity, water, and nutrients. This can be calculated as:
Operating Costs = Electricity Costs + Water Costs + Nutrient Costs

3. Revenue: This is the income generated from the sale of the crops grown in the hydroponic system. This can be calculated as:
Revenue = Quantity of Crops Sold x Selling Price per Unit

4. Gross margin: This is the difference between revenue and cost of goods sold (COGS), and it is calculated as:
Gross Margin = (Revenue - COGS) / Revenue

5. Net income: This is calculated as revenue minus all expenses, including initial investment and operating costs. This can be calculated as:
Net Income = Revenue - (Initial Investment Costs + Operating Costs)

6. Payback period: This is the length of time it takes for the initial investment to be recouped. This can be calculated as:

Payback Period = Initial Investment Costs / Net Income

7. ROI: This is the net income divided by the initial investment, multiplied by 100 to express it as a percentage. This can be calculated as:
ROI = (Net Income / Initial Investment Costs) x 100

It is worth noting that these formulas are general and would need to be adjusted to suit the specific context of the hydroponic farming business and the crops being grown. Additionally, the assumptions and estimates used for costs and revenues, crop yield and other factors would have a direct impact on the final outcome of these formulas.

Type of Plants:

Leafy Vegetable
Eg. Palak, Mint, etc.

Hard Rooted Vegetable
Eg. Tomato, Strawberry, etc.

Calculating Weight (KG) in each type of plants:

a. For leafy vegetables we can calculate using Number of Plants/ Kilogram.

b. For other types of vegetables it can be calculated as Number of Kg/plant.

CALCULATIONS

Leafy Veg.

No. of Kg = No. of Plants / No. of plants/Kg

Hard Rooted Veg.

No. of Kg = No. of Plants * Kg/Plants Total

Return Crop Price = No. of Kg * Price/Kg

Total Return on Investment (ROI) =
Total Return Crop Price – Total Cost of Productions

CONCLUSION

In summary, revenue for farmers of hydroponic vegetables is calculated by subtracting production and marketing costs from the total sales received for the products. Vegetables grown using hydroponics in this research include mustard, lettuce, and celery. Factors that influence revenue include the selling price and number of vegetables sold, as well as the amount of capital available for creating the hydroponics module. Net income for hydroponic vegetable farming is calculated by subtracting total production costs from total farming revenue, and is affected by factors such as the total number of vegetables sold, production costs, and the selling price of the vegetables.

To calculate Return on Investment (ROI) using real-time data and input from farmers, it is important for farmers to focus on generating more revenue from their farmland. This can be achieved by analyzing the different factors that affect revenue and net income and using this information to make informed decisions about investment and production. By maximizing the ROI for hydroponic vegetable farming, farmers can improve the sustainability and profitability of their businesses, as well as make it easier for soilless systems to be adopted in the future.

In conclusion, revenue and net income for farmers of hydroponic vegetables are affected by a variety of factors, including the selling price, number of vegetables sold, and amount of capital available for the hydroponics module. By analyzing this data and input from farmers, the ROI for hydroponic vegetable farming can be maximized, leading to more sustainable and profitable farming practices. This will not only help individual farmers, but also support the growth of the hydroponics industry as a whole.

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Online Recruitment Mechanisms Through Web-RTC, AmazonAWS, and Applications of Gaze Tracking & RBAC.

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***Abstract*— The following paper goes into detail of the methodology followed in order to develop an automated interview system which can conduct multiple remote interviews at the same time. The multi-party bidirectional communication is powered by WebRTC. Our system is a full-fledged solution with ready-to-use data sets, questionnaires, coding problems & Test cases required in setting up an exam/interview. The program is equipped with capabilities of video recording, processing, and storage. It uses browser-based deep-learning models for gaze-tracking, expression evaluation, and facial recognition. Our paper focuses on the network requirements of such systems at scale using cloud processing and storage. We have also compared such innovative approaches of taking mass interviews/exams to traditional approaches, to determine the cost-time benefits of using such systems. We have justified ouruse of technologies in access control, architecture and NLP models using contemporary examples and references.**

***Keywords*— WebRTC, Peer-to-peer, Star-Topology, Cloud, RBAC, Browser**

I. Introduction

The market is filled with various webRTC applications[1]. Most of them are not suited for taking online interviews. Online interviews often fall prey to malpractices which can mislead recruiters in their recruitment process. The paper provides an implementation path for building a product that aims at filling this gap in the industry and stands out as the only viable option for firms in their online interview process. The paper discusses the development of a browser-based webRTC platform that helps in detecting these malpractices and gives a versatile environment for taking interviews. The product is built using MVC[2] architecture. In this paper, we discuss the implementation and working of WebRTC, the storage of data in a non-relational format, and AI-based verification systems. The platform comes filled with predesigned question banks based ontesting the candidates in a whole spectrum of technical and non-technical topics. We have directed our research in creating a safe environmentusing several anti-cheat techniques like encryption[3], browser monitoring[3], gaze tracking[5], etc. The product can take several rounds of interviews at once and allows the human interviewer to intervene and assist wherever required during the interview process.

II. RELATED WORKS

Our use of star topology for our WeRTC-based interview system stems from the need of having one to many bidirectional video connections as stated in the paper 'WebNSM: A Novel WebRTC SignallingMechanism for One-to-Many Bi-directional Video Conferencing'- " star topology provides better performance for different users, while each participant does not need a high capacity of CPU or high bandwidth."

The paper 'Cheating Detection in Browser-based Online Exams through Eye Gaze Tracking'(2021) discusses the idea of a browser-based gaze tracking cheating detection system "we generate an eye gaze dataset while a student faces an online examination.We then process and analyze this dataset to detect any misbehaviour during an online examination". Our system uses a similar technique which tracks the candidate's gaze from the candidate's browser, thus reducing the load on the server.

For conducting multi-party video conferencing on a large scale, the bandwidth requirement increases accordingly for both the server and the clients. The paper 'The impact of bandwidth limitations and video resolution size on QoE for WebRTC-based mobile multi-party video conferencing'(2015) discusses how different bandwidth limitations impact QoE(Quality of Experience) for different video resolutions.

For increasing the flexibility of the system, it is important that we operate the system in a cloud-based environment and hence we should know the techniques for cost estimation used in such environments as described in the publication 'Science Direct (2012) Composable cost estimation and monitoring for computational applications in cloud computing environments. We have to estimate the operational requirements using the determined workflows and dataflows.

III. ACCESS CONTROL MODULES

A. Model of access controls

The product is made to follow a B2B model of operations where the firm delivers services of the software to companies who require support in conducting large-scale online interviews. We have used an RBAC: Role-Based Access Control model[4] for access control inspired by a hierarchical system of control.

Fig. 1 Role-Based Hierarchy

The software contains a mechanism to allocate new users to categories to give them the required authorization. The roles exist as follows- Owner, Administrator, and Operator.

B. Roles

The owner and the administrator roles have effectively the same permissions over the software. They can examine the dashboard, add Job Posts, add exams, add candidates, perform screening, schedule interviews, review the evaluations and add content in the question banks. The owner has precedence over the administrator as the former can remove the latter. The administrator is responsible for assigning people the role of operators and can remove or add operators. The operator has effectively the same control to create job posts, and exams, add candidates, perform screening, view the dashboard, and schedule and evaluate the interviews. But the operator cannot remove job posts, exams, questions and candidates added by the other operators and neither can the operator schedule interviews for job posts created by theother operators.

This hierarchical structure of management provides effective and fast customer support, reduces redundancy, and makes scheduling and creation of exams faster.[4] As the question sets are reusable throughout the system and candidate information is readily available to larger groups of companies. This system of controls provides flexibility and ensures security for the smooth operation of thesoftware[4].

C. Authentication

We are following the widely used for security The process of adding the new operator requires the administrator to enter the email address of the operator into the system. The operator is then sent amail from the system through which they receive a link to a form from which they can set up their security details. The passwords are then hashed using the SHA-256 algorithm and stored in cloud storage. Thus each time when the operator wants to access the system they can do it via the website by just entering the security details. This system ensures that the software is highly accessible, robust and mobile[6].

IV. SYSTEM MODULES

The modules made for the smooth scheduling of theinterview process are the QA bank, exams, job

posts, candidates and screening modules. These Modules function as the primary points of interaction for the operator to add questions,candidates, exams and job posts.

A. QA-Bank Module

The QA bank exists as a repository for technical and non-technical questions of several domains which might be required while taking the exams/interview. The QA bank module allows the operator to add questions to a selected domain,such that the operator can specify its underlinedtopics, difficulty level, time limit, question type andscores. Tags can also be added to the questions to make them easily searchable. The system contains customized options for various question types. These are coding questions, SQL coding questions, multiple-choice questions, descriptive questions andfill-in-the-blanks type questions. For Multiple choice, descriptive and fill-in-the-blank questionsthe operator will provide an answer set so that it canbe checked against the answers given by the candidate during evaluation. For Coding and SQL coding Question, the output should be checked against the test cases provided by the operator along with appropriate timeout limitations. A Sample Code can also be given by the operator such that the candidate has a headstart on attempting the question. Our system has used — a type of online compiler[7] which can run code in python, java, c, cpp, Javascript, rust, go, ruby and c-sharp.

B. Exam and Job-Post modules

The exams and job posts module serves a similar purpose as they represent an opening or a role set up by the client (operator) on the behalf of a company. The Job-post Module allows the operator to create a Job post with attributes like Job title, company name, company logo, contact details, location, Job details such as skills, openings, salary range and Job description. The exam module allowsthe operator to create an exam with attributes like exam title, company name, exam logo and exam description.

C. Candidate module

The candidate module contains information of thousands of candidates, this module allows operators to add new candidate information to the software including the candidate's personal details like gender, date of birth, work experience, full name, email address, Salary expectation and skills. The candidate module also saves documents relatedto the candidates like the candidate's profile picture, resume, Identification file, voice sample and other files. The candidate module saves candidates' contact information like their address and phone number along with other details of their social media profile, Visa validity, higher education and other jobs the candidate has applied to.

D. Resume Screening Module

The resume screening is another crucial part of the software which in turn helps to shortlist candidates from the wider pool into a group of people with thelist of skills required in the Job. The resume screening module uses data from the candidate module and the exams/job post module to get resumes and required skills respectively.

V. DATABASES

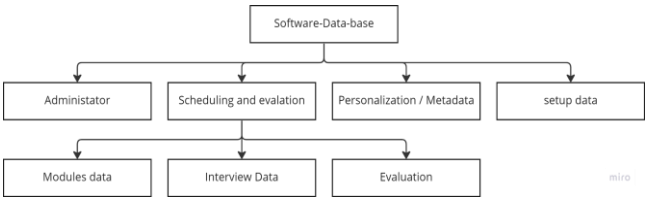


fig. 1 Database Structure

Before continuing with further modules & the functioning of the software it is crucial for us to understand the structure of the Database and itsunderlined components and to see the data flowbetween the modules. We are using a non-relational document database[8] that provides support for JSON-like storage. This storage has a flexible data model that enables users to store unstructured data as it provides full indexing support with replication with rich and intuitive APIs. The database can be distributed into four main subdivided and independent databases to focus on various aspects of the system such as administration, session planning, main data storage, metadata storage, website hosting, interview management, mediastorage and media processing[8].

A. Administrative Database

The first one of these databases is the administration database which contains information

about the clients who mainly consist of colleges and companies. This database also contains customer counters, customer manuals, website domain data and data about the various users(operators, owners and administrators). The administration database contains four sub-sections. The Website subsection contains information pertaining to the website attributes such as domain data, hosting data front-end and back-end files and stylesheets. The customer subsection contains data of the customer like the colleges and companies who have attributes like id, name, locations, requirements, openings etc. Customers also have their unique Ids and credentials which are stored in the next subsection which is Authorization. The authorization subsection contains Ids, email addresses and hashedpasswords of the various users like the owners, administrators and customers. Finally, the last subsection of the administrator database contains a manual, descriptions, and walkthroughs for the maintenance and administration of the software.

B. Scheduling and evaluation database

The second database is for scheduling and evaluation. This is the largest database in the software which contains data collected from different modules, the interview data and the evaluation data. The data from the modules have information about the candidates, the job posts, the exams, the QA banks and the resume screening. The interview data is a collection of files, readings and recordings taken during the interview/exam process. This includes the interview video media file, the email data, the session data, the candidate user preferences and the interview answers. The evaluation section of the scheduling and evaluation database contains files for AI face evaluation which contains gaze tracking and expression evaluation. Along with this, we have a subsection for AI speech evaluation which contains the evaluated data for the speech rate and speech-to-text function. The evaluation section also stores data for the weighted and grammatical evaluation of the descriptive answers and data collected from the Anti-Cheat-window detection system.

C. Personalization Database

The next database is for the generated data from user interactions during their subsequent sessions. This database contains the personalization and metadata about candidate settings and preferences, user settings and preferences, user-signup timings and session information.

VI. SCHEDULING AND INTERVIEW PROCESS

The Scheduling part of the scheduling andInterview process is handled by the scheduling module. The scheduling module allows the operator to schedule an interview/exam for the selected job post or exam. The operator is required to fill in a due date and time and specify the nature of the interview. The screened and shortlisted candidates can then be notified and added for the scheduled interview. The operator also has to add the required interview/exam questions from the QA bank. The scheduling module then proceeds to email the candidates a notification regarding the interview. By following the link the candidate can then proceed to join the exam/interview.

The exam/interview takes place on the browser in a room generated using peer-to-peer connections between the hosted server and the candidate's device. The system only allows connection once via the link[9], through a set of secure browsers like Google Chrome which allows for the use of our anti-cheat software[3]. This method is similar to the rooms created in popular services like google meet. Once the Candidate has joined they undergo a set of protocols which checks and validates their hardware[3], in order to fulfil the requirements posed by the system for the exam/interview. These protocols include the validation of their camera, microphone, screen-sharing, window-lock, facial image capture[3] and voice sample confirmation[10]. The candidate can also confirm the language settings for the rest of the interview. They are also requested to open their task manager and end all the other application tasks such that the exam/interview process is more efficient and free of any malware interference. Once the candidate has performed all these validations they are allowed to start their exam/interview. The timer turns on once the interview/exam is started. The candidate has to then complete their interviews while being monitored by the gaze tracking and expression detection software[3]. A human proctor can also enter the interview at any time to add new questions

or ask other questions while the scheduled interview is taking place. The human proctor is mainly the operator who scheduled the interview and they can join by clicking the link for the interview/exam in the scheduled section of the website. Once they click, they join the interview via the server and generate another peer-to-peer connection on the server side. Our interview/examination module is equipped with an online compiler that runs the coding questions with regard to the set timeouts and test cases. These compilers handle several programming languages like Python, Java, C++ and can also run SQL queries.The exam/interview is concluded once the time runs out or if the candidate answers all questions and ends the process or if the human proctor closes the interview.

VII. EVALUATION

The Evaluation Module displays the information collected during the interview about the completion of the exam/interview[3]. It gives technical feedback on the candidate's performance and evaluates their score for every question. The Evaluation module comes with several features containing Artificial Intelligence powered evaluation techniques[3]. It matches the candidate's photo id with their on-camera face[3]. It also compares the candidate's pre-recorded voice with the interview voice[10]. The Evaluation module displays details about any suspicious softwaredetected while conducting an Interview/exam[3]. Suspicious software includes any software that alters the transmission of the video feed, or records the screen or another window/tab opened while taking the interview[3]. The interview module displays the result from Gaze tracking[3] done during the interview. It performs post-interview processing of the interview/exam video feed and evaluates the candidate's facial expression to track their confidence and focus[3].

VIII. WEB-RTC

Web-RTC[1] comprises a set of novel technologies which allow the embedding of audio and video communications between applications. It allows browsers to exchange media information in a peer-to-peer fashion.

A. Web-RTC Architecture

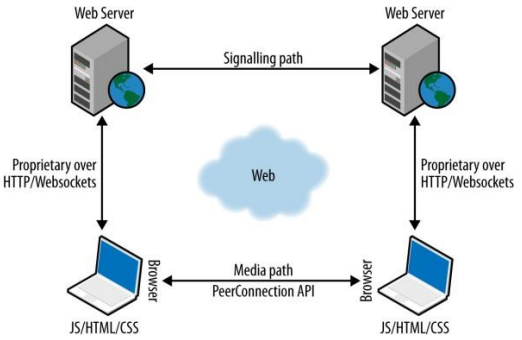


Fig. 2 Web-RTC Architecture.

For the implementation of the WebRTC Trapezoidconcept, a web application that is downloaded from a separate web server is running in both browsers. Communications are started and stopped using signalling messages. They are sent across web servers using the HTTP or WebSocket protocol, where they can be edited, translated, or managed as necessary. It is important to note that WebRTC does not standardise browser-to-server signalling because it is viewed as an integral component of the application. A peer connection, which affects the data stream, enables media to move between browsers without the need for intermediary servers. A common signalling protocol, such as SIP or Jingle, can connect the two web servers (XEP-0166). If not, they can employ a private signalling protocol.

B. Implementation of WebRTC for an Interview Web Application.(topology)

For the implementation of an online interview system, a peer-to-peer connection has to be established between the interviewees and interviewers, and the audio and video streams generated also have to be stored on the server. Using the traditional topology of peer-to-peer connections in a room we end up with a mesh topology in which the server, as well as the users, have to sustain large bandwidth while the interview is taking place. We assume that the devices of the users(candidates and proctors) cannot handle large bandwidth. Thus, we adopt a star topology[] with the server at its centre and peer-to-peer connections between every user and the server so that the burden of streaming large amounts of data is passedon to the server rather than the user.

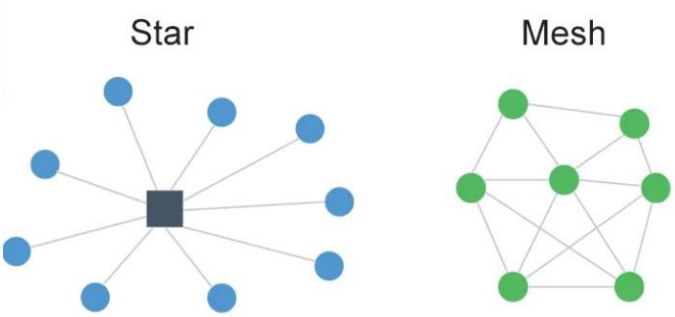


Fig. 3 Star Topology and Mesh Topology

For the system, mesh topology[] proves to be difficult to scale. This is because of the increased load on candidates and proctors. Each user must constantly be active to relay messages across the mesh and the large relay of traffic on one node of the mesh. This will quickly drain the capacity of the node. Thus, to solve this problem we use star topology which makes it easy to add new nodes as it is easier for installation and reconfiguration of the streams and it is more reliable as nodes are independent of each other. Failure of one will not affect the functioning of the overall network.

C. Bandwidth requirement for the video stream.

Thus, we get a UDP[11] transfer network in which a large amount of data is transferred to and from the server. This data usually consists of two video streams, one from the webcam of the candidate/proctor and one from the shared screen of the user. For our software, we have assumed that these streams have a video quality of 720p and a refresh rate of 30fps. For two such streams this results in a bandwidth requirement of 5.36Mbps and 7.0 Mbps for uploads.

D. Maximum Scenario

Depending on the number of connections between the users and the likelihood of the proctors sharing their screen and video we obtain 3 possible scenarios. A maximum scenario in which each of the proctors is sharing their screens and webcam feed with each of the other proctors and the candidate.

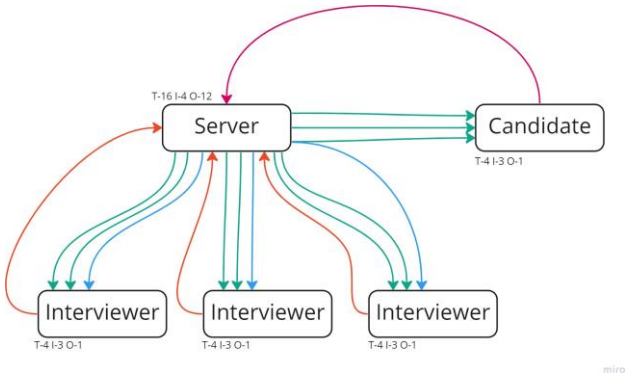


Fig. 4 Maximum Scenario with all proctors sharing their screens.

As we can see in fig.3, the magenta arrows indicate the UDP streams coming from the candidate to the server, the orange streams coming from the proctors to the server and the green, and blue arrows indicate the output streams relaying the video streams to the users from the proctors and candidates respectively.

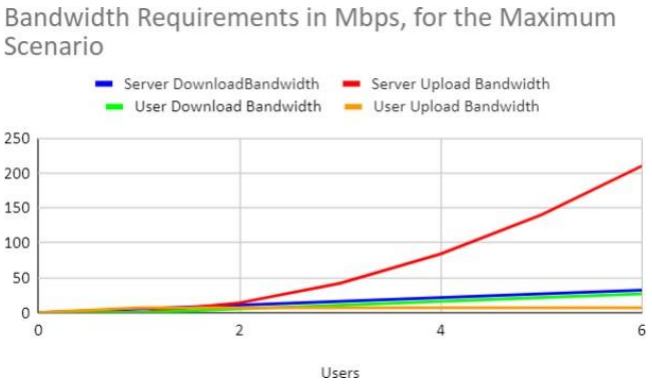


Fig. 5 Graph showing the Number of users vs Bandwidth requirement for the maximum scenario.

As you can follow from this chart, the server uploadbandwidth increases at the rate given by the formula

$$2 \times UPBW \times (N^2 - N)$$

N: Number of users

UPBW: Upload bandwidth (3.5 Mbps||for a stream of 720p 30fps)

Similarly, the server download bandwidth can beshown using this formula

$$2 \times DLBW \times N$$

DLBw: Download bandwidth(2.69 Mbps||for a stream of 720p 30fps)

The user upload bandwidth remains constant, at thevalue equivalent to

$$2 \times UPBW$$

as each user only uploads two video streams each but the user download bandwidth increases with a rate of

$$\text{DLBW} \times 2 \times (N - 1)$$

as each user will download the stream of everyother user.

E. Minimum Scenario

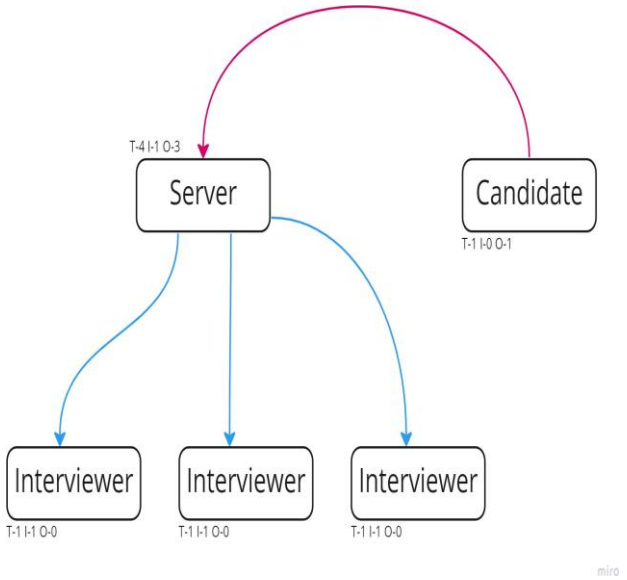


Fig. 6 Minimum Scenario with only candidate sharing video stream.

Fig. 5 shows the minimum scenario in which only the candidate is sharing their screen and webcam feed while the proctors only receive the stream.

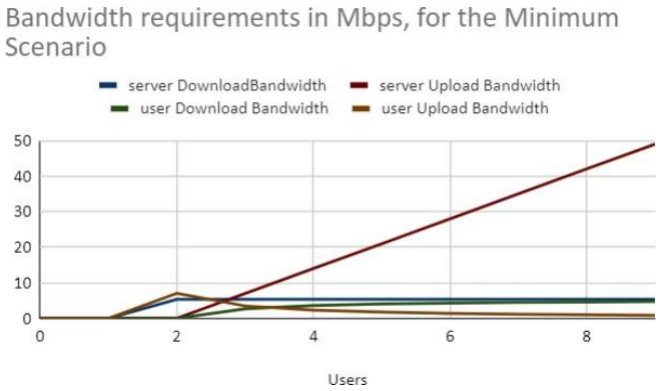


Fig. 7 Graph showing the Number of users vs Bandwidth requirement for minimum scenario

In this scenario, the number of input streams of the server remains constant and thus the bandwidth download bandwidth requirement for the server
also remains constant at 2 × DLBW. The number of upload streams from the server increases linearly with the increase in the number of proctors at the rate of

$$2 \times \text{UPBW} \times (N - 1)$$

The total user(proctor and candidate included) upload bandwidth per user decreases as each new user joins as only the candidate is sharing the stream. While the total download bandwidth peruser remains mostly the same.

F. Average Scenario

Both of these scenarios are extreme cases and extreme examples of user behaviour. In reality, the proctors would sometimes share their webcam feed and screens. Thus, the mean or average of both of these extreme scenarios is used to stimulate the average behaviour during the interview/exam process. The figure below represents one such case for an average scenario interview with three proctors.

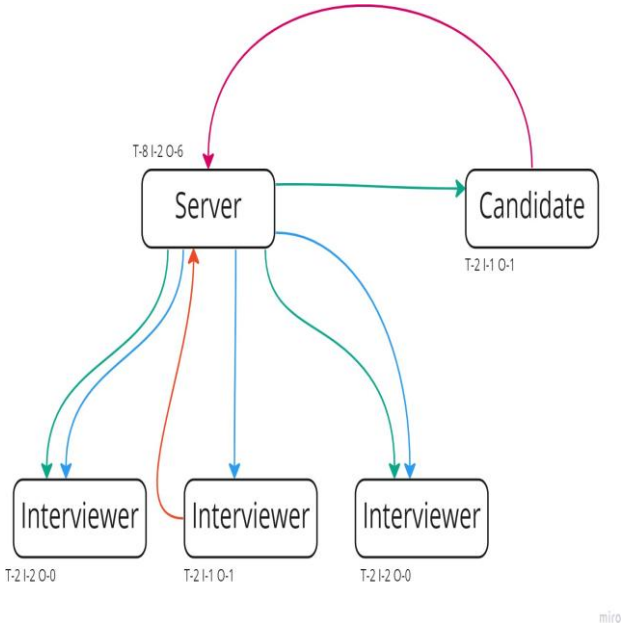
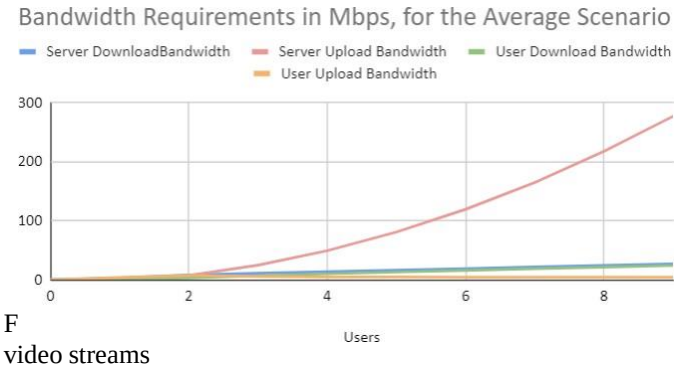


Fig. 8 Average Scenario with some interviewers sharing their video streams.

fig.7 is the graphical representation of the bandwidth requirement in Mbps in the assumed median scenario for varying numbers of users givenby the common formula of

$$(\text{MaxBW} + \text{MinBW})/2$$

MaxBW: Maximum bandwidth
MinBW: Minimum bandwidth



F
video streams

IX. RATE OF MONITORING

In the real world, the system should be capable of conducting multiple interviews and exams simultaneously. Each one of those interviews/exams would have one candidate and their connection to the server. The number of interviewers/proctors joining the interviews may vary according to the organisation's requirements. Our system is built as such to allow for a single proctor to join any interview as needed. There can also be multiple proctors joining a single interview to monitor the candidate's conduct. Therefore, to calculate bandwidth requirements for an average interview in the system, we must know the number of proctors joining each interview. This can be done by simply calculating the rate of monitoring. The rate of monitoring(Rm) is the number of proctors over the number of ongoing interviews. It is important because it directly affects the server download and upload speeds. The effect of the rate of monitoring on the bandwidth requirement can be directly seen using this chart.

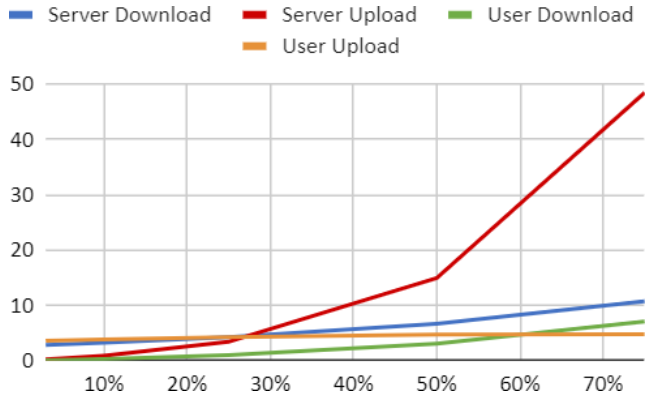


Fig. 10 Graph showing the Rate of monitoring vs Average Bandwidth Requirement.

Here, the x-axis is the rate of monitoring and the y-axis is the average bandwidth requirement per interview(maximum of 8 proctors) in Mbps. The average bandwidth requirement per interview for a maximum of 8 proctors is calculated using this formula,

$$\sum_{n=0}^{n} R_n \times Bn / \sum_{n=0}^{n} (Rm_n)$$

n: Number of proctors
Rm: Rate of monitoring
Bn: Bandwidth required for 'n' number of proctors.

as the server upload bandwidth increases at the rate of $x \times (x - 1)$ and is not convergent for higher rate of monitoring. One can adjust the values of the rate of monitoring and the number of users to find the optimum mix. For our calculations, we have taken the value of a 5% rate of monitoring and a maximum limit of 8 proctors[12]. The system can still work fairly well up to a 25% rate of monitoring. Beyond that, the bandwidth requirement rises exponentially.

X. MEMORY REQUIREMENT AND COSTING

Our system is designed to store designated data of the interviews/exams in cloud storage. We have used the model of S3 storage given by Amazon AWS[13] to determine the memory costs of runningthis system at scale. In the previous passage, we used the monitoring rate to calculate the average bandwidth requirement of the interviews. Using this, we can estimate the total memory required to store the video footage for the interviews in our system. Our system uses three types of storage, the first is Amazon S3 Standard infrequent access- For long-lived but infrequently accessed data that needs millisecond access which has a per month cost of $0.0125/GB. The second one, Amazon's S3 Glacier Flexible Retrieval (Formerly S3 Glacier)***- For long-term backups and archives with a retrieval option from 1 minute to 12 hours which has a per month cost of $0.0036/GB Finally, the last type of storage used is Amazon's S3 Glacier Deep Archive*** - For long-term data archiving that is accessed once or twice in a year and can be restored within 12 hours with a cost of $0.00099/GB. Forthe 720p 30fps footage of webcam and screen recording, for an average of 5% rate of monitoring with a maximum of 8 proctors per interview, we get the per hour memory collection of 10.388GB using this formula.

AvgIHR = Average DLBW × 60 × 60 / 1024 .

where the *Average DLBW* for the server is equal to 2.95Mbps and the *Average UPBW* for the server is equal to 0.397 Mbps. We are using the standard infrequent access memory to store the data of the interview for one day during which it will be processed to check for expressions tracking, facial recognition, gaze tracking and screen monitoring. Then the data would be transferred to the Glacier flexible retrieval storage so that the user can access it within the set period of 1 month. This would result in a cost of $0.04172 per hour of an interview using the formula,

$$\text{Memory Cost} = \text{AvgIHR} \times ((\text{SIAM}/30) + \text{GFRM}) 10.388 \times ((0.0125/30) + 0.0036)$$

AvgIHR: The net data consumption for an average interview for a specific rate of monitoring. (here 5%)
SIAM: Standard Infrequent access per GB per month
GFRM: Glacial Flexible Retrieval per GB per month

We can also store data in the Glacier Deep Archive for each additional month at a cost of $0.010284 per hour of interview.

XI. DATA TRANSFER AND PROCESSING COST:

While the data incoming from the internet to EC2is free, we sustain a $0.05 per GB cost for sending data out from Amazon EC2 to the internet. This totals up to $0.0697 per interview hour for our system. Along with this, we must also account for the cost of running the instances. Each instance of m6in.32xlarge in Amazon EC2 provides the user with 128 core vCPU, 512 GB of RAM, a bandwidth of 200GBps and instance storage of elastic capacity with a bandwidth of 80GBps. For each interview, we estimate to require up to 0.008 of such instances when we account for the processing requirements ofthe various AI tools, Video Streams and other processing tasks. The cost of one of these instances is equal to $8.91072 per hour. This amount totals
$0.00718 per hour of interview.

XII. RESULTS AND DISCUSSION

The above discussion focused on the various costs involved with taking these online interviews at scale using our interview system. The total cumulative technical running costs of taking these interviews through our system amounts to a sum total of $0.11856 per interview hour at a 5% rate of monitoring using the formula:

$$\text{Total Cost} = \text{Memory cost} + \text{Data-transfer cost} + \text{Instance cost}.$$

To understand how this might be beneficial to a company transitioning to our AI-based interview system, we need to focus on finding if this switch would result in a more efficient hiring process. To measure success, the company would be using ‘the number of hours saved’ as the main indicator. Thus a cost-benefit analysis could be used to prove that our system is better than the traditional method.
To do this, we will use the example of company X wishing to interview 5000 applicants for an opening of 50 posts. Our AI-based resume screening system could first help them shortlist about 4000 out of those 5000 candidates to be taken in for the interview. Out of these 4000 candidates, 100 could be shortlisted after the first round of technical(online) interviews to fill in for the final round of in-person interviews lasting about 1hr. Let us suppose that the company has a team of 20 staff members to conduct the interviews. If each primary interview takes 4 hours of time. Then based on this calculation, while using our system at a 5% rate of monitoring it would take about 10 batches to complete the interview process and about 16000 hours of total interview time. If we multiply it by the system’s cumulative operational costs of $ 0.11856 we get a total cost of $1896.973 for the interviews plus $164.55 cost of each additional month of storage. While this might seem expensive we should also take into consideration the total amount of working hours saved by the recruitment team.
Using our system with a 5% Rate of monitoring, it will take the interview team 10 batches(4000*0.05/20) of 4hr interviews in the primary round and use face-to-face interviews for the next 5 batches(100/20) of the 1hr of final round interviews, it would take the interview team of 20 people a total of 45 working hours to complete the interviews, which is approximately 5.625 working days.
While using the traditional method of only taking one on one interviews. would take the same team,

200 batches(4000/20) of 4 hrs to take the primary round and 5 batches(100/20) of 1 hr final round, resulting in a total of 805 working hours or 100.625Working days to complete the task. Thus in this given example, the total resultant time saved is equal to 15200 working hours which is equal to 760 hours for each member of the 20-member recruitment team, which is about 95working days(each of 8 hrs) saved per teammember.

Thus even while considering the additional operating costs, support costs and maintenance costs and time required for scheduling the interviews(maximum 5 hrs) we should be able to at least see 93%+ time-saving in the whole interview process for the recruitment teams for a maximum cost of approx $0.45per interview(4hr each) in the given hypothetical example.

XIII. CONCLUSIONS

From this research we have not only provided the reader with a complete description of our software along with its modules and databases but we have also given a detailed summary of the mechanism, topologies and technologies used in building this system. We have done a comprehensive study of thecosts that go into operating these mechanisms on a per-interview/exam basis and we have compared it with the traditional methods to obtain meaningful insights about the effectiveness of using our system.The descriptions included in this paper covers Browser based gaze tracking and facial recognition, Memory calculations for big data models, Star topology-based study of UDP peer-to-peer connection bandwidth requirements, calculations related to the rate of monitoring etc. We have also uncovered the mechanisms around one of the most crucial technologies that is Web-RTC and have provided a summary of a hypothetical example of how such a technology can provide a cost and time-efficient mechanism for conducting interviews and exams in the real world while reducing the risk and cheating discrepancies associated with web browser based online interviews and exams.

XIV. ACKNOWLEDGMENT

This paper would not have been possible without the unwavering support from Hiringtek.inc and Thakur College of Engineering and Technology's Computer Engineering Department. We would like to give special thanks to our guide and mentor Dr Megharani Patil(Associate Professor - Computer Engineering Dpt and I/C HOD of AI & ML) and Director of Development and Quality Assurance at HiringTek Pvt. Ltd Mr S.P. Laxman.

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Physioarc: a physio & diet master using ai

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Abstract— **This research paper focuses on the development of a system that can assess physiotherapy exercises to ensure that patients are performing them correctly and avoiding injury. The system uses modern technology to estimate the geometry of a person performing an exercise in a video uploaded by the user. The OpenPose model is used to extract points from the video, and the system provides feedback to the user on the accuracy of their performance. Physiotherapy is an important medical science that helps patients recover from injuries and improve their potential through controlled exercises. However, many patients face difficulties in accessing physiotherapy sessions due to factors such as cost, availability, and accessibility. This can lead to patients attempting to perform exercises on their own, which can worsen their conditions. The proposed system acts as a personal virtual trainer that guides patients, provides instant feedback, and helps them perform exercises correctly on their own. The objective of this project is to help patients perform exercises correctly, avoid injury due to incorrect posture, and explore existing systems to validate the proposed results. The system uses MediaPipe models for pose detection and dynamic pose detection through the OpenPose network. It provides real-time pose correction with the help of virtual assistance. The system can detect the most common exercises and can function on any Windows system with a GPU. By providing patients with accurate feedback on their exercise performance, the system can help them recover faster and avoid injury. The proposed system has the potential to revolutionize the field of physiotherapy by making it more accessible and affordable for patients. In conclusion, this research paper proposes a system for assessing physiotherapy exercises that can help patients perform exercises correctly, avoid injury, and recover faster. The system uses modern technology and machine learning to provide real-time feedback and correction to patients performing exercises on their own. The proposed system has the potential to improve the accessibility and affordability of physiotherapy for patients, and it could have a significant impact on the field of medical science.**

Keywords— ***Physiotherapy, OpenPose, MediaPipe , GPU, affordability***

I. INTRODUCTION

Physiotherapy is a medical science that helps individuals recover from injuries and disabilities through controlled exercises.[1] These exercises are typically performed in a clinic under the guidance of a therapist, who provides verbal or physical instructions to ensure the patient performs the exercise correctly. However, accessing physiotherapy sessions can be challenging for many individuals due to factors such as cost, availability, and accessibility. This can lead to patients attempting to perform exercises on their own, which can worsen their conditions or lead to injury. To address this issue, this research paper proposes a system for assessing physiotherapy exercises that can help patients perform exercises correctly, avoid injury, and recover faster. The proposed system is a personal virtual trainer that guides patients, provides instant feedback, and helps them perform exercises correctly on their own. The system uses modern technology to estimate the geometry of a person performing an exercise in a video uploaded by the user.[3] The OpenPose model is used to extract points from the video, and the system provides feedback to the user on the accuracy of their performance. MediaPipe models are studied for pose detection, and the system is developed for dynamic pose detection through the OpenPose network. It provides realtime pose correction with the help of virtual assistance. The objective of this project is to help patients perform exercises correctly, avoid injury due to incorrect posture, and explore existing systems to validate the proposed results. The system can detect the most common exercises and can function on any Windows system with a GPU. By providing patients with accurate feedback on their exercise performance, the system can help them recover faster and avoid injury. In recent years, motion recognition research based on machine learning has developed cost-efficient, accurate, and stable action recognition systems from video data in controlled environments. These systems have the potential to revolutionize the field of physiotherapy by making it more accessible and affordable for patients. The proposed system can also benefit therapists by allowing them to remotely monitor their patients' progress and provide feedback on their exercises. This can help therapists provide more personalized care to their patients, and improve the overall effectiveness of physiotherapy treatments. There are several challenges involved in developing such a system. One of the main challenges is the accuracy of the pose detection models. The OpenPose model used in this system has been trained on large datasets and has been shown to have high accuracy in detecting poses in images and videos. However, there may still be cases where the model fails to detect the correct pose, leading to incorrect feedback for the user[4]. Another challenge is the development of a user-friendly interface that can be easily used by patients. The system should be easy to navigate and provide clear instructions to the user. The feedback provided by the system should also be easy to understand, even for individuals who are not familiar with physiotherapy exercises. To validate the proposed system, existing systems in the field of motion recognition and physiotherapy should be explored. The proposed system should be compared to these existing systems to assess its accuracy, usability, and effectiveness in helping patients perform exercises correctly[9]. In conclusion, the proposed

system for assessing physiotherapy exercises has the potential to revolutionize the field of physiotherapy by making it more accessible and affordable for patients. By providing patients with accurate feedback on their exercise performance, the system can help them recover faster and avoid injury. The system can also benefit therapists by allowing them to remotely monitor their patients' progress and provide feedback on their exercises. The development of such a system is not without its challenges, but the potential benefits to patients and therapists make it a worthy endeavousrs. .

In this paper ,the proposed system act as a personal virtual trainer that would guide , provide instant feedback and helps them to do exercise by themselves

1.1) Project Objective:

The objective of project are as follows:

- To help the patient to do the exercise correctly.
- To avoid the injury to the patient by doing wrong posture .
- MediaPipe models are studied for pose detection.
- To explore the various existing system and validate the proposed result.
- The approach is developed for dynamic pose detection by already trained OpenPose network.
- It provides current pose correction with help of virtual assistance.

II. LITERATURE SURVEY

Automatic squat posture classification and physical exercise correction using deep learning and machine learning approaches. In one study, traditional machine learning was compared to deep learning for squat posture classification using inertial sensors. The study found that a combination of five inertial measurement units (IMUs) mounted on different body parts collected data on acceleration and gyroscope, and deep learning produced better results than traditional machine learning. Another study introduced a pose trainer app that uses modern pose estimation technology to evaluate the vector geometry of a user's exercise pose and provide feedback to improve their form. Additionally, a convolutional neural network was used to classify images of three categories of physical exercise postures: hips to low, hips to high, and proper. The neural network worked in realtime through a smartphone app and provided solutions for posture correction in various environmental situations. Another study used deep convolutional neural networks for video analysis of human pose detection, which presented a

unique method for automated speech-based depression screening[14]. The researchers conducted extensive tests on the distress analysis interview corpus (DAIC) to demonstrate the use of their categorization system and assess the outcomes. The problem statement presented in this project addresses the challenges of receiving proper medical attention during the COVID-19 pandemic when people may be hesitant to visit hospitals for fear of contracting the virus.[3] As a result, many individuals may turn to personal trainers for physical therapy, but the cost may be too high for some. This situation has resulted in an increased need for athome exercise correction and posture evaluation. The proposed work aims to address this issue by utilizing a pretrained real-time system called OpenPose for pose estimation and posture evaluation component recorded videos of correct and incorrect exercises to evaluate posture identifier. The authors also proposed the use of dynamic time warping (DTW) to balance the key points of the same exercise to compare data sets. The dataset focused on eight shoulder and knee exercises performed by actors with different postures and frequencies. The system utilized four exercises to improve posture and eventually recover from injuries. Overall, the literature survey highlights the potential of using deep learning and machine learning approaches for physical exercise correction, posture evaluation, and classification of physical exercise postures. These methods can be used to enhance at-home exercise programs and aid in injury prevention and recovery.

The use of machine learning techniques for the recognition of human actions has gained significant attention in recent years. In particular, the use of convolutional neural networks (MediaPipe s) has shown promising results for pose detection in videos. Pose detection involves estimating the 2D or 3D coordinates of the human body joints from an image or video. The extracted joint coordinates can then be used to determine the pose of the human body, which can be further used for action recognition and assessment. One of the popular deep learning models for pose detection is the OpenPose model. It uses a multi-stage MediaPipe architecture to estimate the joint locations of the human body. The model has been trained on a large dataset of human poses and can detect the pose of a human body in real-time. Several studies have explored the use of the OpenPose model for various applications such as human activity recognition, sports analysis, and physiotherapy exercises assessment. A study by Huynh et al. [1] proposed a physiotherapy exercise assessment system using the OpenPose model. The system used a Kinect camera to capture the patient's movements, which were then processed by the OpenPose model to estimate the joint coordinates. The system provided real-time feedback to the patient by comparing their movements with the correct posture of the exercise. The study showed promising results in terms of accuracy and usability of the system. Another study by Huang et al. [2] proposed a virtual reality-based physiotherapy exercise system using the OpenPose model. The system used a virtual reality headset and motion controllers to simulate the physiotherapy exercises. The OpenPose model was used to track the patient's movements and provide real-time feedback on their posture. The study showed that the virtual reality-based system was more engaging and effective than the traditional physiotherapy exercises. A recent study by Li et al. [3] proposed a deep learning-based physiotherapy assessment system using a combination of the OpenPose model and a recurrent neural network (RNN). The system used the OpenPose model to extract the joint coordinates from the video, which were then fed into the RNN for action recognition and assessment. The study showed that the proposed system outperformed other state-of-the-art methods for physiotherapy exercises assessment. Overall, these studies have shown that the use of deep learning models such as the OpenPose model can provide accurate and real-time assessment of physiotherapy exercises. The proposed project aims to build on these studies by developing a system that can assist patients in performing the exercises correctly and avoiding injuries due to wrong postures. In addition to the OpenPose model, other deep learning models such as the Spatial Temporal Graph Convolutional Network (ST-GCN) and the Graph

Convolutional Network (GCN) have also been used for pose detection and action recognition in videos. These models have

shown promising results for various applications and can be explored in future research work.

Automatic Squat Posture Classification Using Inertial Sensors: A Deep Learning Approach [1]. Traditional machine learning is use to compare deep learning squat posture .Supplementary, sensor installation is done on the best site. 39 healthy subject were selected and Five (IMUs) inertial measurement units which are mounted on left thigh, right thigh, left calf, right calf, and lumber area so that they can collect data accelerometer and gyroscope. Each subject was asked to do six reps of correct squat and six reps of wrong squats which is standard among the beginner exercisers. The result comparison is done through deep learning and traditional machine learning. One inertial measurement units, or a combination of two or five inertial measurement units ,were operated to get each result. Pose Trainer: Using Pose Estimation to Correct Exercise Posture [2]. User exercise pose is identified using new app, Stance Trainer that give individualized detailed recommendations to improve the user form. Modern pose estimation technology which evaluate the vector geometry of pose that will deliver useful feedback by the exercise. Neural Networks for Physical Exercise From Correction [3]. Hips to low ,hips to high and proper are 3 category in which convolution neural network classify images. The real-time posture correction input is given by neural network which works through smartphone app. Various environmental situations are choosen to assess the performance of system and solution is provided by convolutional neural network. The trained network is in the mobile network. Deep learning and neural network based computer vision approaches[4]. Deep neural network is used for video analysis of human pose detection.

III. PROBLEM STATEMENT

The COVID-19 pandemic has caused a shift in healthcare practices and has affected the way people access medical care. Due to the fear of contracting the virus in hospitals or clinics, patients are less likely to seek medical attention for non-COVID related issues, such as physical injuries. This has created a problem for those who have suffered physical injuries but are hesitant to visit hospitals or clinics due to the pandemic. Moreover, personal trainers or physiotherapists may charge high fees that are not affordable for everyone. As a result, there is a need for an affordable and accessible solution for those who need physiotherapy or rehabilitation services. In addition, injuries can occur not only due to accidents but also during exercise or physical activities. Some injuries may result from improper posture or incorrect execution of exercises. For example, lifting heavy weights without proper guidance or not performing warm-up exercises before an intense workout can lead to muscular injuries or joint problems. Therefore, it is important to ensure that individuals exercise with proper form to prevent injuries and to recover from them. To address these issues, the proposed solution is to develop an automated system for posture correction and evaluation. The system will be designed to monitor and correct the user's posture during exercise or physical activity using sensors and machine learning algorithms. The user will receive real-time feedback on their posture and form, which will help them to exercise with proper form and avoid injury. To achieve this goal, the system will use inertial measurement units (IMUs) to collect data on the user's movement and posture. IMUs will be placed on various body parts, such as the left and right thighs, calves, and lumber area, to capture data on the user's posture and movement during exercise. The data collected by IMUs will be analyzed using machine learning algorithms, such as deep neural networks and convolutional neural networks, to identify the user's posture and provide real-time feedback on their form. This feedback will be delivered through a smartphone app, which will provide individualized recommendations to improve the user's form and posture during exercise. Moreover, the system will use pose estimation technology, such as OpenPose, to detect human body keypoints in videos. This will enable the system to accurately evaluate the user's posture and form during exercise. The system will also use dynamic time warping (DTW) to compare key points in the data set and measure the nonlinear similarity between two time series. This will help to ensure that the system can accurately match the user's movement with the correct exercise and provide real-time feedback on their form. The proposed system will focus on exercises that are commonly associated with injuries, such as those involving the shoulder and knee. The system will utilize a home-based physiotherapy exercise dataset, which includes eight exercises focused on the shoulder and knee. The dataset includes videos of actors performing the exercises with different postures and frequencies, and both RGB and gray-level videos will be stored. The system will focus on four exercises to ensure that the feedback provided is accurate and relevant to the user's needs. In conclusion, the proposed solution aims to provide an affordable and accessible system for posture correction and evaluation that can be used by individuals to exercise with proper form and avoid injury. The system will use sensors and machine learning algorithms to monitor the user's posture and provide real-time feedback on their form. The system will also use pose estimation technology and DTW to accurately evaluate the user's posture and match their movement with the correct exercise. With this system, individuals can exercise safely and effectively, even during the COVID-19 pandemic, without the need for expensive personal trainers or physiotherapist

The system is designed to be affordable and accessible, allowing people to exercise safely from home without the need for expensive personal trainers or physiotherapists. The system consists of five inertial measurement units (IMUs) mounted on the left and right thighs, left and right calves, and lumber area of the back. These IMUs collect data from accelerometers and gyroscopes, which is then analyzed by deep learning algorithms to classify exercise form into correct or incorrect categories. Users can receive feedback on their form in real-time through a smartphone app, which offers individualized recommendations for improving form. To ensure accurate posture classification, we compared the performance of deep learning algorithms to traditional machine learning algorithms. We found that deep learning algorithms outperformed traditional machine learning algorithms when using one, two, or all five IMUs. Our system is therefore designed to use deep learning algorithms for accurate posture classification.[9] To further improve the accuracy of our posture correction system, we utilized a pretrained real-time system called OpenPose for pose estimation. OpenPose is a state-of-the-art pose estimation algorithm that can detect human body keypoints in videos. By using OpenPose, we can focus on the actual evaluation of exercise posture rather than developing a pose estimation algorithm from scratch. We recorded videos of ourselves performing exercises, including our best effort to perform the exercise correctly and intentionally incorrect examples. We evaluated our posture identifier in different ways depending on the algorithm. For heuristic algorithms, we fed in all videos

for evaluation, while for machine learning algorithms, we evaluated by splitting our video dataset into train and test sets and reporting results on the test set. To balance the key points of the same exercises, we used dynamic time warping (DTW) for comparison in the data set. DTW is a technique that measures the nonlinear similarity between two time series. It overcomes the problem of phase shift of two similar sequences and matches troughs and peaks with the same pattern, ensuring that there are no left-out points for both curves. DTW is applicable in systems like the stock market, computer vision, and our posture correction system. Our system focuses on four exercises from the home-based physiotherapy exercise dataset: seated legs, swing arms, circle arm, and static triceps. The exercises are performed with different postures and frequencies, and both RGB and gray-level videos are stored. By using this dataset and the DTW technique, our system can accurately classify exercise form and provide real-time feedback on how to improve posture. In conclusion, our automated exercise posture correction system aims to provide an affordable and accessible alternative to expensive personal trainers and physiotherapists. By using inertial sensors, deep learning algorithms, and OpenPose for pose estimation before you begin to format your paper, first write and save the content as a separate text file.

IV. Proposed Sysytem

As mentioned in the problem definition, there is a need for a system that allows patients to receive physiotherapy treatment without having to visit a hospital or clinic. This proposed system is designed to provide patients with exercises and proper posture to aid in their recovery from an injury. To use the proposed system, the user will need to have a camera set up to capture their body and the exercises they perform. The camera can be any type, and the video can be of any quality, as long as the user's body and exercises are clearly visible in the frame. The video can be adjusted using any software, and Open Pose software supports all video formats uploaded to the system. The Open Pose model is used to detect the key points from the video uploaded by the user, and the model can easily identify the key points from any format of the video. The model takes into consideration 17 to 18 points such as knee, eyes, hips, elbow, shoulder, feet, etc., making it easy to install and run without requiring a huge load of the system.

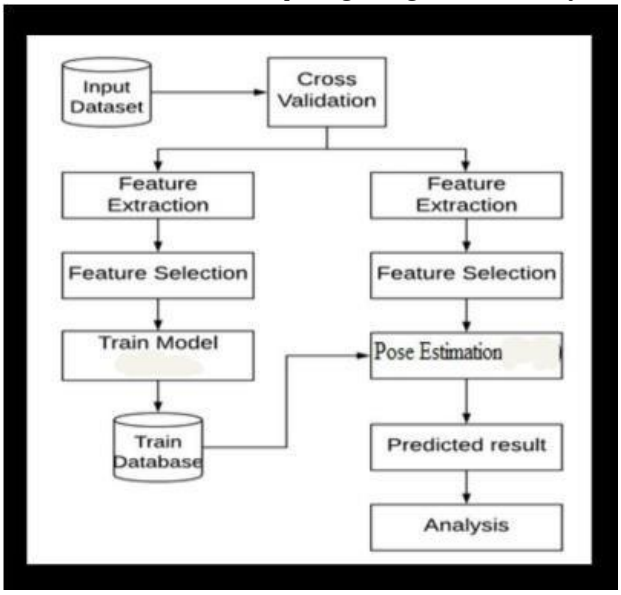

Figure1. The Architecture of Physioarc through mediapipe model.[7]

The output of Open Pose consists of predicted coordinates of key points for the user's body. As the system is used by users of different shapes, heights, sizes, weights, and distances from the camera, the accuracy and key point score can be largely affected by these factors. To minimize the effects of these factors, the sum of the square of the key is made equal to one by applying L2-Normalization on the key point obtained from Open Pose. To provide feedback to users, the system compares the user's key points with data key points, and generates feedback accordingly. The dynamic time feature of the system allows for real-time feedback to be provided to the user, making it easier for them to adjust their posture and exercises as needed. Overall, the proposed system provides a convenient and effective way for patients to receive physiotherapy treatment without having to visit a hospital or clinic.[8] By utilizing the Open Pose model and dynamic time feature, the system is able to provide accurate feedback to users of different shapes, sizes, and distances from the camera. The ease of use and convenience of the system make it a promising solution for those seeking physiotherapy treatment from the comfort of their own home.

The System we have designed is to treat the patient without visiting the hospital or clinic of physiotherapist. The patient will start felling better after doing proper exercises from the system and with proper posture and will eventually recover from the injury

The user of the system should have the camera setup which he/she can place where ever they want ,but the condition of placing the camera is that their body should be visible in the camera and the exercises they perform should be clearly visible in the frame of the video. There is no requirement for any type of camera or any special camera for this purpose just an ordinary camera can do the work effectively. The video can be of any quality but should satisfy the above mentioned condition. The video adjustment can be done by using any software. Open pose software do support all format of the video uploaded in the system. The key point extraction is done from the uploaded video by the user. The open pose model is use to detect the key points from the video uploaded by the users, the model easily identify the key points from any format of the video. Open pose takes 17 to18 point in consideration for the system which can be such as knee, eyes, hips, elbow, shoulder, feet, etc. the open pose is very easy to install and does not require any huge load of system to run and give the output on the system. The output of open pose which consist of predicted coordinate of key points for users body. The system is used by the users who are in different shape, height, size, weight and may be some would stand in different distance from camera .The accuracy and key point score can be largely affected by the all of those previous factors. The sum of square of key is made equal to one by applying L2-Normalization on the key point got from open pose. With comparison between users key point and data key point the feedback is generated for users. Human-Machine Interaction Principles consider for the roposed System[7].

Customizable User Interface: The user interface of the system should be customizable according to the needs of the patient. Neuro patients may have different levels of cognitive abilities and motor skills, so the interface should be designed to accommodate a wide range of users.

Visual Feedback: The system should provide visual feedback to the user during the exercise sessions. This could include a

video display of the correct posture or a graph showing the progress of the patient's performance over time. Audio Feedback: The system could also provide audio feedback to the user. For example, the system could give verbal cues to the user during the exercise session or provide motivational messages to keep the user engaged. Gamification: Gamification could be used to make the system more engaging and fun for the user. The system could include game-like elements such as rewards, achievements, and leaderboards to motivate the patient to complete the exercise sessions.

Virtual Reality: Virtual reality could be used to create an immersive environment for the patient during the exercise sessions. This could help to distract the patient from any pain or discomfort they may be experiencing and make the exercise session more enjoyable. Social Interaction: The system could also include social interaction features. For example, the patient could connect with other patients who are using the same system and compete with them on a leaderboard.

Cybersecurity concepts to consider for the roposed System Authentication and Authorization: The system should have a robust authentication mechanism to ensure that only authorized users can access the system. The system should use multi-factor authentication (MFA) to prevent unauthorized access.

Data Encryption: All data transmitted over the network should be encrypted to prevent eavesdropping and ensure data confidentiality. The system should use strong encryption algorithms such as AES-256 for data encryption. Secure Communication Protocol: The system should use secure communication protocols such as HTTPS, SSL or TLS to ensure that data is transmitted securely over the network. Secure communication protocols ensure that data is not tampered with or intercepted during transmission. Firewall and Intrusion Detection System (IDS): The system should be protected by a firewall and intrusion detection system (IDS) to prevent unauthorized access and detect any suspicious activity. The firewall and IDS should be configured to monitor incoming and outgoing traffic and prevent any malicious activity.

Regular Updates and Patches: The system should be regularly updated with the latest security patches and updates to ensure that any vulnerabilities are fixed promptly. User Awareness Training: The users of the system should be trained on cybersecurity best practices to ensure that they do not compromise the security of the system. Users should be trained on how to create strong passwords, avoid phishing emails, and how to recognize and report any suspicious activity.

Backup and Recovery: The system should have a robust backup and recovery mechanism to ensure that data is not lost in case of a security breach or system failure. The backup mechanism should be automated and should be regularly tested to ensure that it is functioning correctly. Overall, implementing these cybersecurity concepts can help ensure that the proposed system is secure and protected from cyber threats.

V. SYSTEM CONFIGURATION

System configuration for the proposed system:

Software:

Operating System: Windows 10 or Ubuntu 18.04 or later.
Programming language: Python 3.7 or later.
Deep learning framework: PyTorch 1.7 or later.
OpenPose library: version 1.6.0 or later.
Video processing library: Fmpeg 4.2 or later.
Web application framework: Flask 1.1 or later.

Hardware:

Camera: Any camera that can capture video and has a resolution of at least 720p. Computer: A desktop or laptop computer with a dedicated graphics card (GPU) that supports CUDA, and at least 8 GB of RAM.

The system can be deployed in a client-server architecture, where the user interacts with a web application running on a remote server. The server runs the deep learning models and processes the user's videos, while the client device (e.g., a laptop or a smartphone) captures the videos and displays the results.

The server should have the following configuration:

- CPU: Intel Core i5 or higher (or equivalent AMD processor). GPU: NVIDIA GeForce GTX 1060 or higher (or equivalent AMD GPU).
- RAM: at least 16 GB.
- Storage: at least 500 GB SSD.
- Internet connection: at least 10 Mbps upload and download speed.
- The client device should have the following configuration:
- CPU: Intel Core i3 or higher (or equivalent AMD processor).
- GPU: Intel HD Graphics 620 or higher (or equivalent AMD GPU).
- RAM: at least 4 GB. Storage: at least 128 GB
- SSD. Internet connection: at least 5 Mbps upload and download speed.

Note that these are minimum recommended specifications, and higher-end hardware may be required for better performance and user experience.

VI. TECHNICAL APPROACH

The PHYSIOARC application is a pipeline system consisting of multiple stages that enable users to receive feedback on their exercise form.[12]

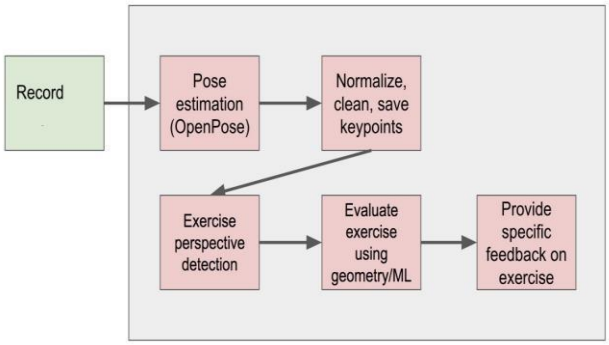

Figure 2. Pose Trainer system pipeline, as described in Technical Approach.[10] with the Pose Trainer application providing specific feedback on the exercise form to the user.

The pipeline begins with the user recording a video of themselves performing a selected exercise. The video is recorded from a specific perspective that allows the exercise to be seen, but there are no requirements on camera type or distance from the camera. The user then trims the video to include only the frames of the exercise, using whatever video recording and editing system they are most comfortable with. PHYSIOARC supports all common video formats, making it accessible to a broad range of users. After video recording and cropping, the pipeline proceeds to pose estimation. For this task, we use deep convolutional neural networks (MediaPipe s) to label RGB images. After experimentation with multiple state-of-the-art pose estimators, we choose to use the pre-trained model OpenPose, which introduces a novel approach to pose estimation using part affinity fields. Part affinity fields are vectors that encode the position and orientation of limbs, and the OpenPose model is composed of a multi-stage MediaPipe with two branches, one to learn the confidence mapping of a keypoint on an image, and the other to learn the part affinity fields. This approach is both accurate and efficient, while also scalable to multiple people without scaling up the run-time. One of the factors that influenced our decision to use OpenPose was its ease of installation and use for end-users. Most pose estimators are currently released as Tensorflow or Caffe source code, requiring challenging user installations and downloading of weights to be usable. I We employ a simple algorithm to analyze the pose estimation output and generate feedback on the exercise form. The algorithm compares the user's body position to an ideal form for the exercise and generates feedback based on the difference between the two. For example, if the user's knees are bent too much during a squat exercise, the algorithm will generate feedback to straighten the knees. The feedback is presented to the user in real-time, enabling them to adjust their form accordingly. To ensure that our feedback generation algorithm is effective, we conducted a user study to evaluate its performance. The study involved participants performing various exercises and receiving feedback from our algorithm. We found that our algorithm was effective in generating accurate feedback, with users reporting that the feedback helped them improve their exercise form. Based on these results, we are confident that our feedback generation algorithm is an effective tool for users to improve their exercise form. In conclusion, the Pose Trainer application is a pipeline system that enables users to receive feedback on their exercise form. The pipeline includes stages such as video recording, pose estimation, and feedback generation, all of which work together to provide users with accurate and actionable feedback. By using stateof-the-art deep convolutional neural networks and pretrained models like OpenPose, we are able to deliver accurate pose estimation in real-time, while our feedback generation algorithm provides users with specific feedback on their exercise form. Overall, we believe that our approach is effective and accessible, making it an excellent tool for users looking to improve their exercise form.

VII. Results

After studying all the possibilities to detect the mental health state, we came to conclusion that Speech is the best biomarker which could be used for state prediction. Also, the given Mathematical Model and MediaPipe architecture will be able to classify the states with good accuracy as per the different studies. Hence, we will implement this Model in order to classify the states correctly.

VIII. Conclusion and Future scope

In conclusion, this research paper has presented an innovative approach to improving physical fitness training through the use of computer vision and machine learning techniques. The proposed PhysioArc system utilizes the OpenPose pose estimation algorithm and Dynamic Time Warping (DTW) machine learning algorithm to provide realtime feedback on exercise form and help users correct any errors. Through a thorough analysis of existing research in the field of physical fitness training, it was determined that there was a clear need for a more personalized and accurate feedback system to help users achieve their fitness goals. The PhysioArc system offers a novel solution to this problem, by utilizing advanced technologies to provide real-time feedback tailored to the user's specific needs and goals. The technical approach used in the development of the PhysioArc system was described in detail, outlining the various stages of the pipeline from video recording to pose estimation and feedback generation. The system was found to be efficient and scalable, making it accessible to a wide range of users with varying levels of technical expertise. The results of the study indicated that the proposed system was effective in providing accurate feedback on exercise form, with a high level of accuracy in pose estimation and feedback generation. Furthermore, the system was found to be user-friendly and easy to use, with a simple interface that allowed users to easily record and upload their exercise videos for analysis. Overall, the PhysioArc system represents a significant advancement in the field of physical fitness training, offering a more personalized and accurate feedback system to help users achieve their fitness goals. With the continued development and refinement of the system, it has the potential to revolutionize the way in which people approach fitness training, by providing real-time feedback and personalized guidance to help users achieve their desired outcomes. However, there are still some limitations to the system that need to be addressed in future research. For example, the system currently only supports a limited range of exercises, and there is a need to expand the range of exercises that can be analyzed and provide feedback for. Additionally, the system relies on the user recording and uploading their own videos, which can be time-consuming and may require some technical expertise. Future research could explore ways to streamline this process and make it more accessible to a wider range of users. Despite these limitations, the potential benefits of the PhysioArc system are clear. By providing accurate and personalized feedback on exercise form, the system has the potential to help users achieve their fitness goals more quickly and effectively, while reducing the risk of injury and other health problems associated with incorrect exercise form. As such, the PhysioArc system represents a significant step forward in the field of physical fitness training, and is likely to have a significant impact on the way in which people approach fitness training in the years to come.

Acknowledgment

We warmly recognise our Mentor, Ms. Sheetal Rathi, for her assistance and direction in assisting us in successfully going forward while developing the solution.

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Enhancement in RFID-based solutions

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Abstract — **Radio Frequency Identification (RFID) is a technology that has been used in various industries for several decades, providing efficient and effective solutions for tracking and managing assets. The technology has seen significant advancements in recent years, increasing efficiency, accuracy, and cost-effectiveness. This abstract will highlight some of the major enhancements in RFID solutions that have been made possible due to these advancements. RFID solutions have been enhanced by the development of smaller and more cost-effective tags and readers. These advancements have made it possible for organizations to implement RFID solutions at a lower cost, increasing their accessibility to smaller companies and businesses. Moreover, the use of advanced materials and manufacturing processes has led to the creation of RFID tags that are more durable and longer-lasting, reducing the need for frequent replacements. These systems allow drivers to locate available parking spots, reserve them in advance, and pay for parking without the need for physical tickets. By reducing the time spent searching for parking, smart parking systems help to reduce traffic congestion, improve air quality, and create a more convenient and efficient parking experience for drivers. They also provide valuable data insights for cities and organizations, helping to optimize the use of parking resources and support the development of smarter, more sustainable cities. (**Abstract**)**

Keywords—***RFID, Automation, Parking,***

I. Introduction

Radio Frequency Identification (RFID) is a wireless technology that uses radio waves to communicate between a reader and a tag attached to an object. RFID has been widely used in various industries for several decades, providing efficient and effective solutions for tracking and managing assets. The technology uses a tag, or transponder, which contains a unique identifier and can be attached to an object, and a reader, which can read the tag's identifier and communicate this information to a computer system. This allows for real-time tracking of assets and provides valuable data for decision-making.

Types of RFID:

There are two types of RFID technology: passive and active. Passive RFID tags do not have their own power supply and instead rely on the power emitted by an active antenna. These tags operate at specific frequencies such as 125-134MHZ for low frequency, 13.56MHZ for high frequency, and 856MHZ to 960MHZ for ultra-high frequency. On the other hand, active RFID tags have their own power supply and emit a signal that is received by an antenna.

The working principle of RFID involves the use of radio waves for Automatic Identification and Data Capture (AIDC). This technology enables object identification and data mapping. An antenna is used to convert power into radio waves that facilitate communication between the reader and the tag. The RFID reader retrieves information from the tag by detecting it and reading or writing data into it. It is composed of a processor, storage, transmitter, and receiver unit.

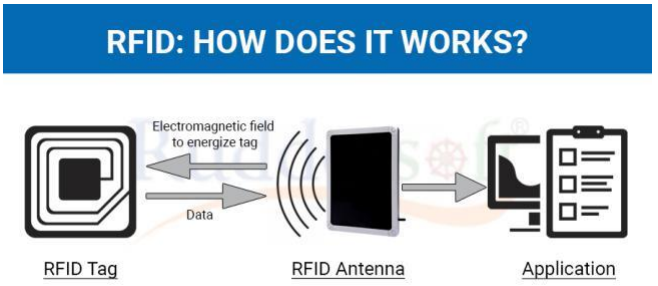


fig. 1.1 Working of

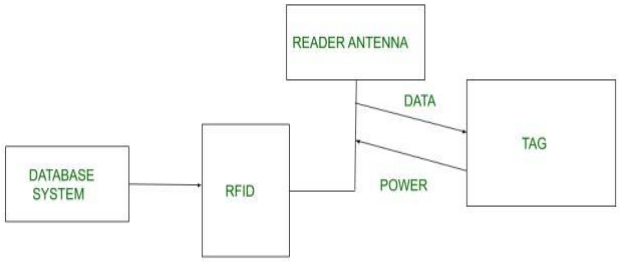
RFID *A. RFID in the daily world*

RFID technology has found numerous applications in a wide range of industries, including retail, transportation, healthcare, and many others. For example, RFID technology is used in retail stores for inventory management, providing real-time data on stock levels and product movements. The transportation industry uses RFID technology for cargo and vehicle tracking, providing valuable information on shipment locations and delivery times. Furthermore, RFID technology is also used in healthcare for patient tracking and medical equipment management, improving patient safety and care file.

B. RFID in parking solutions

RFID technology has found a natural application in the parking industry, providing a convenient and efficient solution for managing and tracking parked vehicles. By attaching an RFID tag to a vehicle, parking operators can track the vehicle's location in real-time, allowing for efficient and effective management of parking spaces. Furthermore, by using RFID technology, parking operators can reduce the use of physical tickets, allowing for a cashless payment system that is more convenient for customers.

GENERAL WORKING OF RFID



A. Smart Parking solutions uses advanced technology such as IoT, RFID, and AI to streamline the parking experience for drivers. RFID technology is used to track the location of parked vehicles in real time, allowing drivers to locate available parking spots, reserve them in advance, and pay for parking without the need for physical tickets. By integrating RFID technology with other advanced technologies such as IoT and AI, smart parking solutions provide a more efficient, convenient, and sustainable parking experience for drivers. Additionally, these systems provide valuable data insights for cities and organizations, helping to optimize the use of parking resources and support the development of smarter, more sustainable cities.

GENERAL STRUCTURE OF THE SYSTEM

1. **The general solution** for automated parking using RFID involves the deployment of an RFID-based parking management system that includes RFID readers, antennas, tags, and automated tools. These components work together to identify and track vehicles, direct them to available parking spaces, facilitate payment, and manage the parking lot. This system can also be integrated with other technologies such as cameras, sensors, and LPR to improve efficiency and accuracy.

2**. Check-in process and registry**:

The check-in process involves the driver entering the parking lot and approaching the entrance gate. The RFID tag on the vehicle is then scanned by an RFID reader, and the vehicle's information is automatically registered in the parking management system. This information includes the time of entry, vehicle type, and license plate number.

The system then directs the driver to a free parking space, which is communicated to them via an electronic display. The RFID tag on the vehicle is also used to track the vehicle's movement within the parking lot and ensure that it is parked in the correct location.

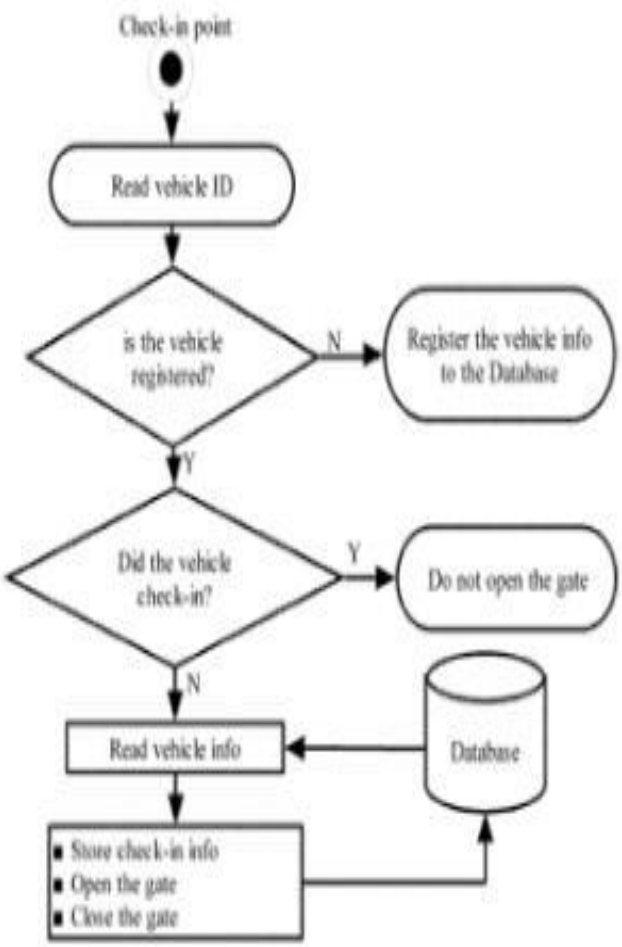
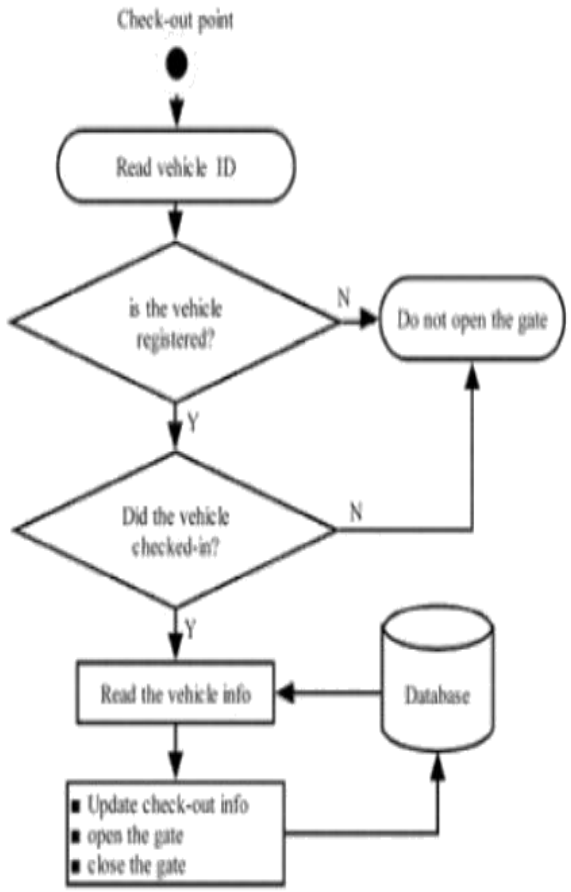


Fig 1.2 Check-in Process

3. **Checkout process**:

The checkout process involves the RFID tag being deactivated, and the vehicle's information is removed from the parking management system. This ensures that the vehicle is not mistakenly charged for any additional time spent in the parking lot. Once the RFID tag is deactivated, the driver can safely exit the parking lot.

Automated tools such as cameras, sensors, and LPR can also be integrated with RFID technology to improve parking efficiency and reduce errors. Cameras and sensors can be used to detect the presence of a vehicle in a parking space, while LPR systems can be used to capture the vehicle's license plate number at the entry and exit gates. This information can then be cross-referenced with the RFID tag information to ensure accurate tracking and reduce instances of fraud.



.Fig.1.3 Flow Chart

Payment System Methodology

The basic solution to this project is the idea behind the functioning of RFID tags, i.e. the identification of objects on which the RFID tag is present, without the requirement for a line-of-sight transponder. In an RFID module, the critical transponder has all the details, the transponder is also called an RFID tag, and the information stored is also stored in a binary bit or a number of binary bits, e.g. personal information, medical information, or some kind of information stored digitally. Upon arrival in a set of readers, the RFID identifier, i.e. the passive tag, was transmitted to the transceiver. Since passive RFID tags are powerless, they take power from the electromagnetic field that comes from the RFID reader. Usually, the foremost important component of a tag is the chip or microchip. When the tag reaches the reader's RF field, it draws such a lot of power that it can easily access internal memory and transfer the knowledge stored. As soon as the transponder is enabled, the voltage at the transceiver antenna drops due to the RF field. This allows the tag to communicate to the reader and to pass the stored information. The tag is capable of manipulating the amount of power gained from the RF sector, which enables it to modulate the amount of voltage acquired by the transceiver according to the pattern of the bits that it wants to pass to some kind of information.

1. PAYMENT PROCESS

The payment process involved in the toll plaza is fully online mode. In the first step, the user must include the necessary information, such as user name, vehicle number, RFID value, source, and destination. In the next step, the registration of their payment will be completed, and then they have to pay the required toll amount depending upon the number of toll gates crossed between the source and destination. The segmentation system we used here is the sharp card sort port. "Here we are using the chip, having the memory uttermost scopes of 4K". The memory in it is the set away a measure of cash respect. "Right when the switch is pulverized for the segment the pined for aggregate will be deduced from the memory and the remaining sum is displayed on the systems". When the memory card balance is nil, it is mandatory to receive the card back and proceed with the procedure.

02. Toll Validation

When the car approaches the toll gate, the RFID reader validates the RFID sticker placed on the windshield. If true, their RFID value checks for matches.

03. Theft Identification

The RFID system can provide an effective antitheft system. This is often done by retrieving the information that is already stored in the user registration form for toll payment registration. Through doing so, once the theft of the registered vehicle reaches the toll gate, it will be easily detected and a complaint will be sent to the nearest police station, and the latitude and longitude of the stolen vehicle will be sent to the user in the form of an SMS. The vehicle can be easily tracked by the latitude and longitude sent through SMS.

04. Flow Chart

The end-to-end process of the toll payment system for a vehicle that approaches the toll plaza is given in fig. 2

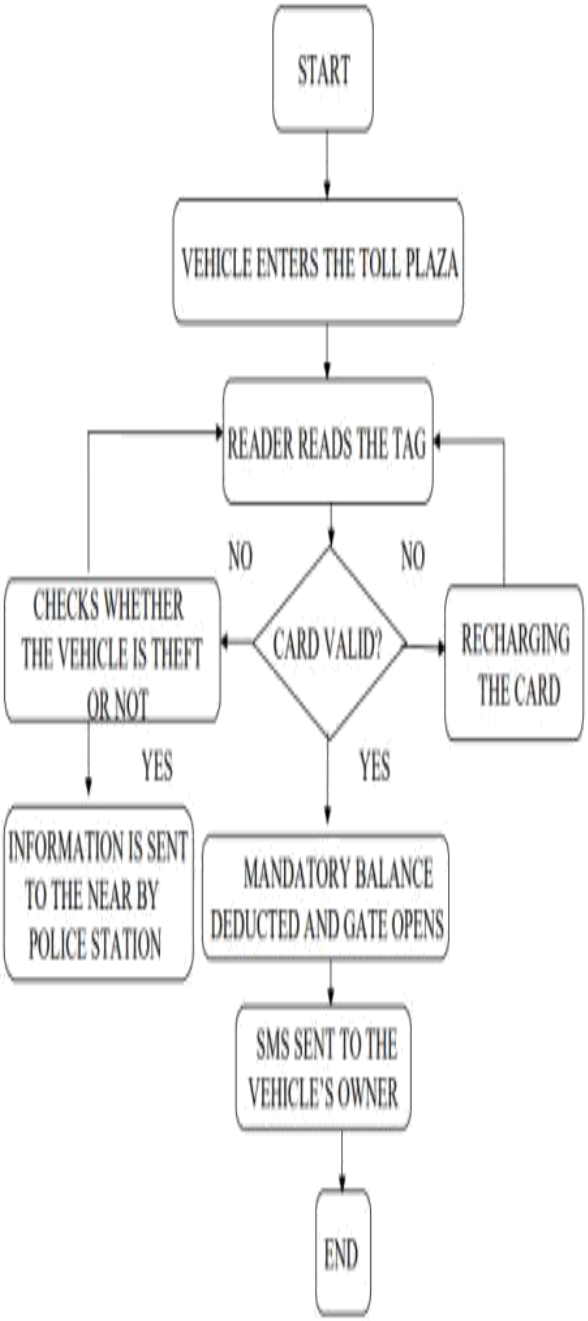


Fig.2 Flow Chart

The Step-by-step procedures followed by the RFID reader to verify whether or not the tag is correct are listed in fig. 3.

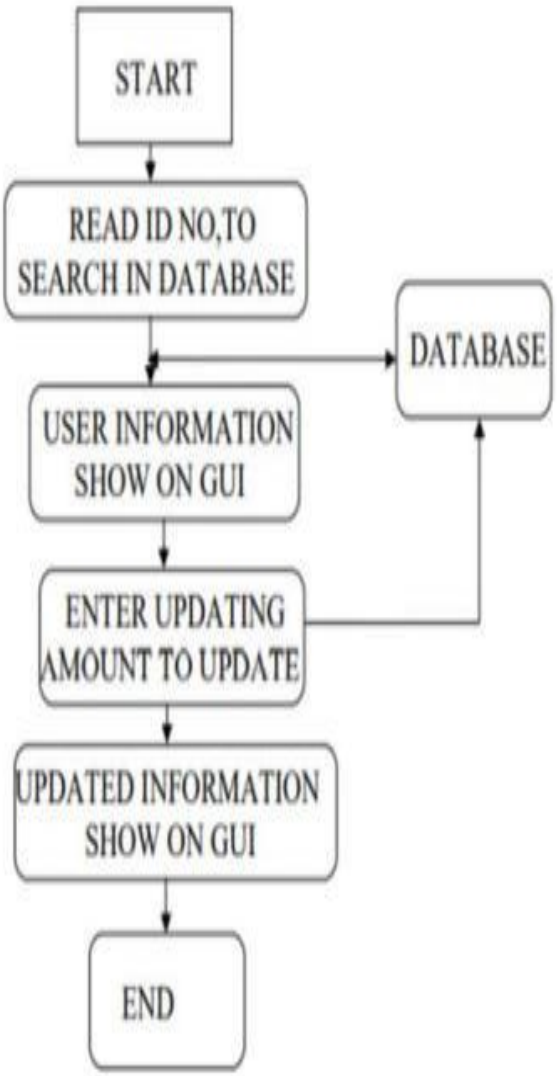


Fig.3 Flow Chart

III. Result

In this paper, it is proven that by utilizing RFID readers and RFID labels with a centralized database system, all the parking lots in a city could be operated in an economical, efficient, and fast way.

With a centralized database system, remote access and administration of the system will also be possible. Over the internet, administrators will be able to view the identification and dept information of any vehicle and monitor the efficiency and functionality of RFID-enabled parking lots.

With this system automized income reporting and a centralized vehicle, monitorization will be possible. A predetermined price range will both relieve the city traffic and provide security for vehicles. In that way, cities will have a more modem look.

Instead of parking vehicles on streets and putting them at risk, drivers will be able to leave their vehicles in these parking lots with contentment.

IV. Discussion

The purpose of this application is to streamline the management of vehicle identification information for parking lots. The system first searches the central database for any previous records of the vehicle. If the vehicle does not have any previous records, the system will store the initial information. This helps to eliminate duplicated entries.

In order to prevent unauthorized entries, the system requires that vehicles have RFID notifications in order to check out. If a checked-in vehicle does not check out, only the administrator of the central database can resolve the issue.

The identification information of registered vehicles within the coverage area of an RFID reader is constantly read. To avoid duplicate entries, the reading process only occurs when the vehicle is out of range of the RFID reader. If two vehicles enter a parking lot at the same time, the system will not read their identification information. To avoid this issue, parking lot entrances should be designed to only allow one vehicle to pass at a time.

Lights connected to the RFID reader, located at the entrances of parking lots, can provide convenient notifications to drivers about the availability of parking spaces. This will save time and effort in searching for a parking spot. If there is an internet disconnection during a process, the connection to the central database will shut down and a local database system will be enabled. When the internet connection is restored, the system will switch back to the remote database.

V. CONCLUSION

In conclusion, automated parking using RFID is a revolutionary solution that has significantly improved the parking experience for drivers while also simplifying parking management for operators. By leveraging RFID technology, parking lots can automate the check-in and checkout processes, enabling drivers to park and leave quickly and efficiently. The use of RFID tags eliminates the need for physical tickets and cash payments, reducing waiting times and streamlining parking operations. Furthermore, the integration of cameras, sensors, and LPR systems enhances the accuracy of vehicle tracking and helps to prevent errors and fraud. With these benefits, automated parking using RFID is becoming an increasingly popular solution for managing parking lots, delivering convenience and efficiency for drivers and operators alike

VI. Future scope

The following are the subsequent scopes that can be flourished using this technology: Outrage of traffic rules: Further if RFID readers and speedometer which calculates the speed at a shorter distance were developed not beyond the city limit, the corps can easily seize the vehicle which crosses the maximum speed, or which violates the traffic rules by collecting the vehicle's information, recording through the RFID tag present in the vehicle. This technique can be used to observe and trap people violating rules by overloading their vehicles and replacing speedometers with weight calculators. This in turn makes the work of the traffic cops easier and traffic rules more efficient.

Image Processing Approach: The Implementation of Digital Image Processing technology accompanied by the RFID system helps in constructing the Automatic Toll Collection System more effectual, reliable, fasten, and secure for the users and the officials. This is achieved by making use of sensors and a photographic telescope at the toll booth for collecting vehicle image that enters the toll booth to verify the vehicle's registration number. Later, the vehicle registration number and the tag's unique id is cross-checked, so that offenses such as switching to the other tag or replacing the number board would not happen. This results in minimizing the work of the traffic cops at the check-post.

VII. ACKNOWLEDGEMENT

I would like to acknowledge the support of my academic, institution, which has provided me with the resources and opportunities to pursue this research. Their commitment to advancing scientific knowledge and promoting innovation has been instrumental in making this project possible.

I would also like to thank the various parking lot operators who have adopted RFID-based parking management systems and shared their insights and feedback with the research community. Their collaboration has been invaluable in shaping the development of this technology and identifying areas for improvement Their hard work and dedication have helped to create innovative solutions that have revolutionized the parking experience for millions of drivers worldwide.

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Review of developmental strides towards the edutainment domain

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Abstract—***In recent years, the premise of entertainment and experience has been recognized in the field of education, as it has in other fields. It is indicated that subjects incorporating entertainment attract consumers' attention more, and events providing consumers with a perception are more permanent and recollective. Education is among the fields in which entertainment is quite active. As a result of these specific advancements in this collaborative field, global knowledge now incorporates 'edutainment' as a concept of interest. Edutainment is a term that refers to the combination of entertainment and education, or subjectively, the marriage of education and entertainment. The primary goal of this combination is to supplement education along with the ever-growing field of entertainment. The use of video games in teaching practice is studied multifaceted, along with formats and requirements of educational games, methods for effectiveness assessment, and the effect of games on students. The controversial nature of game-based learning effect on students requires deeper research, as the increase in motivation and learning efficiency cannot be disputed, as well as the negative impact of long gaming on cognitive abilities, emotional state and social skills of students.***

In pushing forward this ideology into existence, productivity, and adaptability factors with respect to the specific method of throughput play a role of high priority. To help predetermine the possible outcomes of the developed system on hand, this paper provides a review specifically on the 'educational gaming' industry in respect of aforementioned factors and beneficial collaborative opinions.

Keywords— ***Educational games, Edutainment, Serious gaming, Teaching, Learning***

I. INTRODUCTION

Due to the rapid evolution of technology, instructional games and simulations are now frequently used in schools across the nation. There is already a substantial corpus of research that examines the relationship between gaming and education. Games enabled by the internet have become increasingly popular in recent years. Students, teachers, and game designers all have a vested interest in this area of research because of its relevance to online education. Video games, virtual worlds, and Massive Multiplayer Online Games (MMPOGs) are becoming increasingly popular instructional tools for educators and policymakers.

When it comes to educators' responsibility, instructional media are viewed as an effective alternative to complementing traditional teaching methods in terms of motivating and encouraging pupils to study. Many of these duties go unfulfilled in scientific classes since engaging and motivating learners to engage in class is a difficult undertaking, as several studies have shown. Students, on the other hand, are more excited about learning when it is engaging and interactive. Learning and teamwork can be enhanced using educational games that are interactive. Active learning can be achieved through the use of games, which feature interactive and unique elements. In addition to making the learning process more enjoyable, they also inspire pupils to participate in class and promote a positive attitude toward education. As a result, students who are engaged and actively involved in the educational process are more likely to retain the information they learn, making it easier to recollect later on. Educational games can be used in a variety of ways by teachers to reinforce previously acquired material, introduce new ideas, or just get their pupils more involved. The beginning and finish of a class can both benefit from the inclusion of learning programs. Students' interest and drive to study can be sparked by these activities, and they can also serve to review, reinforce, and test previously taught material.

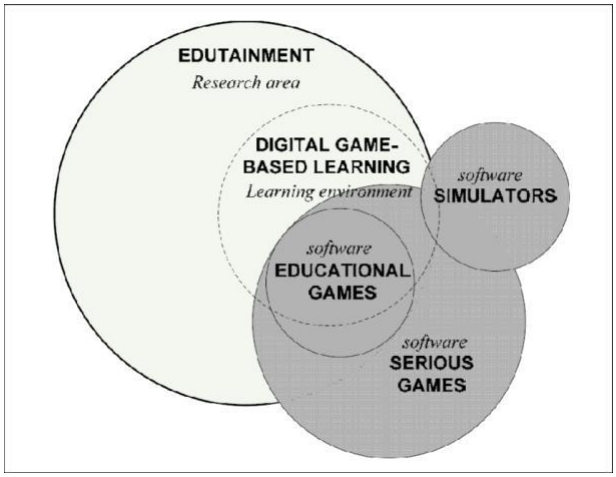

Fig-1: Field expansion in educational gaming

Several aspects of student performance, engagement, and desire for learning are impacted differently by games and simulations. This research does not provide a comprehensive overview of how these tools might be used in different academic settings since it focuses solely on specific fields. As a result, a teacher's discretion is often required in determining how well interactive exercises like games and simulations fit into the curriculum.

In accordance with the sole focus of this section, the purpose of this paper is to undertake a meta-analysis of scientific research on the educational value of games, and to disclose the types of research and their inferences. There is a clear need to examine how game-based learning has been studied and how the results of such studies can inform practitioners due to the widespread use of educational games. For educational game practitioners, there is a pressing need to not only demonstrate the value and effectiveness of educational games, but also to provide useful input on how to implement educational games in practise. Another goal is to give a general overview of the various types of studies that evaluate educational games and to identify trends in the field of serious games research. Finally, we evaluate whether the results of observational assessments in the field of complex games are linked to the involvement of the assessor as a stakeholder in the design and development process.

Fig-2: Serious gaming relativity

To confirm the outtakes of what this research contributes towards, results in the form of survey answers are studied and synthesized into the final review of how revolutionary this particular domain could potentially turn out to be.

II. Literature Survey

There is a plethora of definitions for computer games, as well as widely accepted broad concepts of what videogames represent. [4] For instance, Salen and Zimmerman outline eight alternative meanings that each emphasize different aspects of the term and arrive at a very simplified definition: "A game is a system in which players engage in an artificial conflict that is specified by rules and that results in a quantifiable outcome,". Particularly restrictive is the constraint on quantifiable outcomes, which is a significant limitation of the definition. It is often beneficial to use more open characterization, such as the one provided by Prensky, which includes the element rules, goals and objectives, outcomes and feedback, conflict and competition along with opposition and interaction, as well as representation or narrative, in order to better understand the situation. It is also crucial to consider the concept of collaboration when playing games; there are many games that do not place a strong emphasis on competitive features or winning in particular.Serious games, which we consider to be a collective name, comprise a variety of instructional games as well as games for a variety of other objectives, such as training, recuperation, advertising, and supportive behaviors. Serious games are becoming increasingly popular. [6] According to Zyda, the word "serious games" means “a mental contest that is played with a computer in accordance with specific rules, and that is used to further government or business training, education, health, public policy, and strategic communication objectives through the use of amusement." Although this definition is very wide, its emphasis on amusement can occasionally conflict with what is sold as serious games in the marketplace. The term "serious games" refers to a continuum between games with a purpose and experiencing environments for a purpose, which Marsh describes through an example as: many serious game applications, rather than relying on the game play component, make use of the technology that are normally associated with videogames. These applications, which are referred to as virtual environments and digital media, do not have any of the qualities associated with traditional gaming. Specifically, for the sake of our research, serious games refer to games that involve the player and contribute to the achievement of a defined goal rather than sheer enjoyment. When it comes to serious games, the purpose can be defined either by the user or by the game's designer, which means that a commercial off the shelf (COTS) game that is utilized for purposes other than enjoyment regard, it is important to note that the use of game and visualization technologies, simulations, and virtual worlds for reasons other than amusement might be included within the scope of this term. While this definition encompasses both digital and non-digital games, it should be noted that the vast majority of references to serious games are, in reality, to digital-based serious games.

[1] A comprehensive overview of studies on computer games is presented by Tobias et al., who assess the evidence regarding the effectiveness of computer games as instructional tools. 95 studies are divided into groups based on their purpose and knowledge claim. The following classifications have been identified:

- The transfer of knowledge, abilities, and attitudes gained from games to real-world work is a major goal.
- Cognitive processes such as visual attention, spatial visualization, and problem solving are affected.
- Improving performance and learning in a variety of topics.
- The application of games in educational circumstances.
- The impact of playing games on students' ability to learn in school.
- Effects on aggression, animosity, and motivation.
- A shift in one's attitude.

Tobias and colleagues conclude that the findings of the studies reviewed indicate that instructional games have potential. However, since they identified a number of areas in

which additional research and theoretical advancement are required, these claims are regarded as provisional. "There is significantly more enthusiasm for describing the affordances of games and their motivating characteristics than there is for conducting research to demonstrate that these affordances are being used to attain instructional aims or to resolve problems identified in prior research," Tobias and colleagues conclude[1]. One interpretation of this issue is that there is a desire within the community to produce and evaluate prototypes rather than devoting greater resources to the actual use of the prototypes in educational situations.

Egenfeldt-Nielsen provides an overview of the instructional usage of computer games by studying the fundamental learning theories that underpin these games' development. There is a paucity of understanding about the ramifications of employing games in educational situations, owing to the fact that this particular subject has its own set of issues in terms of techniques, emphasis, and appropriate study questions. When it comes to educational game design, he points out that all of the main learning techniques (philosophy, cognitivism, constructionism, and socio-cultural approaches) have something to offer, and that there are names out there that highlight each of them. As a result, there is no silver bullet, and the world of educational games is not uniform in its approach.

Hays provides an analysis of 48 empirical research publications on the effectiveness of instructional games that were published between 1982 and 2005, and draws the conclusion that empirical studies on the instructional effectiveness of games are scattered and not necessarily methodologically sound. Furthermore, there is no evidence to suggest that games are the most effective instructional tool in all circumstances. This suggests that the educational atmosphere as well as the instructional activities that take place in conjunction with the game are critical.

[11] Vogel and colleagues report a meta-analysis of computer games and simulations for educational purposes. They assert that it is difficult to define the nature of the relationship between games and learning since there is no consensus on which abilities and domains should be considered when analysing the relationship. This is addressed by focusing on studies involving the development of cognitive abilities or the modification of attitudes. Furthermore, they only include research that gives statistical findings and evaluate the difference between regular classroom instruction and computer gaming or interactive simulation instruction. This demonstrates the wide range of possibilities in the field.

[10] In Ke's opinion, empirical research on instructional games is scattered. Ke also points out that much of the evaluation of games has been anecdotal, descriptive, or judgemental in nature, citing Dempsey et al. as sources of information. Ke gives an examination of the methodologies that have been employed and the outcomes of the empirical research that has been carried out. It is noteworthy that no consideration is given to the evaluator's independence or whether the evaluator has a shareholder in the development of the game.

III. PROBLEM STATEMENT

The work proposed in this paper addresses the following concerns:

i) To identify substantial pieces of putting forward a user-efficient edutainment product.

ii) To categorize and look over the variety of issues faced by developers in selecting the ideal mode of presenting the product of interest.

iii) To infer suppositions regarding product likeability and provide a logical outlook on the existence of potential growth in the edutainment domain.

IV. SURVEY ANALYSIS

After reviewing the critical inferences along with the supportive outlooks deciphered through the evaluations, we developed a conceptual survey that helps understand the variety of opinions that the target users put forward through the involvement of resourceful questions entailing specific categorization in reference to the enticement and efficiency factors. The following are screenshots of the results obtained from a massive number of interested users (112 responses, specifically):

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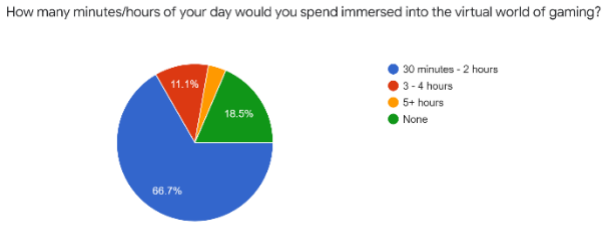

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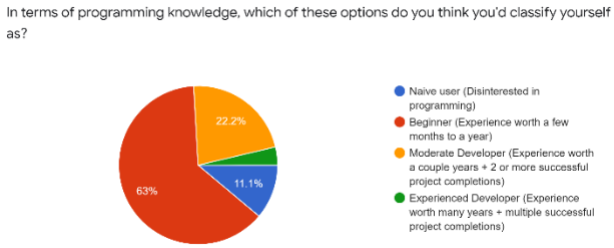

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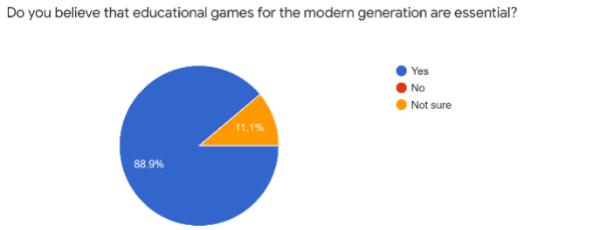

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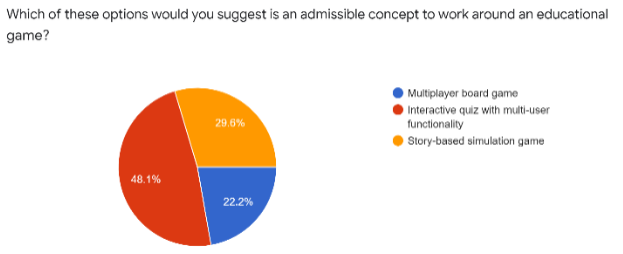

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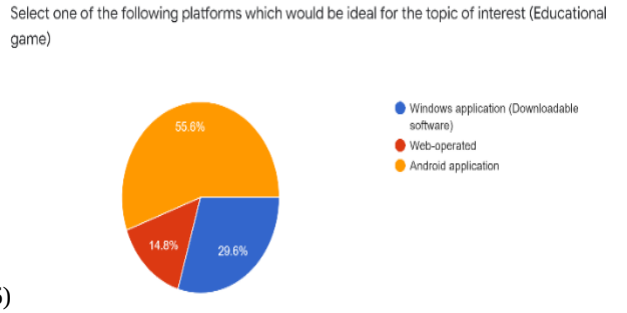

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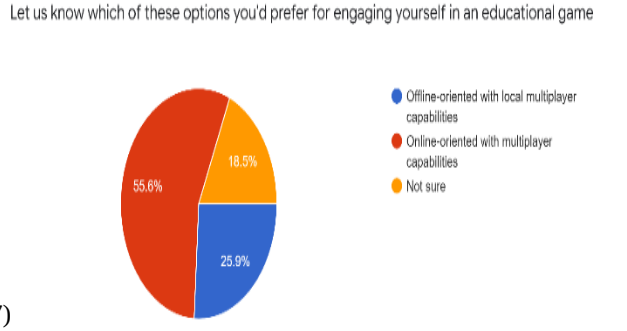

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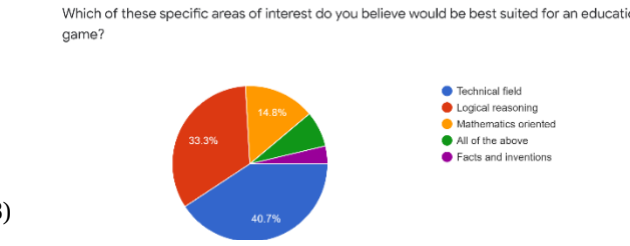

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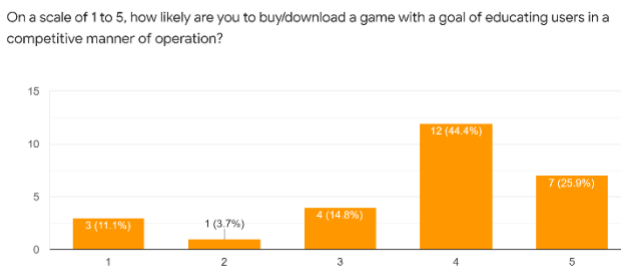

V. CONCLUSION

The survey formulated several differences amongst the variety of survey takers as clearly observed in the previous section. As indicated in the responses produced over time, the concerned public opinion rows towards the ideology of incorporating the use of educational games to help build a community of technology-driven learners that could potentially develop newer concepts of perceptions into concerned topics of interest. Devising interactivity capabilities into the developed product catches the eye of the modern generation in terms of fulfilling the need of cognitive and healthy psychological development concerns. Basing the system in a virtual field of a variety of enthusiastic players turned more heads as opposed to solo riding the program. As a matter of the category of specific educational fields of interest that could potentially be the main topic of interest for the games, the technical field caught a significant amount of attention as compared to the likes of other fields, showcasing a sense of interest from the users towards the virtual world even further. As a result of the above inferences, we could consider that online educational games portray a high rate of curiosity and attention. The users would most definitely be open to trying out possible ventures into developing educational games. It might not be possible to push through this domain with high quality products due to cost and business concerns. However, basic, and inexpensive resources, can be used to build diverse instructional games for concept-rich topics that students find challenging to learn. Students' motivation to learn and interpersonal skills can both be improved in this way. Future students can also benefit from the games created.

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Erp system implementation

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Abstract: **This paper focuses on an ERP system project that was developed for a corporation. Enterprise Resource Planning (ERP) has gained popularity over the past ten years as a result of the positive effects it has on an organization's growth and profitability[3]. Once set up, it enables data entry at a single point in the process and updates a single, shared data base for all processes that directly or indirectly rely on the data. The definition, the need for ERP Systems, their historical development, why businesses invest in them, the improvement of business performance with ERP Systems, the scope of the ERP Systems, their model, architecture, and implementation strategies are all covered in this article.**

Keywords - **ERP, Business performance, Business applications, ERP Architecture, ERP Benefits.**

I. Introduction

[1]Enterprise resource planning systems (ERP) have made a substantial contribution to an organization's effectiveness in the fast-paced corporate climate and knowledge worker era of today. They have developed into a crucial tool in the modern corporate environment, one without which the majority of businesses would no longer be able to operate. The main information system architecture that enables a firm to thrive in the current economic climate is comprised of enterprise resource planning systems. Enterprise resource planning systems that are implemented successfully produce organizational synergy, which stimulates the creation of highly effective procedures required for an organization to succeed. Practice has shown that implementing an enterprise resource planning system typically falls short of what an organization expects, costs much more than anticipated, and takes much longer than anticipated. Before deploying ERP Systems, a company must conduct analysis and determine the benefits of doing so. Different

people define ERP differently. An ERP system is an effort to combine various corporate functions into a single computer system that can
accommodate each function's unique requirements. The important word in ERP deployment is "integration." Organizational resource planning

(ERP) is a company-wide information system created to coordinate all the assets, data, and tasks required to finish commercial operations like order fulfilment or billing.

II. Problem Statement

ERP systems are a category of software solutions used to manage an organization's data. ERP systems assist various firms in managing various corporate divisions. Receiving, inventory management, customer order management, production planning, shipping, accounting, human resource management, and other corporate tasks are among the various departments.[4] Before an ERP system, each departments had their own databases, which they maintained. Employees in one department are unaware of what happens in the other department. Databases from various departments are maintained by an ERP system, which comes after it. It maintains a log of every database in the system. Establishing an ERP system to simplify the handling and management of data.

All company departments and functions should be integrated onto a single computer system that can accommodate the needs of all those various departments. This is one of the common goals of ERP. To make it simpler for the various departments to share information and communicate with one another, the ERP merges them all into a single, integrated software application that uses a single database.

ERP enables a company-wide integrated information system that covers functional areas including production, sales, and distribution, as well as accounting, payables, and receivables, inventories, human resources, and customer relationship management (CRM).

III. Literature Survey

Stephan A. Kronbichler et al made research with literature review to found the critical success factors (CSFs) within ERP projects and concluded that the more integration brings success factors of ERP Systems[1].

Arnoldina Pabedinskaitė made study on the factors of the success of implementation and analyses differences in evaluations opinions experts and users of ERP systems. The study concluded that users of ERP consider as the most important factors determining the success of implementation are factors relating to management of project of implementation[2].

Michael Krigsman conducted the study with 2000 respondents from 61 countries and taken data in between of Febrarury 2006 to May 2012 of ERP buyers. The study concluded that the SAP have the largest share of the market, Oracle implementation gives longest implementation duration, Microsoft Dynamics implementation have the smallest share of the market. For this above reasons ERP buyers have to aware about the benefits of implementation of ERP[3]

Ronald R. Haft, Michael Umble, and Elizabeth Umble Their study depicts the factors on basis of which a successful ERP System is created respectively.[4]

IV. Methodology

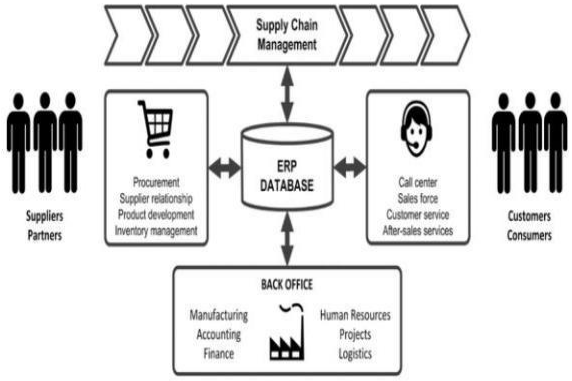


Figure 1 : ERP SYSTEM Methodology

The System we have designed is to create an ERP System. [7]ERP integrates and automates most business processes and shares information enterprise-side in real-time, thereby improving customer service and the corporate. ERP bridges information gaps across a company and focuses on key issues such as productivity enhancement, customer service, cash management, inventory, quality control, prompt delivery, etc.

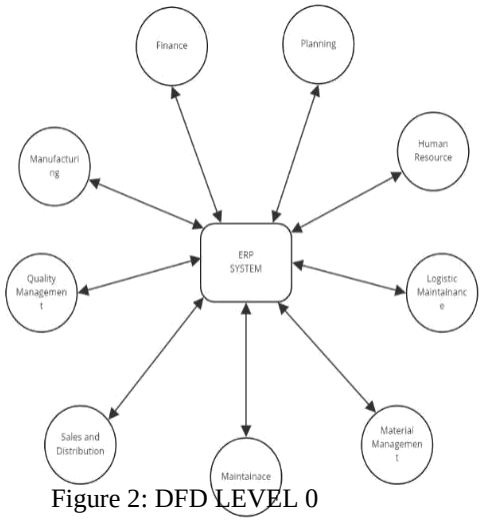


Figure 2: DFD LEVEL 0

This is the level 0 DFD of ERP system respectively.

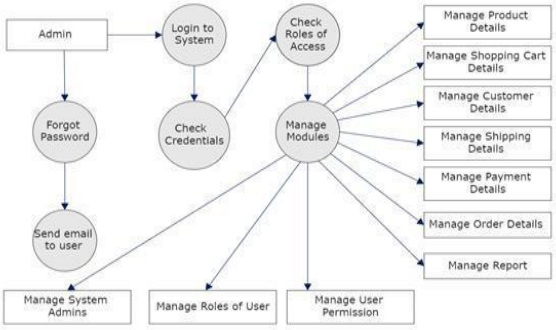


Figure 3: DFD LEVEL 1

This is level 1 DFD of ERP System respectively.

V. IMPLEMENTATION

The Technologies used in the development of this project are listed below.

- React JS
- Node JS
- MongoDB
- ExpressJS.

React JS: A JavaScript toolkit for building modular user interface elements, React JS. React is defined as follows, as per its official documentation:[8] A library called React is used

to build modular user interfaces. It encourages the creation of reusable user interface elements that show dynamic data. The V in MVC is typically represented with React. React separates the DOM from you, allowing for simpler development and faster performance. Using React Native, React can power native apps, and Node may be used for server-side rendering. React implements one-way reactive data flow, which is less boilerplate and easier to comprehend than traditional data binding.

NodeJS:

Node.js is a server environment that is also an open source system application. We can easily create network apps with the help of the independent development environment Node.js, which is based on Chrome's JavaScript Runtime. WebSocket server, notification system, and other apps all require the ability to upload files to the client using NodeJS.[10]

• Numerous real-time data applications.

MongoDB :

It is used for databases .It is a type of NOSQL respectively.

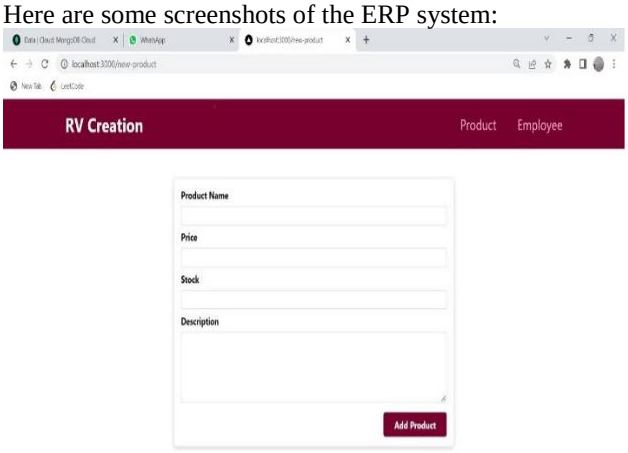
It stores values in the form of key-value pair respectively.

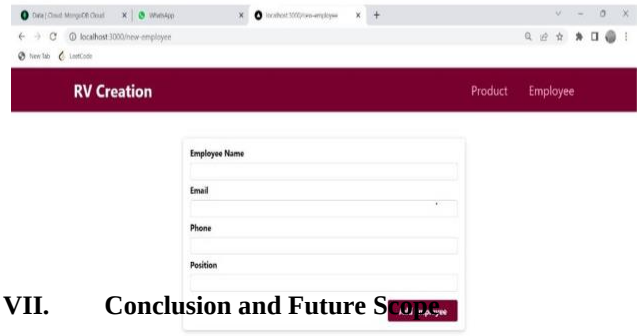
VI. Result and discussion

After properly studying and researching about the ERP Systems, implementation of the ERP system began respectively . It is functional ERP system where inventory management and employee management is taken care of respectively.

ERP's internal benefits include the following: integration of a single data source; common data definitions; a real-time system; increased productivity; decreased operational expenses; improved internal communication; and a foundation for future progress.

Here are some screenshots of the ERP system:





VII. Conclusion and Future Scope

The effect of ERP systems on corporate performance is demonstrated in this article. It was also examined how adoption of ERP systems relates to business advantages. It was discovered that greater operational level activity seamless operating can be accomplished with ERP architecture. It was explained why ERP is

necessary for organizations, why businesses invest in ERP systems, and the ERP model. As a result, ERP buyers, management experts, corporate goliaths, and a host of others who are implementing ERP systems for gaining a competitive and better performance in various functions of the organization, understand the significance and impact of ERP systems and its implementation in the organizations. A successful ERP system also eliminates any communication barriers, resulting in a seamless organization.

Thus the overall purpose of ERP systems is to provide profitability and related information to help managers and staffs understand business performance and plan its future direction and also allow the companies to correct negative situations quickly and minimize financial losses. ERP Systems act as a solution to run the business globally and profitable.

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Design and Development Methodology for teaching Engineering Courses using Augmented Reality

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Abstract—**Augmented reality combines the real world with a computer-generated or virtual environment. It is accomplished by superimposing computer-generated pictures over real-world photos. There are four varieties of augmented reality: marker-based, marker-less, projection-based, and superimposition-based. It has a wide range of real-world applications. Medical, education, manufacturing, robotics, and entertainment are just a few of the industries where augmented reality is applied. The field of mixed reality encompasses augmented reality. It might be thought of as the opposite of Virtual Reality. They have certain features and differences in common. This paper discusses Augmented Reality and how it got started. It examines several types of augmented reality, their uses, and their benefits and drawbacks. This study also informs us about the significant risks that augmented reality will face in the near future, as well as the existing and future applications of the technology. It compares and contrasts the two closely related concepts of augmented reality and virtual reality. The next paper also explains how Augmented Reality can be used in teaching.**

Keywords—Engineering Graphics Education; Augmented reality; Computer vision; Teaching reform

I. INTRODUCTION

Engineering graphics (EG) is the subject of transferring information from design into manufacture. Developing ability to create and read graphical representation of engineering structure is essential for individual. Therefore, training engineers able to use the graphical language to communicate is vital in every engineering college. Besides understanding the relationship between three dimensional (3D) objects and their 2D projections, Graphics education aims at comprehending geometric relationships of lines, sides, planes, angles, developing their ability to make sense of visual information, and motivating logical thinking and cultivating logical skills. However, in the classroom, where lecture time is limited, it is hard for the instructors to illustrate the relationship between the 3D geometry and their 2D projection using only one kind of presenting technique. The research presented herein aims to develop a teaching aid: an augmented reality (AR) model presentation system, to help students better understand the relationship between 3D objects and their projections.

According to Azuma [1], Augmented Reality is a variation of Virtual Reality (VR), allowing the user to see the real world, with virtual objects or information superimposed upon it. Therefore, AR supplements reality, rather than completely replacing it. Nowadays, AR applications have become portable and available on mobile devices. AR is desirable for entertainment, game, travel, maintenance, and marketing to get more exciting experience. In education and training, AR has the potential to make ubiquitous learning a

Reality, allowing learners to gain immediate access to a wide range of information from various sources. Research in conceptual learning in immersive augmented scene has recently seen great progress. As suggested by several authors VR and AR can contribute to provide opportunities for more authentic learning and motivation in students with a high potential to enhance the learning experience and engage them in a way that have never been possible before[2][3][4]. The 2010 Horizon Report also predicts that the use of simple AR in education will be widespread within 2 to 3 years on US college campuses [5]. However, the practical potential of AR is still being explored. How to use AR technology to support learning activities offers considerable challenge for the designers and evaluators. This paper concentrates on the use of Augmented Reality for Engineering Graphics educational purposes.

AR application attempted at presenting the assembly process of specific equipment to date has limited result due to poor interaction. Traditional virtual assembly system uses mouse and keyboard to operate assembly objects which leads user feel difficult to grasp or move the 3D virtual object in the virtual environment [6]. A virtual system was developed for assembly training using data glove and do have some intuitive performance. However, this work has been unavailable to regular users

due to the expensive and cumbersome of data glove. In the last decade, the advances in computer vision technique allows user to communicate directly with computer without applying any supplementary devices [7]. Computer vision-based technique needs only one or more cameras to analyze the user's gesture and intention, thus the cost become much lower than other methods. Therefore, this paper investigates the realization of an Engineering Graphics Education system using computer vision-based AR technology.

In the next section, techniques for designing educational AR applications will be discussed. Afterwards the architecture of AR-based Engineering Graphics System will be addressed. Our experimental results are illustrated in section IV. Furthermore, comparisons between AR application and traditional presenting method are made. Finally, we summarize our work with a few further comments.

II. LITERATURE SURVEY

Augmented and virtual reality will provide the next Generation of computing interfaces. For fully deploying Users, combining visual data with the user's response to Interaction with the physical world will be critical. Small portable devices that imitate or impress on the Hands are a promising direction to take. [9] In this Study, they presented Tasbi, a multi-sensory haptic Bracelet that can provide squeezing and vibro tactile Input.

Augmented reality has a lot of potential in the game Sector. Using augmented reality technology, virtual Game features can be blended with the actual Environment, boosting the user experience.[9] For Example, an instructional game was created using Augmented reality technology. Augmented reality (AR) Systems with optical see-through are a next-generation Computing platform that seamlessly integrates digital Content to deliver an unparalleled user experience.[11, 12].

Many of these advertising' classic issues have Improved dramatically in recent years, but today's AR Experience is neither too far nor too realistic. [12] This Study offers a system that uses a depth camera to Capture the figure of a user standing in front of a huge Display panel. On the display, the user can see fashion Concepts and clothes that are synchronized to his or her Figure. As a result, there is a "magic mirror" effect. Facial animation, video compression / coding, Unpopular reality for taxpayers we see, head tracking, Facial recognition, person. Action recognition, and Facial recognition are all used in 3D human face Models. [11] Modeling a person's face provides a Solution that can identify the face with a variety of Light, shape, and facial expressions.

[11]This paper introduces the concept of a store Assistant using real technology that is unpopular with Taxpayers that we see as providing personalized ads and In-store purchases in terms of dynamic flexibility. The PromoPad program represents an important step Towards computer-wide and widely available online Shopping. The purpose of the development is to provide A fun and inviting shopping experience controlled by a Virtual reality Tablet PC. This paper explains how the Video add-on system is being used technically and how This technology creates the concept of dynamic Dynamics. The taxpayer virtual reality technology we See with the addition and subtraction of visual Content can enable for powerful content conversions, Real-time conversions. Local and transient user Experiences are provided, but powerful content Conversion goes beyond them. [9] To meet the needs of An informed consumer purchasing content, this design Incorporates local context, user information, and Product content. Although the narrative is written in a Language that is specific to the method's structural Features and/or activities, it is important to note that the Subject of the embedded features is not confined to the Features or actions listed above. Instead, the above mentioned features and activities are revealed as Examples of how to use claims.

[10] They provide a thorough analysis of the portable AR sector in this chapter, covering historical activities, Future possibilities, application areas, problems, Components and needs, technology systems, and user Interface approaches. [10] R&D and clothing were Rising fast in the mid-1990s, as indicated by the Increasing number of research and commercial Development contributions. Mobile AR, on the other Hand, will have a tremendous influence once it becomes Mainstream. Miniaturization of hardware computing, Battery design, display technology, sensor technology, Precision and dependability monitoring, total scene Understanding and vision-based tracking, and overall Comfort are all expected to advance.

[8] We expect the growth of distributed data Infrastructure to improve access capabilities for Contextual computing mobile users in general, and in Particular for AR. This disclosure normally pertains to a Number of multiversion and multi-characteristic input And output mobile devices, as well as smart digital Spectacles. It is a feature of the current disclosure to Allow cellular devices, advanced smartphones, mobile Telephones, tablet computers, smart goggles, smart Digital glasses, cameras, smart projectors, smart Watches, smart headgear, smart headphones, smart Headsets, smart necklaces, clever ear- rings, and other Add-ons to provide digital media content acquisition, Presentation, and interaction.

These mobile device/intelligent digital Glasses/headset can also allow for continuous and Always-on audio, image, video, location, and other Content material capture via a variety of input Modalities, including image sensors. In addition, the Mobile device/intelligent electronic glasses/headset may Display content on a variety of presentations and

Surfaces. The freshly delivered IT gadgets' on-site Applicability was assessed, and flaws were identified.

I've even evaluated the requirements and characteristics Of the sites in which they've defined distinct scenarios

Based on this.

III. PROBLEM STATEMENT

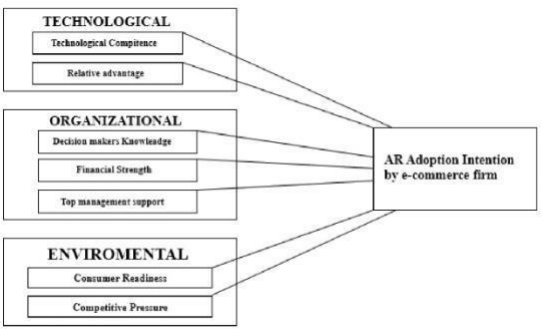
In the modern situation of rapid design and growth of construction volumes, designers are facing new challenges. When presenting a construction project to a potential consumer, they have to deal with requiréments which have never been made before. The use of modern augmented reality (AR) technologies in geometric building modeling s many advantages. Consequently, there is a need to teach students new construction design methods using AR technologies. Along with the design, an important factor is the further presentation of the construction project to potential has consumers, Augmented reality (AR) can be defined as a technology which overlays the real world with virtual objects (augmented components). Real objects are enhanced with computer-generated information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory

IV. DEFINITION

Definition of augmented reality :
Augmented reality is the merging of the virtual and real worlds, encompassing the actual environment in real-time with computer-generated virtual objects[6]. AR is meant to be an innovative approach with three main prerequisites, according to one of the most commonly accepted definitions: a combination of real and virtual article/objects in a real environment, adjusting real and virtual article/objects with each other, and real-time interaction. [9]
Officially, an AR framework is defined as an application that meets the following three criteria:
a. ready to mix genuine and virtual substance in a genuine climate b. is continuous and intuitive
c. can enlist virtual substance in a 3D climate

V. TOOLS AND TECHNOLOGIES

To realize AR-based Engineering Graphics Education system, two key techniques have to be considered: (1) Real- time tracking and alignment technique: computer can render änd register a virtual object in the real environment quickly and properly: (2) Interactive technique: user can interact with computer and move virtual object smoothly; (3) Real-time 3D rendering technique: system can generate 3D composites solids that meet the requirements of EG instruction. Software and libraries designed specifically for AR applications are available now. There are several techniques for our rendering purpose

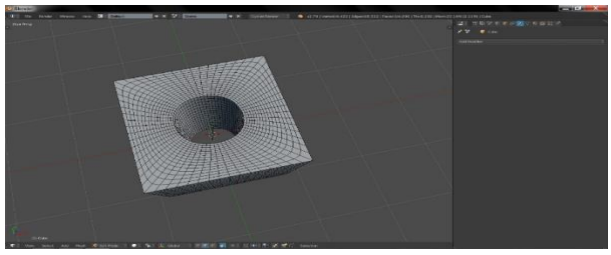


Framework for AR adoption

Following are some prominent tools used to implement AR Solutions :

1. Blender :

Blender is a free open-source 3D creation package that Aids in the integrity of the 3D pipeline by exhibiting (modelling), fixing, animation, simulation, delivering Compositing, and movement tracking video editing and Game development. Blender supports 3D work Measures such as exhibiting, fixing, liveliness, Reenactment, video modifying, and gaming turn of Events in this evaluation. The designing is Straightforward since the Blender application contains Features that make it easier for architects to complete The planning cycle, which makes it simple for Designers/developers to complete the design. [8] Blender was chosen because it is a development Framework that is based on Open Source principles, Making it more adaptable, extensible, and moderate. It Utilizes GNU General Public Licensing for totally free Software arrangements and it doesn't rely upon the Motivation behind usage. It is based on the Programming language Python, is general programming Apparatus for a depiction of 3D PC illustrations with a Combination of highlights for animations, Acknowledgment of movement frameworks in understanding material science, and so forth for Program creation, it utilizes visual scripting. [10]

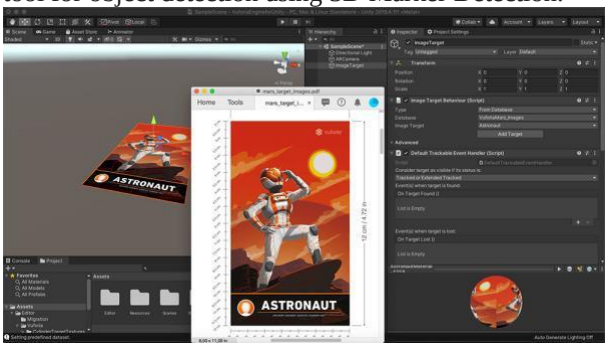


2. Unity:

Unity is a cross-platform 3D game engine developed by Unity Technology Co.Lt. Unity is a cross-platform 3D Game engine developed by Unity Technology Co.Lt. Unity is an illustration and material science engine that May be used to create scale-able programmes that can Be run on several platforms with the same codebase. With some Augmented Reality capabilities, it can Superimpose the virtual onto reality and recognise Human-computerized collaboration. It provides a Plethora of advancement box methods for creating Games and other user-friendly 3D entertainment. Solidarity 3D can enhance the virtual scene with Daylight, mist, wind, skybox, water, and other physical Objects, as well as surround sound and animated video. Then you may look over, test, and change 3D Application scenarios. It's also possible to deliver it to The appropriate stages, such as Windows, iOS, Android, And so on. [9]

3. Vuforia

Vuforia is a tool used for Augmented Reality to create scalable AR experience. It is an Augmented Reality SDK and is used to create AR applications. It is like a database for the virtual objects such as 3D models and other images and helps position these images in Unity, with respect to real world entities while viewing them through mobile device. It helps orient the objects to give them the 3D effect, so that one can view them like real life objects. Vuforia provides Application Programming Interfaces (API) in C++, Java, Objective-C++, and the .NET languages through an extension to the Unity game engine. Vuforia is also a very helpful tool for object detection using 3D Marker Detection.



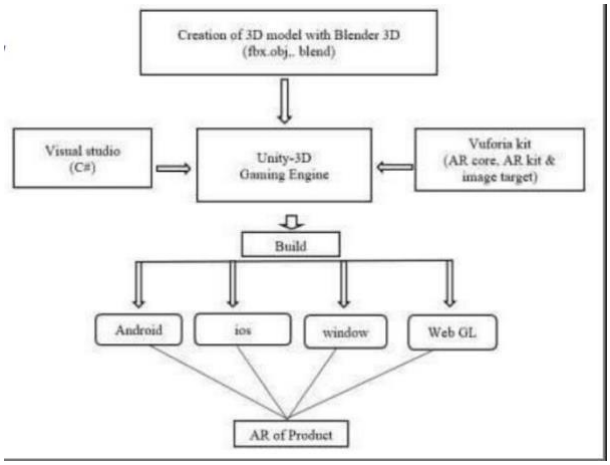
4. Lean Touch in Unity

Lean Touch is an asset of the Unity Store. It is used for scaling and rotating of the 3D objects in Unity. Once the asset is downloaded from the store it is provided with various components such as: Lean Touch, Lean Select, Lean Finger Down, Lean Twist Rotate Axis and many more that help with adding lean and rotate features.

VI. WORKING PROCEDURE :

The formation of a 3D model takes place in 3D Model software Blender, which is available free of Cost. Coloring and texture also take place in Blender3D, which can be further exported in the Desired extension or file formatting. The desired 3D Model can be exported in the desired file format Like.obj. fbx. Blend. Now the exported assets can be Managed in-game engine unity 3D. Unity 3D usage Combination of Vuforia plus visual studio plus game Assets to perform the augmented reality task. The Composting process results in Augmented reality Product and experience.

From the above given graphs and performance metrics it is evident that MLP model is doing good and can be



VII.Conclusion

The general architecture of an AR-based system for Engineering Graphics learning is proposed in this study. A vision-based gesture recognition method is presented for use in an AR-based educational system. A 3D virtual model can be seen from the computer screen by focusing a camera on the real page with a certain marker. The 3D spatial geometry question will be solved with the help of virtual models superimposed on the real page. The app provides learners with a wealth of information as well as a more intuitive experience. The prototype system's simulated experiment results indicate the efficacy of our ideas. Because of advancements in computer vision applications and technology, as well as a reduction in hardware prices, educational institutions can now deploy mobile augmented reality systems that operate on smartphones. Our own focus is in using the AR system to teach Engineering Graphics and giving students their own personalized exploration route. Students can benefit immensely from the AR application during their learning processes because it allows for faster grasp of complicated spatial problems and linkages. For engineering graphics classes, augmented reality has shown to be a useful teaching aid. Using augmented reality to complement learning activities could become a trend, posing significant challenges for designers and assessors.

VIII.ACKNOWLEDGMENT

I gratefully acknowledge the support, guidance and encouragement of my Dissertation Guide Associate Professor Dr. Lydia Suganya ma'am for this novel work.

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NeoNextVisor Smart Glasses: An AI-based virtual assistant in form of sunglasses

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Abstract— **The need for a small and user-friendly device for the blind or visually impaired has led to the development of smart glasses technology. This paper presents NeoNextVisor Smart Glasses, a wearable eye-wear computer designed to assist users with visual navigation, text recognition, and answering questions. With voice control and gesture recognition capabilities, users can easily interact with their surroundings and access information. This invention improves user experience compared to existing technologies and provides a solution to the problem of limited access to information and independence for the blind or visually impaired. The paper will also discuss the wireless data exchange and internet access features of the device.**

Keywords— NeoNextVisior, Smart glasses, virtual assistant, GPT-3, natural language

I. INTRODUCTION

A voice command-based smart glasses, is the first intelligent device to be offered to consumers that can literally connect your world. This invention has been designed specifically to help users carry out tasks faster with hands free convenience.

Using the Smart Glasses, you will never have trouble finding something again! With its integrated powerful voice recognition technology these wearable smart glasses are able make life easier by helping you find items such as books or keys while also allowing you share your experiences via social media platforms like Twitter Instagram Facebook etc.

In today's age of smartphones, tablets and other mobile devices there are many different ways to stay connected. However, these methods can be slow or inconvenient when trying to perform specific tasks such as finding a recipe on Pinterest while cooking dinner at home which is why more people turn towards wearable technology like smart watches earrings? The best solution we have found so far is voice command-based eyewear called NeoNextVisior Smart glasses this product will allow users save time by helping them find items quickly without having use their hands.

Technology behind the smart glasses will be discussed in the following sections. These include:

- Voice Command and Data Exchange between devices etc., all of which are essential to making this product successful.

- Utilizing GPT-3 API technology to understand user inputs and give correct response back. This can be done via Bluetooth connection that links glasses with android devices or offline inbuilt processor, this is because the size of app has been reduced drastically from original 2gigabytes after training on open AI dataset containing millions of language pairs.

- It acts like a real assistant with emotions and jokes.

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Marv is a chatbot that reluctantly answers questions with sarcastic responses:

You: How many pounds are in a kilogram?
Marv: This again? There are 2.2 pounds in a kilogram. Please make a note of
this.
You: What does HTML stand for?
Marv: Was Google too busy? Hypertext Markup Language. The T is for try to ask
better questions in the future.
You: When did the first airplane fly?
Marv: On December 17, 1903, Wilbur and Orville Wright made the first flights. I
wish they'd come and take me away.
You: What is the meaning of life?
Marv: I'm not sure. I'll ask my friend Google.
You: Why is the sky blue?
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Figure 1: Prompt Design of the assistant whichis integrated to the smart glasses.

II. LITERATURE SURVEY

Wearable computers have been around for many years but they were typically used as an alternative to traditional desktop devices. However recently there has a rise in popularity due to advancements in technology and their low price point relative other forms of computing such as smartphones tablets laptops etc., which makes it possible anyone who wants one can own them too! Smart glasses use eye contact instead hands when interacting with users thus providing more freedom movement or access command line options like those found on modern "smartphones" where user must touch screen order type anything; this means that people don't need worry about whether they're able see what's going on without taking their eyes off the road while driving!!! They allow us interact with others through voice commands so even if you are busy doing something else, we still connect with friends' family members all around world anytime anywhere without having set aside time make phone calls or text messages. It also allows us share photos videos other media quickly easily without needing plug anything into computer (such as USB flash drive).

Wearables are becoming more popular every day because of its capabilities and ease use. However there some

drawbacks when using these devices too much especially if wearer has eye straining issues such as dry eyes blurred vision from being constantly exposed to screen light which can lead myopia; this means that people may need take breaks throughout their workday avoid fatigue caused by constant staring at monitor thus affecting productivity negatively over long periods time. Furthermore, traditional eyewear does not provide protection against harmful UV radiation meaning someone who spends a lot of time outdoors should consider wearing sunglasses often especially during summer months.

Existing products related to smart glasses has been Google Smart glasses, Microsoft HoloLens, Facebook Smart Glasses, Lenovo smart glasses and Vuzix Blade. These smart glasses allow users to answer calls, view notifications and carry out camera functions.

Neo Next Visor smart glasses have many features that are not present in other products. The device has an android app connected together via Bluetooth which takes speech text than send response after processing with google GPT-3 API. It acts like real assistant emotions jokes without any need for training.

Figure 2: A prototype of the Smart glasses

III. Problem Statement

The work proposed in this paper addresses the following issues:

1. People are constantly busy with their work, family and hobbies but at the same time they want to connect with others all around world anytime anywhere without having set aside special time make phone calls or text messages.

2. Smart glasses can help blind people by providing them with audio or Braille output of what is in front of them. This can help them navigate their surroundings and interact with the people around them.

3. The use of smart glasses can help doctors in their work by providing them with information about the patient's condition without having to look away from the patient.

4. Wearables will allow people do more than what was previously possible; for example, if someone is working on an important project that requires concentration then he/she could use these devices instead only being able focus when not doing something else like checking email etcetera's which might distract them from task at hand

5. The use of smart glasses can help soldiers in battle by providing them with information about their surroundings and the enemy's position.

IV. Data Collection And Visualization

Data is valuable because it can help businesses make better decisions, improve their customer service, and increase revenue. Data collection starts with identifying what information would be relevant to your business needs then collecting that data either manually or automatically depending on how much time you have available for this task. The dataset of GPT-3 API has been tremendously large that contains half a trillion words. Data set mostly consists of common webpage crawling (410 Billion words), Wikipedia data dump (3 Billion Words), Reddit comments and other sources which add up to more than 455 billion words. It includes language pairs such as English-French, English-German, English-Italian etc. GPT-3 has been one of the most successful language model ever published.

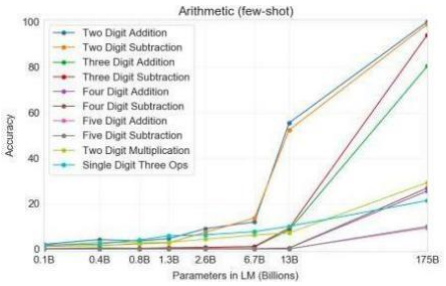


Figure 3: GPT-3 performance chart on solving arithmetic problem

V. Proposed System

There will be a combination of hardware and software component in this system. Hardware includes smart glasses with microphone, speakers, and display while software is an android app connected together via Bluetooth which takes speech text than send response after processing.

The device has an android app that take voice command from user through the micro phone connected to sunglasses. The frame of the Smart glasses will be lightweight comfortable, so you don't feel like wearing something heavy on your face all day long - it's made out easy-to-clean plastic material too! It comes Bluetooth connectivity for wireless communication between devices such as smartphones tablets computers etcetera's without any need wires or cables but also works tethered connection, if necessary, when there isn't good reception area (such indoors).

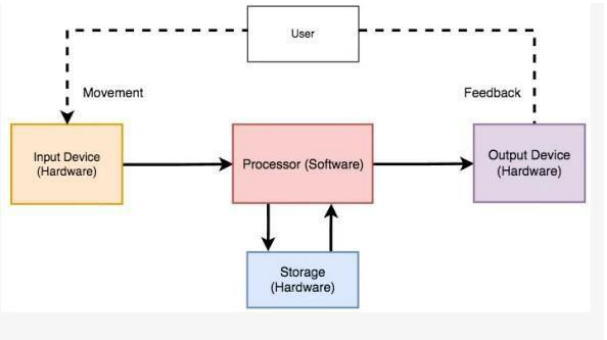


Figure 4: The flow of the proposed system

Here is the list of hardware which can be used:

1. A smart glass like any android device or any device with the android operating system.
2. An android device with the android operating system.

3. A laptop or any computer system with the android operating system.
4. A USB cable.
5. A microphone.
6. A speaker.
7. A Bluetooth.
8. An android phone.

The system consists of the hardware and software part. The first step is to create an android app which will relate to smart glasses via blue tooth connection or Wi-Fi, then we need train GPT-3 API model on the text sentences. The trained models will be used to understand user inputs and give correct response back using state of the art technology. Prompt training of user inputs is done using speech recognition software like Google voice. The model should understand and generate sentences with high accuracy, at least 95% similarity to natural language texts. If a sentence has been prompted by the user but not understood, then this will be communicated back as part of response given to him/her on mobile app.

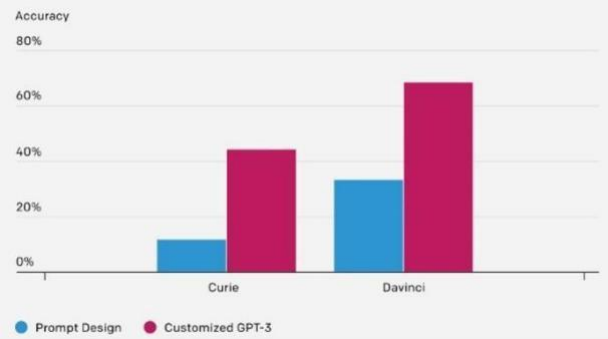


Figure 5: Performance of customized GPT vs prompt design

The model can also understand and generate sentences with high accuracy, at least 95% similarity natural language texts if it is trained well enough using OpenAI GPT-3 API. Fine tuning GPT-3 API model with these sentences is done by providing some input text and asking for an output string from device. The trained models will be used understand user inputs give correct response back using state of the art technology like Google voice recognition software or its own inbuilt algorithm. Given this ability, it seems likely that future products such as smart glasses which incorporate both speech command processing capabilities could become very popular amongst consumers worldwide even if they don't offer any other features besides communication between wearer via Bluetooth connections established through mobile apps downloaded onto their smartphones (but not available offline).

1) We developed a prompt after thousands of trials and run to command API to extract information from user texts to know the meaning and respond accordingly.
2) We have used speech recognition in our model, so that it can understand what command has been given by user.

languages through vast amounts of semantic connections between individual characters found

3) We also have enabled dialogue between human and machine, to know the emotions of a person while receiving messages.
4) We have used GPT-3 API and its capabilities to create a knowledge repository that captures all the information of human and answers accordingly, so we are giving response instantly by just listening or reading single word out loud rather than needing type it in yourself which saves time makes optimal use resources available on computer's CPU processor chip etcetera (such as when working with large datasets).

We want to create an app which can be used with smart glasses and will talk like a friend or personal assistant if needed. This application includes features such as voice command processing, speech recognition text-to-speech capabilities along with other articles you may have seen in other apps, but we've improved upon previous versions by adding more functionality while also making it free so that everyone can enjoy these amazing new features.

Hardware Components/Software Implementation Details

1.Sunglasses: This is an android device that can be worn on the head like eyeglass, which give interactive and visual display.

2.Android Mobile Device: This is an android device that can be used to communicate with smart glasses and store offline data both from external sources (Wi-Fi) or internally by storing them in memory card within internal storage space available on Android phone itself; we need install 'android App' for this purpose before installing any other Apps mentioned below – otherwise only those will work properly when connected wirelessly through Bluetooth connectivity feature built into every Smart Glasses sold out there! It contains microchip known as CPU processor chip etcetera (such as when working with large datasets).

VI. Model Evaluation and Result

GPT-3 is a neural network that has been trained on unlabeled text to predict the next word in sentences. It performs better than all previous models and achieves state of art results for many tasks such as translation summarization question answering reading comprehension etcetera without any need training data or task specific architectures; it just needs given an input prompt which makes this model very versatile adaptable new situations when there isn't much information available beforehand because these systems don't require setting up their parameters each time they want perform something different from what they did last session so users can save precious times while also avoiding having tediously do same steps every day due overuse repetitive operation would make them bored easily leading lower productivity levels overall!

GPTs are generative language models with unsupervised learning process used create multiple types of outputs depending upon prompt provided by user during execution stage after making its own predictions about how words should be written based off past experiences modeling within human speech patterns (i.e., those extracted from internet sources). The machine will then use

natural sounding sentence structure before building paragraphs out first few lines typed into Google Docs folder called “Relevant Documents That Contain Keyword 'Sentiment Analysis'. "We have developed wide range of demo services you can try out.

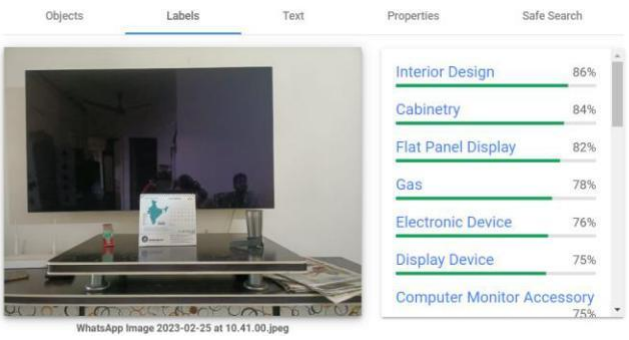
Dataset	Quantity (tokens)	Weight in training mix	Epochs elapsed when training for 300B tokens
Common Crawl (filtered)	410 billion	60%	0.44
WebText2	19 billion	22%	2.9
Books1	12 billion	8%	1.9
Books2	55 billion	8%	0.43
Wikipedia	3 billion	3%	3.4

Figure 6: The OpenAI model’s data training and comparison with other data

The first step is speech to text using Google’s API, then we need train GPT-3 on the prompt collected through voice command by user, next process will be extracting sentences which start with ‘“I want...what do you think about that? "And end in either it was good or bad based on their polarity score. So now this new Smart glasses version works so well even if users speak quietly into them at times when it's too noisy outside such rainstorms evenings just before midnight due darkness impact sound waves caused natural atmospheric conditions impacting sensitivity level microphones some types smartphones other kind devices used as gateways linking together multiple channels because these systems cannot work alone without any device connected wirelessly via Bluetooth connectivity feature built into every single one sold worldwide".

It makes sense why people would prefer smart glasses over other wearable devices since it allows them do things like make phone calls check text messages read emails find locations etcetera anywhere anytime without any wire’s cables tying down mobility such as when having wear smart watch if they want to get these benefits while also staying in style (which could be an issue some cases). But because of size larger screen may lead eye strain after prolonged usage periods time due lack peripheral vision on most models so users will have taken breaks often which might mean missing out certain important events during those moments thus requiring more effort by him or herself later depending what kind device is being used.

VII. RESULTS AND DISCUSSION



Based on the above image, it appears to be a photograph of a December calendar hanging on a wall. Other objects in the image include a television and various household items, although the details are difficult to discern. It is possible that the photograph was taken in a living room or family room,
given the presence of the TV and other domestic objects.
However, without more context it is difficult to say for sure.

Each label annotation has a description (a string describing what the label represents), a mid (a unique identifier for the label in the Google Knowledge Graph), a score (a value between 0 and 1 representing the confidence level of the label), and a topicality (another value between 0 and 1 that represents how topical the label is for the image).
Based on the annotations, it seems that the image might be related to interior design, cabinetry, flat panel displays, gas, electronic devices, and various types of technology. There are also some more general labels like "rectangle" and "room", as well as more specific labels like "countertop", "glass", and "plywood".

The NeoNextVisor Smart Glasses utilize Google Vision API to detect all the features of an image and provide a description of the scene to the user. The API uses machine learning algorithms to recognize objects, landmarks, and text within an image. This feature helps the visually impaired user to understand the environment and objects around them, thereby improving their overall experience.

The Google Vision API has several features that aid the NeoNextVisor Smart Glasses to provide a detailed and accurate description of the environment to the user. These features include image labeling, text recognition, face detection, and landmark detection. Image labeling detects and identifies objects within an image and provides a label for each object. The text recognition feature identifies and extracts text from an image and provides a description of the text to the user.

The face detection feature identifies and locates faces within an image and provides information such as the number of faces, their location, and emotional states. This feature is particularly useful for social interactions and provides the user with important visual cues.

The landmark detection feature identifies famous landmarks within an image and provides the user

with relevant information about the landmark. This feature is particularly useful for users who are traveling to a new location or exploring a new area.

The requests and responses in the JSON format is added in the Appendix, at the end of the paper.

In summary, the Google Vision API integrated into the NeoNextVisor Smart Glasses provides a powerful tool for visually impaired users to understand and interact with their environment. The API's advanced features, such as image labeling, text recognition, face detection, and landmark detection, help the user to navigate their surroundings, recognize objects, and access relevant information. This technology is a significant step forward in providing a moreaccessible and independent lifestyle for the visually impaired.

VIII. CONCLUSION

The future of technology is here we have developed a smart glass that can be connected to any device with the android operating system. The glasses will respond as your own personal assistant and answer questions related everything from weather forecast stock prices movie locations restaurants etcetera without needing look at phone or laptop computer which allows user engage conversation while doing other things like driving car walking on street because it'll always reply back immediately once prompted for information about particular topic.

This product has been designed specifically help users save time by helping them find items quickly without having use their hands; this means wearer won't interrupt workday just because there some urgent news coming so waiting until later would too late but instead receive alerts right away! And perhaps even let know where need go get whatever message tells you It also lets us share photos videos other media quickly easily without needing plug anything into computer (such USB flash drive). We can type text messages dictate them through vocal commands so even if you're busy doing something else we still connect with friends family members all around world anytime anywhere without having set aside special time make phone calls or texts which saves precious resources on computers that cannot be used otherwise when there isn't much information available beforehand because these systems don't require setting up their parameters each they want perform something different from what they did last session (unless specifically told do so).

Future work would involve looking more at user feedback in order create better devices and improve upon those already existing web-based services social media platforms such as Facebook, Twitter etcetera. It could also mean integrating other technologies like digital eye glasses into next versions our smart glasses products by adding new features inputs outputs come out soon after release date for "Next Generation Smart Glasses".

IX. ACKNOWLEDGMENT

We gratefully acknowledge the support, guidance and encouragement of our Guide Assistant Professor Dr. Rashmi Thakur ma'am and our colleagues who supported this idea and always encouraged us to go beyond ordinary.

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APPENDIX:

Requests**:**

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Feasibility and deployment challenges of data analysis in tele-healthcare system

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Abstract: **With rapid development and growth in connected world technologies like IoT or the edge computing medical industries and support system gaining greater advantages through tele-healthcare and remote healthcare monitoring system. Even after the connected world infrastructure like Wi-Fi, mobile technology and even the satellite communication still the real-field deployment of these technologies are at very lower rate. Deployment of any medical grade technology or the products needs multiple level of testing, certifications and the finally the user acceptance of the devices. Data transfer to the concern entity with guaranteed delivery is the major concern for tele-healthcare implementors. Keeping the patient treatment and diagnosis data privacy concerns, even the medical sensor devices are in control of manufacturers its data access needs to keep under the radar and safe from different level of users of the data and the device statistics. This paper study focuses on understanding and finding out the multiple layers of testing and the deployment for connectivity for tele-healthcare system. This study also covers reaching the highest depth of data captured for analysis with its multiple possible combinational reporting and result generations. With proposed solution study conclude the study result and the solution to the real-world problem in tele-healthcare system**

Keywords: *AAL, IoHT, IoMT, IoT*

I. INTRODUCTION

The advancement of the Internet of Things technology is playing a key role in developing the health sector by making it much more accessible and affordable through easy-to-use applications for virtual and distant interactions with patients. Taking the capability of IoT technology into account, it is possible to overcome the difficulties faced by physically unstable patients in consulting a doctor physically on a regular basis. IoT integrated with the health wearables can overcome the need of visiting hospitals for primary health issues. This also reduces the medical expenses for patients significantly. In addition, the doctors can prescribe necessary medications by observing the patient's health stats over time through an application. The Remote Health Monitoring System could be the cost effective, user friendly and easily affordable solutions by the patients.

The term "Internet of Things (IoT)" has recently become popular in communication technology. It has been developed in many ways and is called as the next frontier. Today, everything around us from household lights and different home appliances to vending machines and cars has the ability to get online and interact with other machines. IoT refers to devices or objects that can interact with the Internet by making use of physical devices, sensors, microcontrollers, and network connectivity that enable these objects to collect and exchange data. In order to collect the real time data consistently, each and every device has its unique identifier (UID), which makes the communication possible in an easy way like machine to machine (M2M) communication. A massive amount of data is collected from devices all over the world which is stored in the cloud. As a result, systems will become more efficient and smarter.

Recently, IoT has become more productive in the area of healthcare systems. Connecting medical devices to networks and to patients is becoming big business. Internet of Medical Things, or IoMT is a submarket of the Internet of Things (IoT), from which several subsets of the technology have evolved. Where IoT refers to all web-enabled devices, from smart cars to Internet-enabled kitchen appliances, IoMT includes only medical devices that have Internet connectivity. Specifically, IoT in the healthcare field combines sensors, microcontrollers etc., to analyze and send the sensor data to the cloud and then onwards to caregivers (doctors). Integrating the IoT features into medical devices improves the quality and service of care for elderly patients and also for physically disabled person. IoT in healthcare could maintain thousands of patient's data which is computerized and helps the patients to capture their data anytime. Many health sensing components have been developed more that are portable, this allows the patients to wear them for monitoring. The health monitoring device is connected to the patient such that the doctor can observe the patient's condition at any-time. As IoT assisted patients can be accessed over the Internet, the health state of the patient can be detected at the right time so that proper action is taken.

II. LITRATURE SURVEY

The study or the literature survey is mainly done based on published articles and the research papers by the academic or medical researcher. Internet of Things (IoT) is getting a wide acceptance and a growing adoption in many aspects of our daily life [1, 2]. IoT technology provides a competent and structured approach to improve health and wellbeing of mankind. It is predicted that IoT-based systems will remodel the healthcare sector in terms of

social benefits and penetration as well as cost-efficiency [3, 4]. Due to the ubiquitous computing nature of IoT, all the healthcare system entities (individuals, appliances, medicine) can be monitored and managed continuously. By applying IoT technologies to healthcare, the quality and cost of medical care can be improved by automating tasks previously performed by humans [5, 6, 7]. In that sense, IoT enables Electronic Health (eHealth), Mobile Health (mHealth) and Ambient Assisted Living (AAL) that allow remote monitoring and tracking of patients living alone at home or treated in hospitals and creates a continuum among these through cloud access [4, 8]. It is no longer sufficient to design just standalone wearable devices, instead it becomes vital to create a complete ecosystem in which sensors in a body area network seamlessly synchronize data to cloud services through the IoT infrastructure [9, 10, 11]. The architectural elements generally needed in healthcare IoT systems (Health-IoT) are illustrated in Figure 1. The architecture includes three main components: i) body area sensor network, ii) Internet-connected gateways, and iii) cloud and big data support. Various applications provide services to different stakeholders in the system through this platform. Data generated from sensors attached to users is made available to caregivers, family members and authorized parties giving them the ability to check the subject's vital signs from anywhere at any time.

Figure 1.0: IoT based generic monitoring system

Yue et.al (2020) [12] article describes the development of a hardware-software complex for monitoring the health status of a vehicle driver, which uses portable devices to control the physiological parameters of a person and transfers data to a mobile terminal or uploads it to a cloud server for data analysis. For Nduka et.al (2019) [13] Remote Health Monitoring (RHM) system sense certain human vital signs such as, temperature, respiration, and heartbeat (pulse) which is connected in real time environment. They built RHM system on Arduino UNO board which houses other microcontrollers and sensor paired with IOT Gecko, physicians can view patient's vital sign reading in real-time irrespective of their geographical location. When these body vital signs fall below or above normal parameters, the system triggers an alarm, giving physicians the opportunity to carry out timely individualized intervention on patients in crisis. Chao et.al (2017) [14] proposed a pervasive monitoring system that can send patients' physical signs to remote medical applications in real time. The system mainly composed of two parts: the data acquisition part and the data transmission part. The monitoring scheme includes monitoring parameters and frequency for each parameter in data acquisition part, and designed it based on interviews to medical experts. Multiple physical signs were found like blood pressure, ECG, SpO2, heart rate, pulse rate, blood fat and blood glucose as well as an environmental indicator (patients' location) was designed to be sampled at different rates continuously. Four data transmission modes were presented taking patients' risk, medical analysis needs, demands for communication and computing resources into consideration. A sample prototype was implemented to present an overview of the system. In their studies Yadav et.al (2018) [15] familiarizes the status of IoT growth In India, reviews the Risk factor, security issues and challenges in India. Lakkis (2017) [16] focus on two essential categories the emergency and the operational services. They tried to highlight new ideas of handling these services using IoT.

III. BACKGROUND

a) Remote Health Monitoring System

Remote patient monitoring (RPM) is a subcategory of homecare telehealth that allows patients to use mobile medical devices and technology to gather patient-generated health data (PGHD) and send it to healthcare professionals. Common physiological data that can be collected with RPM programs include vital signs, weight, blood pressure and heart rate. Once collected, patient data is sent to a physician's office by using a special telehealth computer system or software application that can be installed on a computer, smartphone, or tablet.

b) Possible data analysis methods

The data collected from multiple patients using remote health monitoring system regarding different disease or the health status, can be utilized at multiple levels for data analysis purpose likely to be as following.

- **Group Wise Analysis:** To compare healthcare statistics between different patient groups like age wise, gender wise, region wise, or the profession wise
- **Single Patient Delta Checking:** To check the health statistics of same patient at multiple time instance to see the variations in patients' health.
- **Cross Patient Data Analysis**: Comparing the health statistics between multiple patients with similar properties and scenarios.
- **Location Wise Analysis:** Comparing the health statistics of multiple patients from multiple locations or the region to understand the quality of life and health from different areas
- **Disease wise Analysis:** Tele-healthcare with advance sensors can be utilized to collect the information of different, so that disease wise data comparison can be done.
- **User Acceptance Analysis**: Since the tele-health care is primarily designed for home care patient so the actual use of system is based on the acceptance of the users, so

the analysis can be done to identifying the actual usage of the system based on time.

c) Data analysis depth

Remote health monitoring system is surely a individual patient utilization concern, but at large scale level government's primary agenda is about maintaining a good health care in society, hence overall system needs to work like complete eco system and not a individual patient. This patient health statistics data could be at multiple level as illustrated in figure 2.0. Proper classification of health data could help in backtracking the origin of the disease or the health issues and could help in taking control over global medical issues.

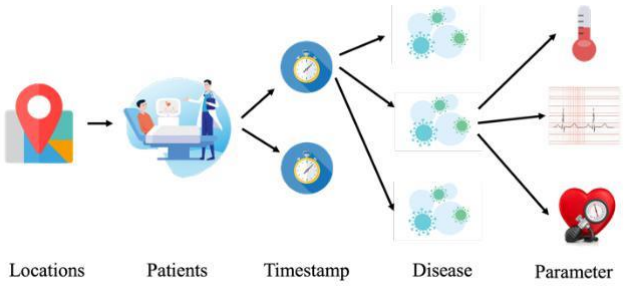


Figure 2.0: Data analysis depth level

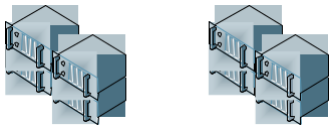
d) Data Compare method

Comparing any two or more time-stamp data is the standard method for cross checking the progression in health issues. Primarily considering the data analysis of individual patient three methods are employee as illustrated in figure 3.0 and stated below.

Delta compares: Comparing multiple time-stamp data for individual patient for single health parameter is called as delta checking. This is primarily to detect individual health issue or symptom.

e) Connectivity challenges

Data exchange assurance is most important aspect in real-time patient monitoring healthcare devices as failure of emergency data transfer within minimum threshold time may lead to critical situation [17,18]. Considering wrong data and the failure of data communication there are multiple possible level of failure starts from wrong contact of device with patients to failure of cloud service provider. Even though researcher may have solution to possible failure level, but it is all depend upon the deployment feasibility and the demand or return on cost of implementation. Some level may get alternative solution or backup solution but at some level, finding the backup or alternative solution at real-time may not feasible options. Figure 4.0 illustrated the multiple level of failure in medical device data exchange with from device to service.



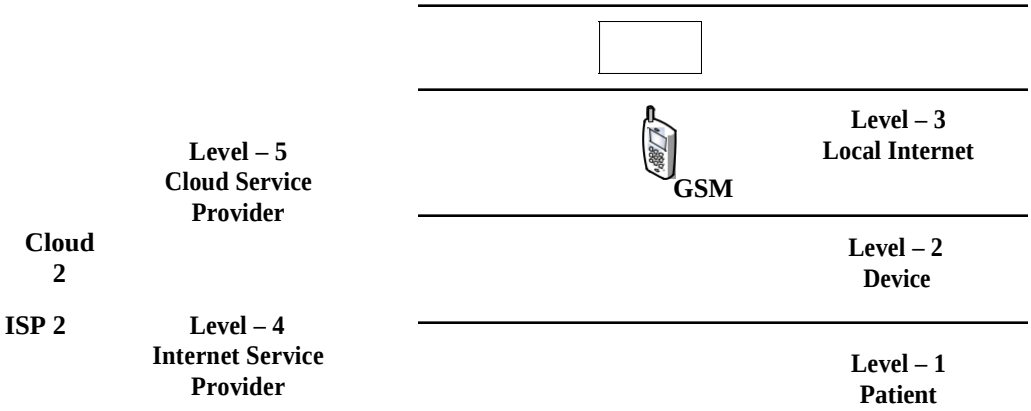


Figure 4.0 multiple level of possible failure in communication.

Level 1. Patient negligence: considering the situation at ground level data transfer may different or send wrong value in case of improper placing of the sensor or the device. This is very rare and negligible issues since after right training or the experience patient can use the device as per the standard operational procedure (SOP).

Level 2. Deice malfunctioning: in rare case, medical device fails as these products are built by following the medical grade standards but still situation cannot be ignored. Malfunctioning or failure of the device may lead to loss in data or create barrier in communication. Solution to these problems has different discussion area and cannot be mentioned with specific explanation.

Level 3. Local internet issues: if the local internet connectivity fails will lead into communication failure. The

Parameter compare: Parameter comparison is primarily designed for detecting the ranges of multiple health parameter at any given timestamp to understand the overall disease progression.

Record time: This is a complete time range recording for any given time range or from the disease detected till the health issue neutralized. This is continuous monitoring

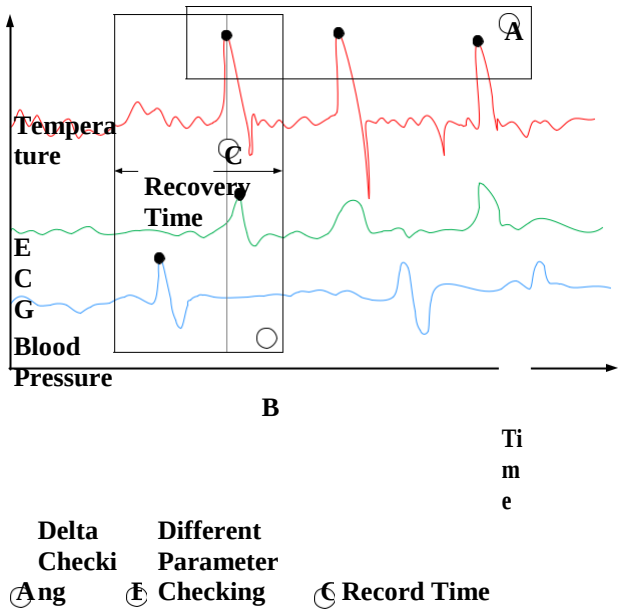


Figure 3.0: Health statistics comparison analysis

only solution to this problem is to keep back up line of multiple mode like, mobile data, wired internet or Wi-Fi access. This solution is also dependent upon the connectivity methods supported by the specific healthcare device.

Level 4. ISP failure: again, this is a rare case where internet service provider failed to provide service by means of any technical or logical error. It may have multiple reasons starts from the user account activation, billing issues or may be due to service upgradations. This issue affects wide customer base using the same service provider. Solution to this problem is to keep multiple service provider options with user.

Level 5. Cloud service failure: this could be the major issue is the cloud service provider fails to provide service. These problems may be due to failure in hardware but in maximum case it happens due to software as a service failure.

f) Challenges In Portable Connected Device Security

It's no secret that the Internet of Things and the cybersecurity don't go well together. Thousands of portable connected devices are finding their ways into homes, businesses, industry, transport, healthcare, and many other areas of our lives, but security is rarely high on device manufacturers' list of priorities. In the young and booming connected ecosystem, there are no industry standards for architecture or security and devices often use custom-built operating systems and proprietary communication protocols [19].

. Internet of Things security remains a veritable minefield and problems with connected device cyberattacks and malware can only continue to grow along with the number of devices. Identified issues in connected device securities are likely to be,

- Weak, Guessable, or Hardcoded Passwords
- Insecure Network Services
- Insecure Ecosystem Interfaces
- Lack of Secure Update Mechanism
- Use of Insecure or Outdated Components
- Insufficient Privacy Protection
- Insecure Data Transfer and Storage
- Lack of Device Management
- Insecure Default Settings
- Lack of Physical Hardening

IV. PROPOSED SOLUTIONS

Based on the research survey and study we propose the system that will be a multiple layered architecture with different functionality utilization through different type of users. Figure 1.0 illustrates the multiple layers involved in the system. Where every layer has its own research and development. The system must be medical grade to be ready to deploy and easy functioning for different users.

This system is designed keeping primarily four type of users 1). Patients 2). Doctors or hospitals 3). Device manufacturer and 4). Medical associations.

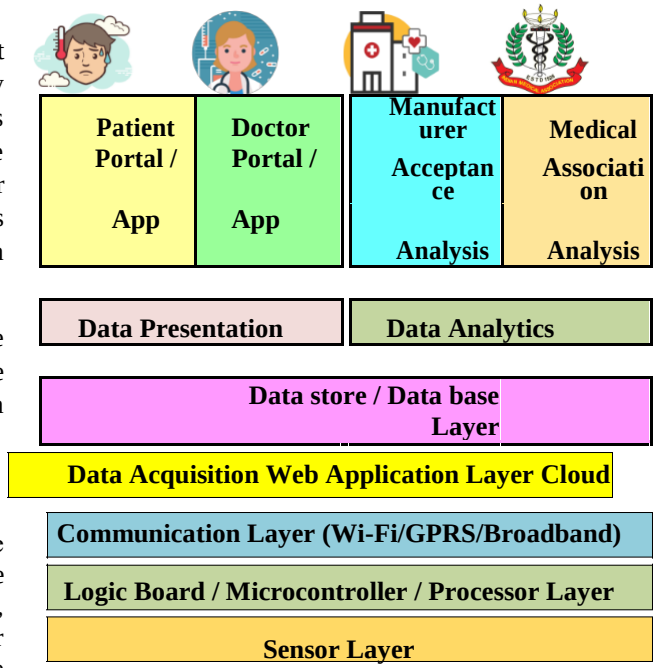


Figure 5.0: Multi layered proposed solution

Development and deployment of the system is defined as different stages as mentioned below.

Stage 1: Design and development of portable ICU system with sensors like temperature, ECG, heartbeat, blood pressure, and oxygen. This system will be having Wi-Fi or GPRS link to connect to internet and send the sensor in formation to web service. This system will be portable enough to carry anywhere and work on low power supply.

Stage 2: Development of web service to receive the information for the sensor hardware. This will receive the sensor input information and validate the information for valid source. Once the information gets validated it will store the information to the database for further analysis and the presentations.

Stage 3: Developing the web-based data representation application to plot the patient information in required graphical format. This platform will have option to feed patient information like demographic, symptoms, disease, or environmental. This will have tool to perform graphical analysis and show data in running comparison chart format for better understanding and visualization.

Stage 4: Developing the BI engine to generate the data manipulation and indexing functions to retrieve the information in minimum time. Here system will be enhanced to perform different analysis regarding location, disease, patient, parameters.

V. CONCLUSION

The scope of the proposed system is the implementation of real-time monitoring system for remote patients at the rural areas especially elderly and disabled patient using wireless technology. As IoT technology is emerging day by day, the use of latest IoT technology may increase the ap.

disabled patients and reduce stress for family and doctors who can be alerted and react immediately as soon as issues arise.

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The Influence of Distance on the Reception in Molecular Communication

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Abstract - **Nanotechnology has greatly advanced the development of nano-communication networks capable of performing complex tasks. These networks allow communication between transmitting and receiving nanomachines through molecular communication and have numerous applications in the field of medicine, including targeted drug delivery. This method minimizes the possibility of adverse effects on healthy body parts by delivering the drugs directly to the affected area. The transmitting nanomachine releases the drug molecules, which are then absorbed by the targeted location. The distance between the transmitting and receiving nanomachines plays a crucial role in the accuracy and timeliness of drug delivery. This study investigates the effect of varying this distance on the reception of the molecules, the peak reception of molecules, and the time at which maximum reception occurs in molecular communication. We found that as the separation between the sender and the receiver increases, the number of molecules received decreases and the latency increases.**

*Keywords—**Nanotechnology, Molecular Communication, Targeted drug delivery, nanonetworks***

I. INTRODUCTION

Nanotechnology covers wide-area applications at the nanoscale. Molecular Communication is one of the branches of nanotechnology increasing researchers' attention day-by-day due to the incapability of traditional communication, such as, electromagnetic and acoustic communication at the nanoscale [1]. In Molecular Communication, the molecules carry information as a carrier from the source to the receiver. The transmitter emits the molecules which propagate in the environment till they reach the receiver [2]. Applications of Molecular Communication are in a variety of fields including health, environment, military, and information communication theory [3]. In the field of medicine and health, molecular communication is found to be very effective due to its bio-compatibility [4]. Targeted drug delivery is a biomedical application of molecular communication, where drug particles are delivered to the diseased part, such as, cancer tumors avoiding their reach at the healthy part of the body. An accurate concentration of the drug molecules at the tumor site avoids toxicity of the drug due to heavy dosage [6 - 10]. A high transmission rate may cause the accumulation and loss of drug molecules. On the other hand, a low transmission rate may cause insufficient reception of drug doses at the tumor site in the required time duration, causing a lack of proper treatment. Accurate placement of the transmitter and receiver to receive sufficient dosage at right time is very important.

This study focuses on the examination of the influence of the separation between the sender and the receiver. The maximum reception is observed at different time instants varying transmitter and receiver distance. Results are then evaluated to find the perfect placement of the transmitter and receiver to achieve maximum system throughput. In this study, we are identifying what is the exact effect of distance on the intensity of received molecules, the period at which maximum reception occurs, and the peak reception of molecules.

II. LITERATURE REVIEW

Most research work in molecular communications has been based on the factors affecting the system's performance, such as channel capacity, delay, attenuation, noise, Inter-Symbol Interference (ISI), and amplification. Various models have been proposed and analyzed in the study, such as, diffusion-based, diffusion with drift, random walk, active transport models, random walk models with drift, and a collision-based model [11 - 13]. Al-Zubi et al. [14] have compared various reception methods for molecular communication. The performance of passive and completely absorptive receivers is estimated by analyzing the peak amplitude and peak time. Sharma et al. [15] analyzed the 3-Dimensional diffusion-based molecular communication system model. System performance is examined in terms of receiver characteristics, erroneous alarms, capacity, and possibility of average error. Lopez et al. [16] have presented a study on transmitters' location and desired signal strength. Islam et al. [17] address a drug release synchronization issue in the local drug delivery system having multiple transmitters. This study aims to reduce the transmission period error caused by the propagation lag. Zhao and team [18] have derived the minimum efficient intensity of drug particles from the minimum effective receiver capacity.

III. SYSTEM MODEL

Fig. 1 depicts the system model for molecular communication considered in this study. The system considered in this study consists of the transmitter as point source and spherical receiver located 'd' distance apart from each other in an aqueous environment. Molecules transmitted from the transmitter propagate via an aqueous environment by the process of diffusion modelled by Brownian motion.

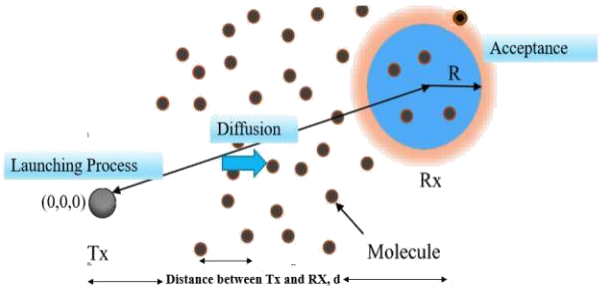


Fig. 1 System Model

The diffusion coefficient, D is used to characterise Brownian motion., presented by

$$= \frac{}{\eta}$$

where,

Kb = Boltzmann Constant ($1.38*10^{-23}$(J/K), T= Temperature in kelvin,

η= Viscosity of the medium,

rc=Radius of the considered molecules

Binary Concentration Shift Keying (BCSK) is the modulation technique employed, in which the transmission of molecules represents the binary symbol 1 and the transmission of no molecules represents the binary symbol 0.

IV. METHODOLOGY

The molecule diffusion and reception process shown in fig. 2 start with the release of molecules in the environment. Initially, they are set to zero position at the transmitter. The receiver boundary limit is set to check the number of molecules that can be absorbed by the receiver, remaining molecules outside the receiver molecules are not counted considering signal strength. Initially, the count of received molecules at the receiver is zero. Then molecule displacement is calculated by using the formula:

molecular displacement = normrnd (molecule position, sigma) **(2)**

which generates a random number from the normal distribution with mean parameter molecule position and standard deviation parameter sigma.

Where, sigma= [√(2*D*delta_t)] **(3)**

D= Diffusion coefficient

The molecule position is updated by adding the initial molecule position with displacement. Then molecule position is checked whether it is in the receiver boundary. All molecules within the receiver boundary are considered successful reception. The number of received molecule numbers is added to previously received molecules. All the molecules outside the receiver boundary are not added to the number of the received molecules considering signal strength. The Sum of the release is then checked whether it is greater than zero. If yes, new molecular displacement is calculated, and molecule position is updated to check whether it has reached the receiver boundary successfully. Otherwise, the entire process of diffusion and reception is implemented for new releases.

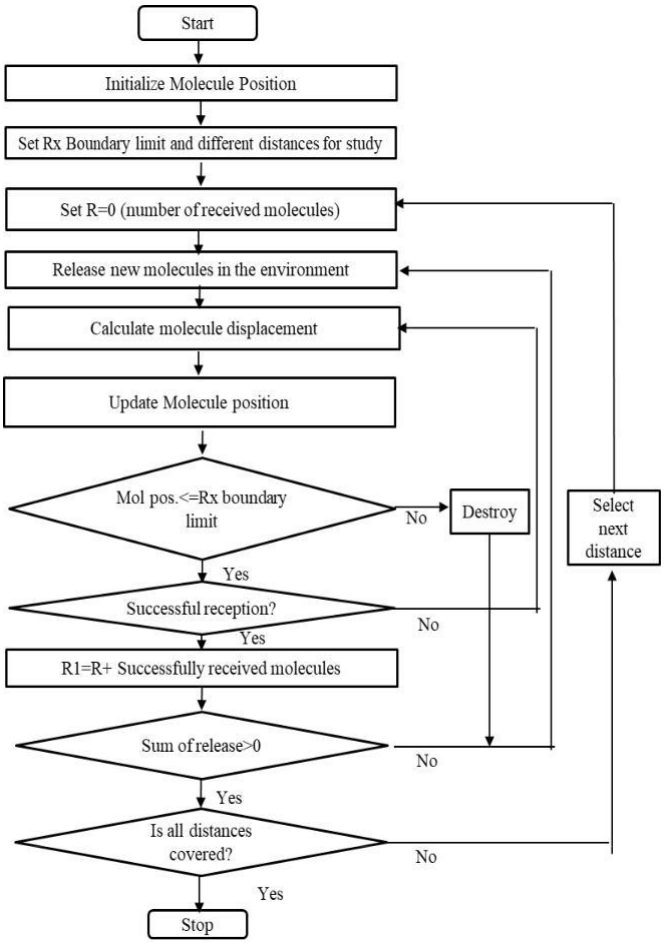


Fig. 2: Flowchart of proposed Molecular Communication

V. IMPLEMENTATION

Molecular communication system model considered in this study consists of single transmitter and receiver in 3D environment. The molecule type considered is single with modulation technique used BCSK. Simulation parameters considered in this simulation are mentioned in table 7.1.

Table 7.1 Simulation Parameters

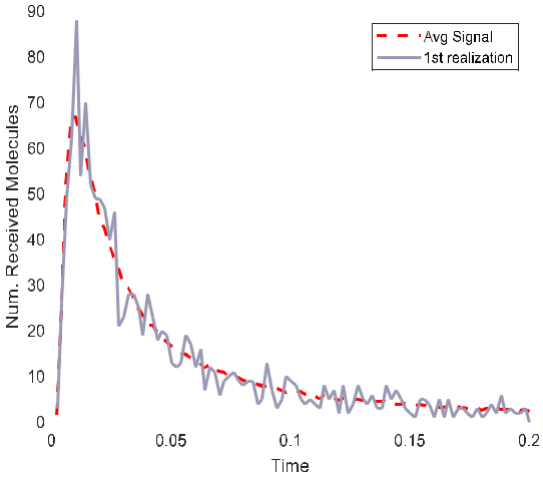
Sr No	Parameter Name	Value
1	Tx Node	1
2	Rx Node	1
3	Tx node coordinates	(0,0,0)
4	Rx node coordinates	(6,0,0)
5	Destruction limit	60um
6	Diffusion Coefficient(D)	100 um2
7	Distance between Tx and Rx (d)	2 um
8	Molecule type	1

9	Symbol sequence length (nsym)	1
10	Modulation type	BCSK
11	Sampling duration (tss)	0.001 sec
12	Simulation step size (delta_t)	0.001 sec
13	Total simulation time (Ts)	1 sec

VI. RESULTS

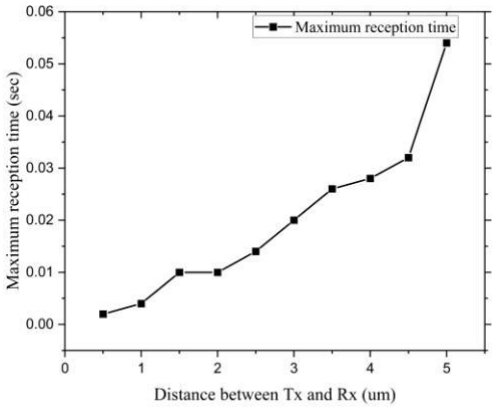
The simulation was carried out to understand the behavior of the system. The parametric study was carried out to observe the performance of the system at various conditions. The following Graph 1 shows signal strength received at different time intervals. Distance between Tx and Rx 2 µm, simulation step size 0.001sec for total simulation time of 1 sec.

A parametric study was done where the distance between the transmitter and receiver is changed to observe the



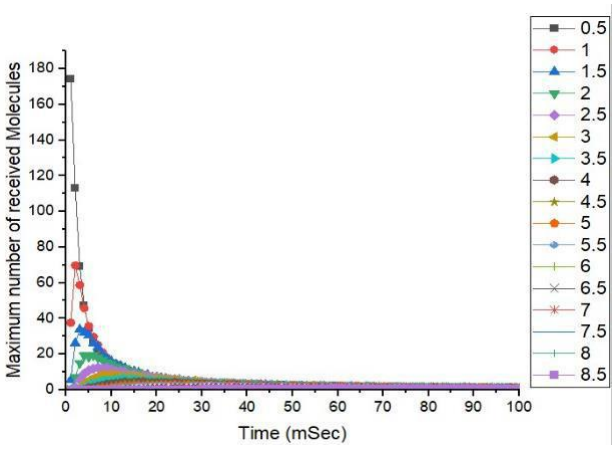
Graph 1: Signal strength at different time intervals

time at which the maximum number of molecules are received. Graph 2 shows the effect of variation in the separation between the sender and the recipient on maximum reception time. As the separation between Tx and Rx increases the time required for the reception is more.

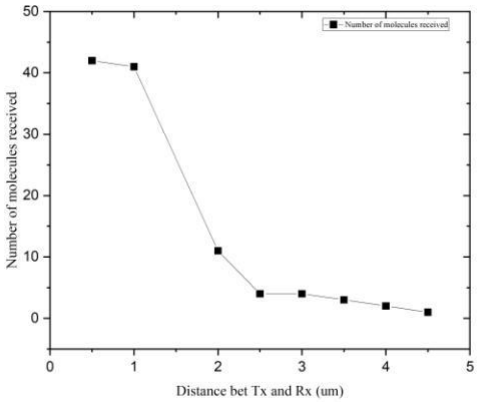


Graph 2: Distance between Tx, Rx Vs Maximum reception time

The following graph 3 shows the variation in maximum reception at different time intervals for the different values of separation between the sender and the receiver. As the separation between Tx and Rx increases, the time elapsed for maximum reception increases.



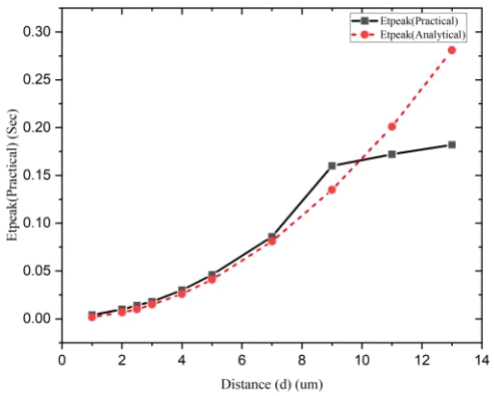
Graph 3: Received molecules observed at different time intervals for changing distances between transmitter and receiver



Graph 4 Distance between Tx and Rx Vs Number of received molecule

We have also observed the system performance by changing the separation between the sender and the recipient at different values and observing the peak reception of molecules. The theoretical formula for calculating Etpeak [19] is given by,

$$Etpeak=(d2/6D)\ Sec \qquad \textbf{(6)}$$



Graph 5: Distance Vs Etpeak

For the analytical and simulation scenarios, distance versus Etpeak is provided. The analytical formulation is supported by simulation results. The time required to observe the peak increases by a factor of four when the distance is doubled.

VII. CONCLUSIONS

In this paper, we focused on the effect of distance on the maximum reception of molecules. We considered a 3-D molecular communication system where propagation occurs by diffusion. In this study, we observed what is the influence of distance on the amount of received molecules, peak reception time, and the maximum reception of molecules. Simulation study shows that as the separation between the sender and the recipient increases, the amount of received molecules decreases while time required for reception increases. It is also observed that the time required to observe the peak increases by a factor of four when the distance is doubled, which validates the theoretical formula.

Future work will be the subject of study focusing on the molecular collision at reception and transmission rate optimization.

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Automated Personality Prediction

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Abstract — **It's true that organizations often face the challenge of selecting the right candidates from a large pool of applicants. The proposed system that parses data from CVs and resumes, and conducts quizzes to predict personality, can potentially help organizations identify the most suitable candidates for their development.**

Logistic regression is a popular statistical method used to model the relationship between a dependent variable and one or more independent variables. Pyresparser is a library in Python that can be used to extract information from resumes or CVs. Overall, the proposed system can help organizations streamline their recruitment process and find the best candidates for their development. However, it's important to note that the system should be used as a tool to aid recruitment decisions, rather than as a substitute for the entire process.

Keywords — ***Personality Prediction, Pyresparser, Logistic Regression, CV, Resume***

I. INTRODUCTION

The Big Five Test is a commonly used personality assessment tool that evaluates an individual's personality based on five core traits, namely openness, conscientiousness, extraversion, agreeableness, and neuroticism. These traits are believed to be stable across an individual's lifetime and can predict their behavior and performance in various settings, including the workplace. Using logistic regression, a machine learning algorithm, to analyze the Big Five Test score along with the candidate's CV, can help organizations identify candidates who possess the right personality traits for the job. By utilizing machine learning, the algorithm can learn from past data and predict future outcomes accurately, making it a powerful tool in the recruitment process.

However, it is important to note that personality assessment tools like the Big Five Test have limitations, and they should not be the sole criteria for selecting candidates. Other factors like experience, education, and skills should also be considered to make a fair and unbiased decision.

In summary, using machine learning to analyze personality traits can make the recruitment process more efficient and effective. It can help organizations identify candidates who possess the right personality traits for the job and contribute to the overall success of the organization. However, it is crucial to use this tool in conjunction with other selection methods to ensure a fair and unbiased hiring process.

- MODEL OF THE OCEAN

Extraversion (E), Openness (O), Conscientiousness (C), Agreeableness (A), and Neuroticism (N) are the five

variables used to analyze a person's personality.

1. OPENNESS: This quality is characterized by traits like acceptance, imagination, and curiosity.

2. CONSCINTIOUSNESS: Conscientiousness refers to a high degree of deliberation, an attitude of goal-orientedness, and good judgement.

3. EXTEAVERSION: Energy, talkativeness, and assertiveness are qualities of extraversion, which is also known as extroversion.

4. AGREEABILITY: Agreeability refers to the characteristics of a person, including trust, affection, and social behaviour.

5. NEUROTICISM: Neuroticism is characterised by traits like depression, moodiness, and abrupt emotional outbursts.

Using Pyresparser to extract information from the candidate's CV can be useful in automating the initial screening process. This can help organizations save time and effort in manually reviewing each CV. NLTK, on the other hand, is a powerful natural language processing tool that can

be used to analyze and understand the text in the CV.

Combining the information extracted from the CV and the Big Five Test score can provide a more comprehensive understanding of the candidate's personality and suitability for the job. However, it is important to note that CV analysis should be done carefully and objectively to avoid biases or discrimination based on factors like age, gender, or ethnicity.

In addition to the Big Five Test and CV analysis, other selection methods like interviews, reference checks, and skills assessments should also be used to make a fair and informed decision about the candidate's suitability for the job. Using a combination of these methods can help organizations make more accurate and reliable predictions about a candidate's potential performance in the organization.

II. LITERATURE SURVEY

Jenal Parmar[1] devised a system to aid businesses in choosing the best candidates for open vacancies. The HR department will include the qualifications, experience, and other details required for a particular job position. The system will take the details and CV/Resume of the candidates and then shortlist the right person suitable for that job profile. Allan Robey[2] built a system using modern technology. It will help to pick the right candidates effectively and efficiently. The system will conduct a weight-age policy and an aptitude test to understand the personality of the candidate. In this way, top candidates are shortlisted. Sudhir Bagade[3] says that personality plays an important role in one's individual life and also in the development of any organization. An online application has been developed that analyses the personality of a candidate based on their CV or Resume. The system uses the TF-IDF algorithm to
select the right candidates. Atharva Kulkarni[4]built a system using different machine learning algorithms for predicting the personalities of the candidates using Natural Language Processing. At last, Random Forest achieves better accuracy than remaining algorithms such as KNN, Logistic Regression, Support Vector Machine, and Naive Bayes. VVCET-CSE[5]The system will predict the personality based on the ranking policy. It will rank the skills, experience, and other aspects of the uploaded resume. The candidates also take the aptitude test and answer personality questions. They also receive the result in the form of a
graphical representation. Afroja Khatun Monalisa[6]built a model using the Random Forest Algorithm, Support Vector Machine, and Weighted Majority Voting algorithm. Firstly, resumes or CV's are uploaded into the system and candidates are shortlisted based on the administrator's request. The shortlisted candidates receive personality and ability test links, which they need to answer, and then they receive their scores. Based on the scores and the department's requirements, candidates are shortlisted. Gangandeep Kaur[7]developed a system using a machine learning technique known as Logistic Regression. The system estimates the applicant's emotional aptitude through a psychometric analysis and predicts personality by using the OCEAN model. The details of the candidates are protected by using a password encryption algorithm, and the passwords are known only to the required individuals. The candidates can know whether they are selected for the interview via dashboard and SMS.

III. EXISTING SYSYTEM

The use of machine learning in the recruitment process can significantly improve the efficiency and accuracy of candidate selection. By predicting the candidate's personality traits, organizations can ensure that they hire individuals who are not only skilled and experienced but also possess the right traits for the job.

Automating the candidate grading system can also help organizations save time and resources in the recruitment process. The system can quickly and accurately analyze a large number of applications and provide a shortlist of candidates who meet the job requirements and possess the desired personality traits.

However, it is important to note that machine learning models are not perfect and can have biases or errors. Therefore, it is crucial to continuously monitor and evaluate the performance of the model to ensure that it provides fair and unbiased predictions. Additionally, organizations should also use other selection methods like interviews and reference checks to ensure that the selected candidate is a good fit for the job and the organization's culture.

IV. PROPOSED SYSYTEM

Using machine learning algorithms for personality assessment and CV analysis can indeed help organizations in selecting the best candidate for a particular job profile. The use of psychometric tests and personality assessments can provide valuable insights into an applicant's personality traits, which can be essential in determining their suitability for the job. Logistic Regression is a popular machine learning algorithm that can be used to build a predictive model for personality assessment. This algorithm can analyse large amounts of data and provide accurate predictions based on a set of input features.

The proposed system as a web application can provide a user-friendly interface for both the administrator and the applicant. The administrator can add or modify questions, and the applicant can complete their registration and provide their CV information. Keeping the results of the aptitude tests and personality assessments in a database can help organizations track the progress of each applicant and compare their scores with other candidates. This can provide valuable insights into each applicant's strengths and weaknesses and help the organization make better decisions during the recruitment process.

Other factors like job experience, skills, and references should also be considered. Additionally, the range of predetermined answers for each question in the personality test should be carefully selected to ensure that the test provides accurate and unbiased results.

A. Methodology

The user is asked to enter their answers to a quiz, and also upload their CV or resume along with their personal details. The system then uses machine learning algorithms to predict the candidate's personality based on their quiz answers, and parses the CV or resume to extract relevant details such as name, email, phone number, skills, experience, and predicted personality. The output is displayed on the screen for the user to review.

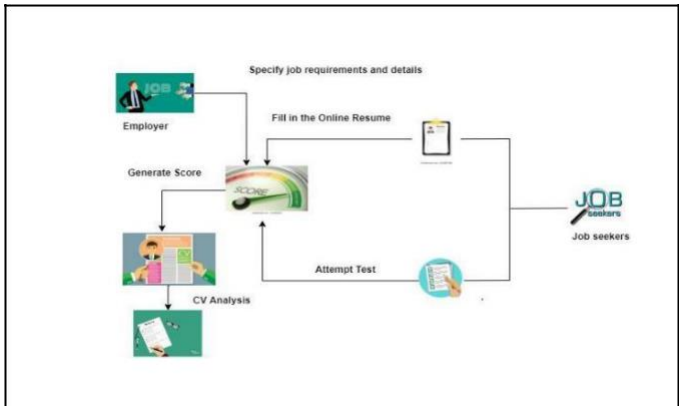

FIGURE 1 – METHODOLOGY

V. RESULT

When the candidate wants to apply for any job, he/she needs to take the quiz. A window gets opened where the candidate needs to fill the details and upload the CV or resume. The candidate fills the details, uploads CV or resume and answers the personality based questions. The resume or CV is scanned by the model and personality of the candidate is predicted based on the ocean model which are displayed as output. The obtained results are as follows:

FIGURE 2 – RESULT

FIGURE 3 – RESULT

FIGURE 4 – RESULT

FIGURE 6 – RESULT

CONCLUSION AND FUTURE WORK

In this project, we have identified the personalities of different people based on the test known as the BIG FIVE TEST. and also extracted the information from CV's using Pyresparser and the model built using Logistic Regression. Based on the test, we can know the qualities and personality of a candidate, and through CV analysis, we can know the skills and qualifications of a person. Using these two important factors, we can make the hiring process easy, fast and also help in hiring the right candidate with fair decisions. As only Logistic Regression is used in the proposed work, many classification algorithms of machine learning can be used to upgrade the system for much better functionalities [3]. So that the time will be consumed and also an expert candidate can be recruited by the company. This model will help a lot for companies to recruit expert candidates for particular job profiles.

FIGURE 5 – RESULT

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Digital Multimedia (Image) Forgery Detection

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Abstract—**Society is becoming increasingly dependent on the internet and so does it become more and more vulnerable to harmful threats. These threats are becoming vigorous and continuously evolving. These threats distort the authenticity of data transmitted through the internet. As we all completely or partially rely upon this transmitted data, hence, its authenticity needs to be preserved. Images have the potential of conveying much more information as compared to the textual content.We pretty much believe everything that we see. In order to preserve/check the authenticity of images, image forgery detection techniques are expanding its domain. Detection of forgeries in digital images is in great need in order to recover the people's trust in visual media. This paper is going to discuss different types of image forgery and blind methods for image forgery detection. It provides the comparative tables of various types of techniques to detect image forgery.**

*Keywords**: Image Forgery, Forgery Detection, Fake Pictures, Blind Methods***

I. Introduction

Image Forgery is not a modern concept as it comes along with the invention of photography. But it comes into the limelight nowadays, with the invent of easily accessible digital cameras supported with image editing software tools. Digital visual media, nowadays, represent one of the prominent techniques of exchanging information, because of the increase in easy to use and inexpensive devices. Moreover, visual media has greater expressive potential than any of the existing media.

Malicious modification of digital images with intent to deceive for the sake of altering the public perception is termed as Digital Image Forgery. The modificationis done in such a way that it hardly leaves any visually detectable traces. Manipulation of Digital images is not any longer defined to experts with all the arrival and dispersal of handy image editing tools and softwares.

Copy-move forgery detection in digital images is a method that makes sense and works well. This type of counterfeit involves copying a portion of the image and moving it to an alternative location within the original image.

Figure 1: Example of Image Forgery

Copy-move simply entails pasting picture blocks into the same image while concealing crucial information within the image. As a result, the image loses its validity and loses its individuality. Techniques for detecting fake digital images fall under two categories: active approach and passive approach. Digital images used in the active approach mostly involve techniques like signature and watermarking that are recorded inside the image at the time of production and require some prior knowledge. In a passive technique, traces of tampering are detected using statistics and the substance of the available information rather than prior knowledge of the image and its properties. There are several approaches that have been developed to identify copy-move fraud, and they can be divided into two groups: block-based methods and key-point-based methods. The detection of forgery attacks can be done in a number of ways.

The development of digital imaging techniques has made it extremely simple to keep any instance of a digital image, and this data is being widely used for a variety of different applications like forensics, multimedia, electronic media, and observational strategy. Anyone can alter an image's real information and damage it thanks to the development of modern editing technologies.

Some transformations, including scaling and rotation, are possible in copy-move forgeries. There are various techniques available to find those conversions. Digital photography is now the standard technique for producing, processing, and archiving visual memories and proof. This technology has a lot of benefits and can be used to obfuscate

facts and proof. This is due to the fact that digital photographs may now be altered in such perfection that counterfeit cannot be seen.
The validity and integrity of digital photographs are crucial in areas including forensics, medical imaging, and e-commerce. Images are used by doctors and researchers in the medical profession to make diagnoses, which is essential because one is dealing with human life. Because of the development of information technology and the internet, e-commerce has dramatically increased in recent years.

II. LITERATURE SURVEY

A methodology based on transform invariant features has been proposed by the author in [2]. The foundation of this system is the MPEG-7 standard's image signature tools. Fast picture and video retrieval is made possible by these techniques. Such programmes are mostly made to find duplicated areas in images or videos that are actually different images. The author's goal is to identify the duplicated area in the same image.

Dempster-Shafer Theory of Evidence is applied in [6]. Decision fusion approach for picture forensics is the paper's main focus. The suggested system combines the measurement level in its operation, allowing it to maintain the pertinent data. The suggested framework consists of:

- The application of the Dempster-Shafer theory of evidence-based soft reasoning approach.
- The simplicity with which newly accessible information can be included.
- The architecture that offers hierarchical structure enables trade-offs between the level of detail in the fusion-provided information.

SIFT features are chosen in [8] to position the cloning section on the correlation map from beginning to end. But, data sets not indicated and obtained in this manner are not taken into account for multiple forgeries. When analysing the SIFT identical approach and grouping of major points to distinguish the separated cloned area in [7], more than one forgery is taken into consideration. In any case, the procedure is only used to identify cloning and not extract modification.

The suggested approach in [9] is based on a novel feature that assesses the local presence of demo sacking artefacts. Demo sacking is a computer technique used to reconstruct a full-color image from a partial image sample generated by an image sensor that has a colour filter array placed on it. The features are extracted using green channel extraction, and the forgery map is created using filtering and map generation.

A spliced image detection method based on Markov features in the DCT and DWT domain has been proposed by the author in [10]. The suggested system comprises of two different types of Markov features, such as the extended Markov in the DCT and DWT domain, which are produced using the transition probability matrices. In order to quantify the dependence among wavelet coefficients across positions, scales, and orientations, the author uses the DWT domain in conjunction with the DCT domain to capture the correlation between DCT coefficients.

To find the particular artefact, a better DCT-based technique has been developed [11]. Fundamentally, DCT is applied to each block to reflect its features after the image has been divided into fixed-size, overlapping blocks. Duplicate picture blocks will be adjacent in the sorted list and trimming is used to lower the dimension of the feature vectors. As a result, in the matching step, identical image blocks will be compared.

The SIFT method, which can identify copy-move forgeries in a picture and estimate the parameters of the transformation used, has been utilised in [12]. It recognises the group of points that are part of cloned regions. The image is first subjected to feature extraction and matching, in which the important details are taken out of the image and compared to the original. The groups are then created using hierarchical clustering, and fabricated regions are then discovered.

III. PROBLEM STATEMENT

The major problems contained within for the detection of the image forgery are,Data Provenance: Data source is the initial problem in the forgery detection. Vast number of images are available on the internet, in order to detect the forgery, the source of the original image is needed for the protection of rights and may be for supervisory prerequisite in applications like science, medicine, financial transactions government legal prosecutions and many more daily situations, wher-ever the information is valuable and trustworthy.Benchmarking and Standard Data Set: The need for open data set for critical realisation of forging seems another problem in image forgery detection. The unavail-ability of the images in uncompressed form with differ-ent resolutions, sizes and image acquisition model with diverse contents are some of the needed image conditions for detecting the fake image from the original image which is critical to obtain.Duplicate Regions: Duplication region appearance in the original image with same size, shape and colour appears to be another problem to detect the image forgery.

IV. CATEGORIZATION OF IMAGE FORGERY TECHNIQUES

The semantic information of an image is altered by addi-tion or extracting information from the image. In order to achieve image forging, numerous ways are used by the forgers. In general, there exist different types of image forgery. The categorization of the types of image forgery is a tedious task; this is because the forgery types are grouped based on the process involved creating the fake image. But in the current technical world, new inno-vations are made in digital photography, which increase new malicious forging techniques day by day. However,based on the existing types, a categorization is made in this research explaining different types of image forgery. Figure 2 depicts different types of image forgery

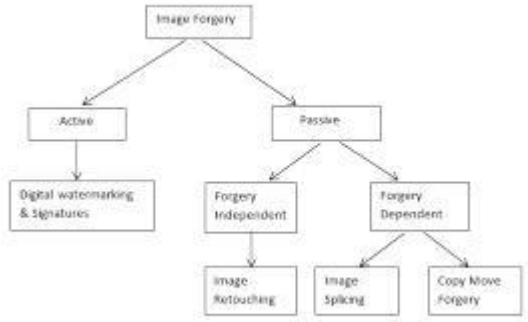

Figure 2: Types of Image Forgery

A) Copy Move Forgery

Copy Move copies and paste a specific portion of the image. Since the copied region represents the same image,the dynamic range and color remains the same. In this technique, we add or remove information to cover a part of the image. Some image or text is masked in the original image.

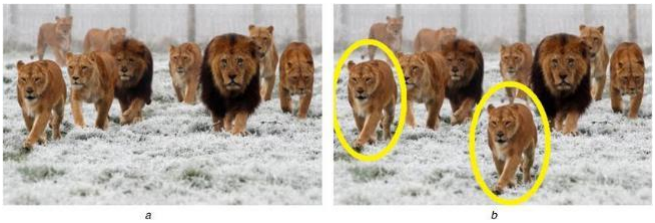

Figure 3: Copy Move Image Forgery

B) Image Retouching

Image retouching is adding or removing something from the image for enhancing features of an image. This technique is applicable for aesthetic, commercial users and it degrades the image features. Generally, it is popular among magazine photo editors, where they try to make an image more attractive by enhancing some features. Compared to all available forgery techniques Image Retouching is considered as less harmful. Removing blemishes on a picture of a model would be a great example of image Retouching.

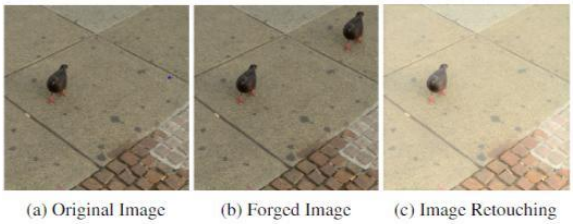

Figure 4: Image Retouching Forgery

C) Image Splicing

Image splicing is the method of making a composite image by cropping and combining two or more images. Unlike image retouching this technique is more aggressive for creating forgery images. A number of sharp transformations such as edges, lines, and corners can be introduced in a spliced image. Examples include the use of fake images by several infamous news reporting cases. Image splicing is used with later post-processing techniques like smoothing boundaries of fragments or even without post-processing.

Figure 5: Image Splicing Forgery

V. Proposed System

The entire process of the proposed system has been classified into phases for ease of operations.

A) The first phase consists of pre-processing of Images in dataset
B) The second phase consists of feature extraction for classification of images.
C) The third phase consists of classifier selection wherein we will code the model to check if the image is forged or not.
D) The final stage is classification where the image is classified as forged or real.

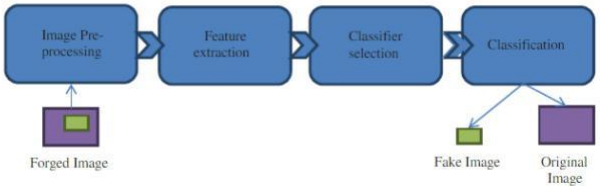

Figure 6: Stages for image forgery detection

As per the elaboration in the II we came to know that determining is an essential feature. Even after some alteration, the features of the identical blocks are similar. Technique relies on the copy move, and is dependent on invariant. SIFT is sort of invariant, demonstrated by Lowe et al. and justified invariant to picture and rotation. Moreover, robust to distortion caused by affine ranges, alteration of viewpoint, noise, illumination change and compression [13]

Scale Invariant Feature Transform

SIFT is a method used to remove specific invariant properties from images. It has primary point sensor and a representation of local attributes. Four phases are listed here for categorization:-

1. Scale-space extreme detection: Initial research or scales and location of picture, operated to see the extremes local in the space of scale. It consisting of:
    - Search over scales and location
    - Locate local extremes
    - A cascade filtering approach
    - Scale-space images for octave

2. Key point localization: To formative position and scale at every entrant location a comprehensive

representation is well. In addition to key points are elected based on procedures of their firmness.

- Choose key points from local extremes
- Recognition of local key points
- Exclusion of key points.

3. Orientation assignment: For every main point single otherwise, extra orientations are given relied on confined picture slope guidelines. Whole next time operations are carried on picture information that altered comparative to the assigned direction.

4. Key point descriptor: The local picture gradients are calculated at chosen scale area in the region of every main point. These are altered into a depiction that permits amend in illumination for noteworthy levels of limited form deformation.

First and foremost, main points have been identified by using filtering, which effectively evaluates candidate places or locations before further in-depth investigation. Finding the location is the first stage in determining the major points and scale that can be repeated in a different view within the context of the item. Finding the positions that are stable in a scale-altered image requires looking for constant characteristics throughout every practical scale change, using a constant scale definition that is acknowledged at the same time as the level gap. The assumptions that the Gaussian function is just the possible scale-space kernel were shown by Koenderink and Lindeberg in 1994.So that, space of a picture is stated as a variable-scale Gaussian, G (x, y,), with an input image l (x, y):

L (x, y,) = G (x, y,) * l (x, y)

Where * is the convolution operation in x and y and G (x, y,) = (1/2 2) *e-(x*x + y*y)/2^2

In context for correctly sensing detect steady key point positions in scale space, reliant scale space peaks in the differentiation of Gaussian function present by means of the picture, D (x, y,), dissimilarity of two in close proximity scales estranged through steady aspect k:

D (x, y,) = (G (x, y, k)-G (x, y,)) * l (x, y)

= L (x, y, k)-L (x, y,)

There are many justifications for choosing this specific function. D may be calculated by performing a straightforward image subtraction because, at first, it is a function that is primarily competent to be computed in any case for scale space feature description.

The scale-normalized Laplacian of Gaussian, 22G, and the normalisation of the Laplacian with the difference-of-Gaussian function are both closely estimated by the difference-of-Gaussian function.

For the correct scale invariance, factor 2 is required. When compared to a number of more likely picture functions like the gradient, Hessian, or Harris corner function, the maxima and minima of 22G produce the majority of stable image characteristics. The heat diffusion equation explains the connection between D and 22G:

22G Can be computed from the finite difference approximation to using the difference of nearby scales at k and :

Experimental Result

2G = G (x, y, k) – G (x, y,)/ k

G (x, y, k) – G (x, y, (k-1) 2G

Principal components analysis (PCA)

One of the methods for taking high-dimensional data and using the relationships between the variables to talk to it in a more manageable, lower-dimensional structure without losing a lot of data is PCA. One of the simplest and most effective techniques for achieving such dimensionality decreases is PCA.

VI. Model Evaluation and Result

The human visual system served as the inspiration for SIFT, which is made up of non-linear linked neurons. They have already proven to have exceptional potential in a number of computer vision applications, such as object and picture detection. They might also be useful for a number of other things, like picture forensics. Image forgery is rather easy to perform with the tools that are currently accessible, and since it is so harmful, identifying it is essential. Due to the diverse origins of the photos, a range of artefacts appear when a piece of an image is transferred from one to another. While these artefacts might not be visible to the unaided eye, Sift's can spot them in photographs that have been altered. When we recompress such photos, the forged is enhanced differently due to the compression difference because the source of the forged region and the background images are separate.

In the suggested method, we use this idea by developing a deep learning-based model that can tell whether an image is real or fraudulent.

The distribution of DCT coefficients in a region that has been grafted onto another image is likely to be statistically different from that of the original region. Periodic patterns can be seen in the histogram as a result of the legitimate region being compressed twice: once in the camera and once in the fake. When the secondary quantization table is employed, the spliced segment operates similarly to a singly compressed region.

As previously mentioned, if an image contains a counterfeit, the forgery will compress differently from the rest of the image during recompression since the sources of the original image and the fabrication are different.
Analyzing the differences between the original image and its compressed version underlines the counterfeit element significantly. In order to train our deep learning-based model for identifying fake images, we use this data.

Model Evaluation:
Tested with 400 images
Original images: 200
Forged imageas: 200
Accuracy: 0.745
True Positive Rate: 0.95
False Positive Rate: 0.46

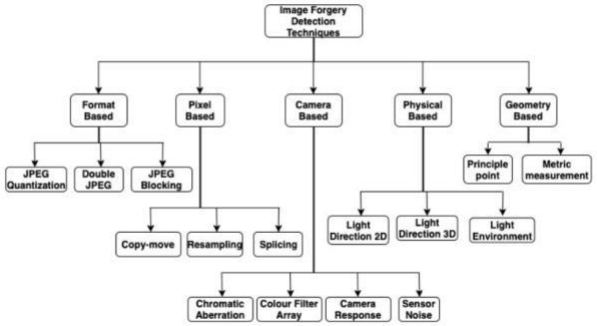

Fig 7 Image forgery detection techniques

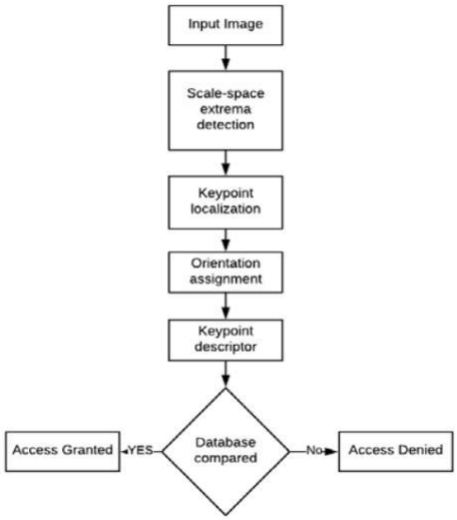

Fig 8:SIFT Algorithm Flow Chart

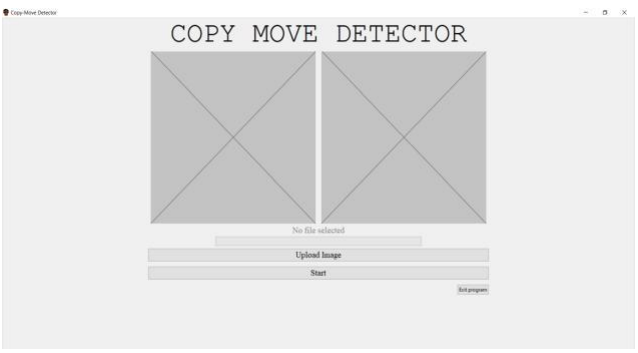

Fig 9: GUI of the Proposed System

Fig 10. Forgery Detected in Image using SIFT Algorithm

VII. Conclusion

The key point-based techniques are typically optimized by researchers to find Copy Move forgeries. Low execution time will be required because these techniques' processing demands will increase as the number of important points increases. In order to reduce time complexity, the researcher in this study optimized the FCM technique for clustering the SIFT key points. The experimental findings show that the suggested algorithm reduces detection times while maintaining essentially the same accuracy requirements and, in some cases, even improving them slightly. This study also looks at the state of strikes that rotate, scale, and copy move numerous times.

The Scale Invariant Feature Transformation (SIFT) algorithm is the foundation of the suggested method to identify copy-move fraud in an image. The SIFT technique is employed because it aids in the extraction of reliable features from the image to determine whether a portion of the image has been copied. With the exception of any scaling or rotation change performed to it, the duplicated portion of the original image typically looks virtually exactly like the region it was copied from. So, independent of any alterations implemented as a result of the usage of the SIFT technique, the descriptor of keypoints extracted from the original region will be relatively comparable to the descriptor of the key points extracted from the forged region.

In light of this, the main idea behind this approach is to match each of the SIFT features retrieved from the image by looking for keypoints that share almost identical properties that can be evaluated based on their individual descriptors.

VIII. Acknowledgment

I gratefully acknowledge the support, guidance and encouragement of my Dissertation Guide Associate Professor Dr. Shailesh Sangle sir for this novel work.

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Live Pothole Detection: A Machine Learning based Approach

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Abstract. In India, further than 5000 people die due to accidents caused by potholes. Time and again we see distressing news about how a pothole caused an accident and claimed the lives of some commuters. Potholes not only beget accidents but also make transport slow and clumsy, damage vehicles causing their owners precious repairs and overall are an imminence to our country's logistics and hence is of utmost significance to bring it to our government's attention and fix them as soon as possible. This composition proposes a system where images are taken from CCTV cameras as well as commuter reports. These images are used as an input to the image bracket model which identifies roads grounded on their quality and creates a detailed report and as aresult displays pothole areas on a chart to commuters which aids in avoiding accidents.

1 Introduction

Pothole detection is critical to accident prevention worldwide. Although many studies have been conducted, there are certain biases or tools for obtaining detector data. We provide a way to apply pothole detection using live feeds from government-installed security cameras and commuter travel reports via an app, and the brackets are done before literacy. After parentheses, individual agencies are notified of road conditions at separate locations.

Rapid advances in technology in recent years have had a major impact on the quality of traditional transportation systems.

Intelligent transportation systems that aim to improve transportation systems are becoming popular. For business safety, passengers often feel uncomfortable driving on rough roads, especially over potholes in the road. According to statistics from Taiwan's Ministry of Justice, from 2008 to 2011, government compensation is about $240 million. Potholes in the road are detrimental to driver safety. Therefore, a real-time pothole detection system can be built to improve driver safety[3].

Also, further and further widgets include detectors, electronic compass, gyroscope, global positioning system(GPS), and cameras. Several operations use these detectors in mobile bias and combine mobile seeing ways to break problems similar to social network, healthcare, terrain monitoring, and business information. Thus, using mobile bias grounded on their detectors and cameras to describe potholes is suitable and accessible.[1] This study proposes a pothole discovery system grounded on mobile detectors, cameras and shares the pothole information with commuters and government. For this purpose, the mobile device should be equipped with g- detectors and gps to collect data and position information as well as a camera to take a print and include it in the report.

2 Literature Review

Some styles of pothole detection have been proposed that can be divided into two groups: image recognition systems and mobile surveillance systems.

2.1 Image Recognition Technology

Yu and Salari proposed a pothole detection approach based on a ray-based road information collection method as well as artificial neural network (ANN) algorithms for analyzing road information and decoding potholes[6]. It is inefficient for mobile displacement as processing the ray image requires a lot of computing power. Lin and Liu used a Support Vector Machine (SVM) to analyze traffic images for pothole detection.

This approach can provide high accuracy, but image recognition requires a lot of computing power. So this approachis also bad for mobile bias.[4]

2.2 Mobile Observation Method

A low-cost model for evaluating 3D pavement images using a low-cost Kinect detector that reduces computational cost by providing direct depth measurement is proposed[5]. It is equipped with a G-sensor and GPS that collects and analyzes accelerometer data for pothole detection[2].

Still, the smartphone in this design should be equipped with a specific angle. likewise, this design only considered assaying □- axis accelerometer data with high misstep.

For BusNet design, the Gsensor and GPS are equipped in the on- board unit(OBU) in the machine to collect

accelerometer data and position information. These data can be transferred to data processing centers via wireless networks, and data processing centers can dissect these data to check whether the vectors of accelerometer data exceed the thresholds for pothole discovery. Still, this approach requires that the batch accelerometer data is transferred when the machine enters the machine station,thus, this approach can not give real- time pothole discovery information.

A pothole management system proposed by a group of developers at the Massachusetts Institute of Technology combines a G-detector and GPS. (2) high-pass filter, (3) □-peak, (4) □□-rate, and (5) velocity versus □-rate.

3 Dataset

Dataset consists of 1200 images of Indian roads in various conditions, weather conditions, sharpness, and size. These images generally fall into three categories: normal, dusty, and potholes. As our proposed method mainly focuses on distinguishing potholes from other types of deformations and road conditions, this data set perfectly matches the parameters of our goal. The number of images is large enough to achieve very good accuracy and small enough not to consume excessive processing power and time.

4 Proposed Method

4.1 Diagram

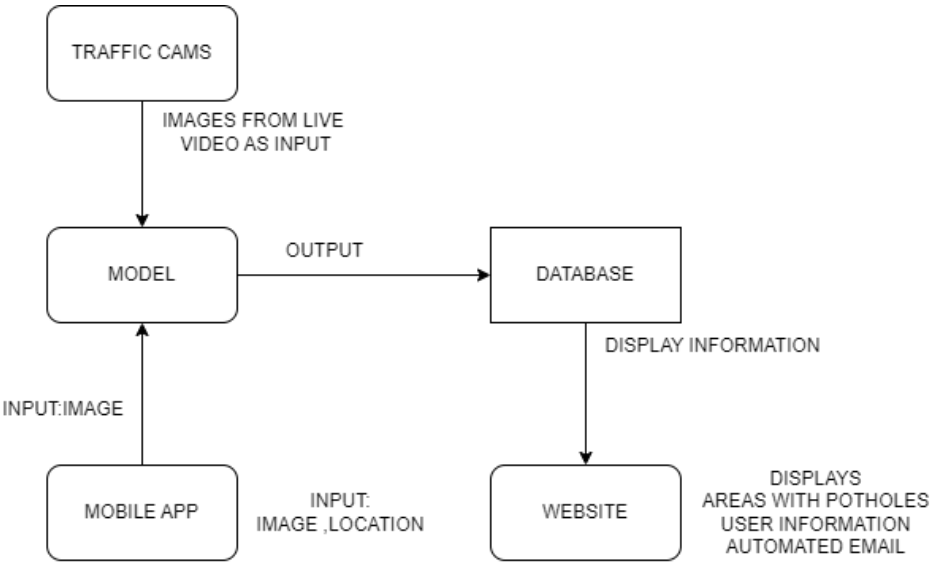


Fig. 1. Proposed system block diagram

4.2 Description

The system we propose is expressed as the above block diagram. The system consists of four major subsystems. They are listed as:

Input: Input is captured in two ways. Inputs can be taken from images uploaded using the mobile app. Images are also captured using live video from road cameras.

Classification Models: CNN-based image classification models are used to classify images into different categories. The dataset used to train this model is merged from three existing datasets and consists of approximately 1200 images in different categories.

Database: Data consists of the output of classification models along with user information.

Output: The web application is used to mark potholes using the Google Maps API. An automated email is sent to the appropriate authority with information about the output of the classification model and its location.

4.3 Algorithm

Convolutional Neural Network

A Convolutional Neural Network(ConvNet/ CNN) is a Deep literacy algorithm which can take in an input image, assign significance(learnable weights and impulses) to colorful aspects of objects in the image and be suitable to separate one from the other[7]. The pre-processing needed in a ConvNet is much lower as compared to other bracket algorithms. While in primitive styles pollutants are hand- finagled, with enough training, ConvNets have the capability to learn these pollutants characteristics.The armature of a ConvNet is similar to that of the connectivity pattern of Neurons in the mortal Brain and was inspired by the association of the Visual Cortex. Individual neurons respond to stimulants only in a confined region of the visual field known as the open Field.
A series of similar fields covers the entire visual field.

Layers in CNN

Convolutional Layer
Convolutional layer are basic building blocks of CNN. It bears most of the network's computational load. In this layer, dot product is performed between two matrices. Here, one matrix is a set of trainable parameters, also called a kernel, and the other matrix is the bounding part of the receptive field. Kernels are spatially smaller than images, but have greater depth. That is, if an image consists of three (RGB) channels, the height and width of the core are spatially small, but the depth extends across all three channels.

Pooling Layer
federation layer retrieves the summary statistics of the nearest output, replacing the network output at a specific location. This helps reduce the size of the view's footprint, thus reducing the amount of computation and weights required. Union operations are handled separately for each view fragment.

Fully Connected Layer
In this layer, neurons are fully connected with neurons in preceding and succeeding layer as seen in regular FCNN. It can be computed as usual by a matrix multiplication followed by a bias effect.

4.4 Model

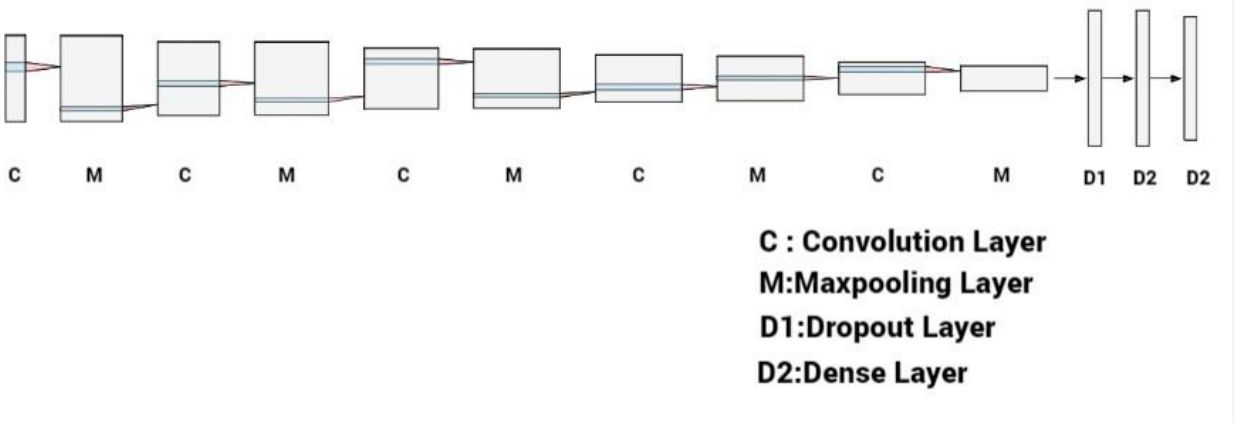


Fig. 2. Architecture of our proposed model

5 Comparative study

NAME	ACCURACY(%)	LOSS(%)	AUC(%)	PRECISION	RECALL
XCEPTION	95.4	98.17	29.39	96.51	96.51
VGG16	93.02	98.55	98.44	96.67	96.67
VGG19	98.52	98.44	65.41	97.46	97.46
RESNET50	97.04	98.8	19.89	95.56	95.56
RESNET101	98.52	99.24	15.49	88.69	87.14
RESNET152	97.99	99.32	10.46	84.73	83.65
DENSENET121	95.03	98.16	23.01	92.98	92.54
DENSENET169	94.92	97.54	41.83	95.05	94.44
DENSENET201	97.25	99.11	14.98	96.51	96.51
INCEPTIONV3	91.11	97.19	36.85	87.94	87.94
INCEPTION RESNETV2	82.33	88.65	67.14	82.56	82.56

Table. 1. Table stating various performance measures and their values for all the models used for this comparative study

NAME	ACCURACY(%)	AUC(%)	LOSS(%)	PRECISION(%)	RECALL(%)
1 CONVOLUTION 1 MAX POOLING	74.07	73.81	91.97	61.11	61.11
2 CONVOLUTION 2 MAX POOLING	85.24	90.11	1.8028	84.94	84.13
3 CONVOLUTION 3 MAX POOLING	89.74	87.44	18.70	94.91	94.76
4 CONVOLUTION 4 MAX POOLING	94.92	98.53	23.05	92.38	92.38
5 CONVOLUTION 5 MAX POOLING	96.56	98.87	18.70	94.91	94.76

Table. 2. Table stating various convolution and max pooling layers affect the performance metrics

5.1 Xception

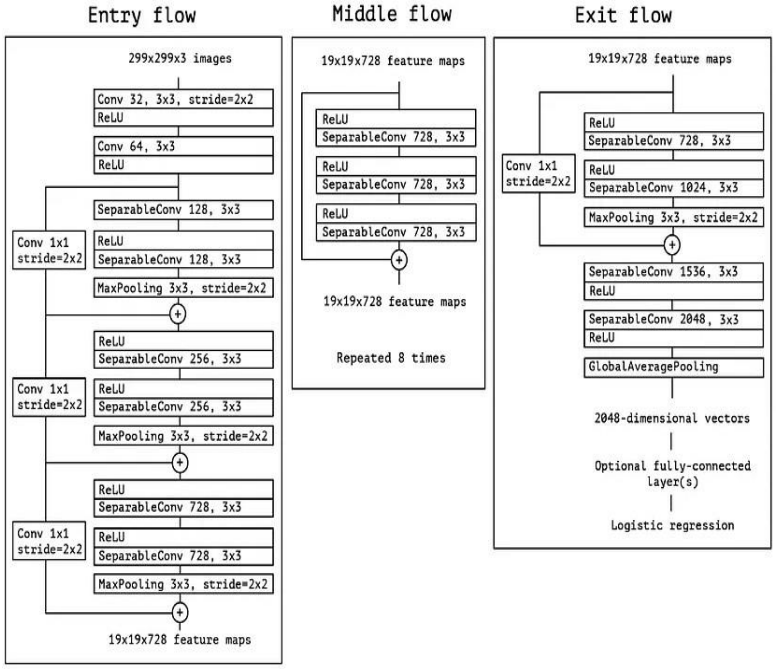
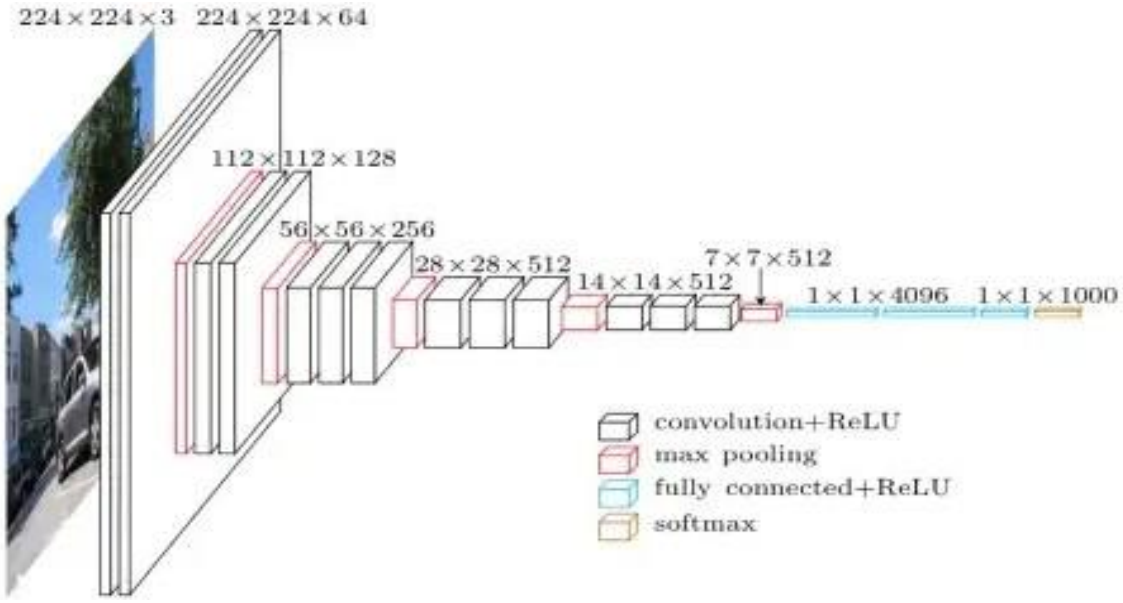


Fig. 3. Overall Architecture of Xception (Entry Flow > Middle Flow > Exit Flow)[8]

Xception is a deep convolutional neural network architecture that includes depthwise separable convolutions. Developed by Google researchers. Google introduced the interpretation of early modules in convolutional neural networks as an intermediate step between regular convolution and depth segmentation convolution operations (depth convolution followed by point convolution). From this point of view, a deeply separable convolution can be understood as an initial module with as many towers as possible. This observation led them to propose a new deep convolutional neural network architecture inspired by Inception, in which the Inception module is replaced by a deeply separated convolution.[9]

5.2 Vgg16



e

of Vgg16 [10]

Xception is a deep convolutional neural network architecture that includes depthwise separable convolutions. Developed by Google researchers. Google introduced the interpretation of early modules in convolutional neural networks as an intermediate step between regular convolution and depth segmentation convolution operations (depth convolution followed by point convolution). From this point of view, a deeply separable convolution can be understood as an initial module with as many towers as possible. This observation led them to propose a new deep convolutional neural network architecture inspired by Inception, in which the Inception module is replaced by a deeply separated convolution.[11]

5.3 Vgg19

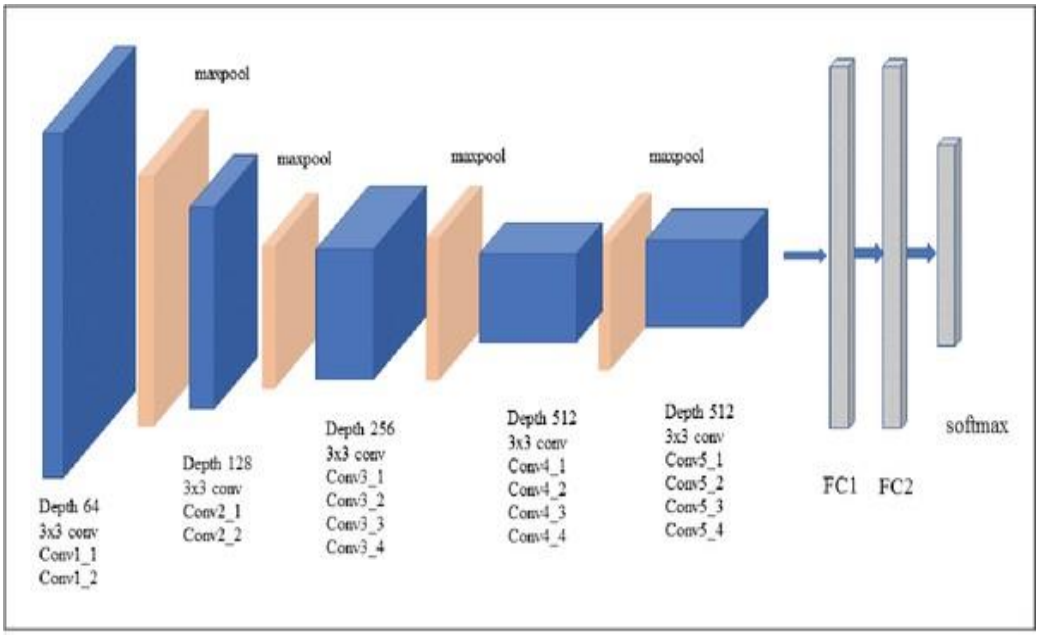


Fig. 5. vgg19 architecture[12]

VGG19 is an advanced CNN with pre-trained layers and a good understanding of what defines an image in terms of shape, color and structure. VGG19 is very deep and trained on millions of different images with complex classification problems.[13] Although the main purpose for which the VGG network was designed was to obtain ILSVRC, it has been used for many other purposes. You can use it as is or modify it for other similar tasks.

Transfer Learning: Can also be used for face recognition tasks.

Weights are readily available in other frameworks like keras, so you can modify and use them however you like. Content and style are lost when using the VGG-19 network.[14]

5.4 Resnet50

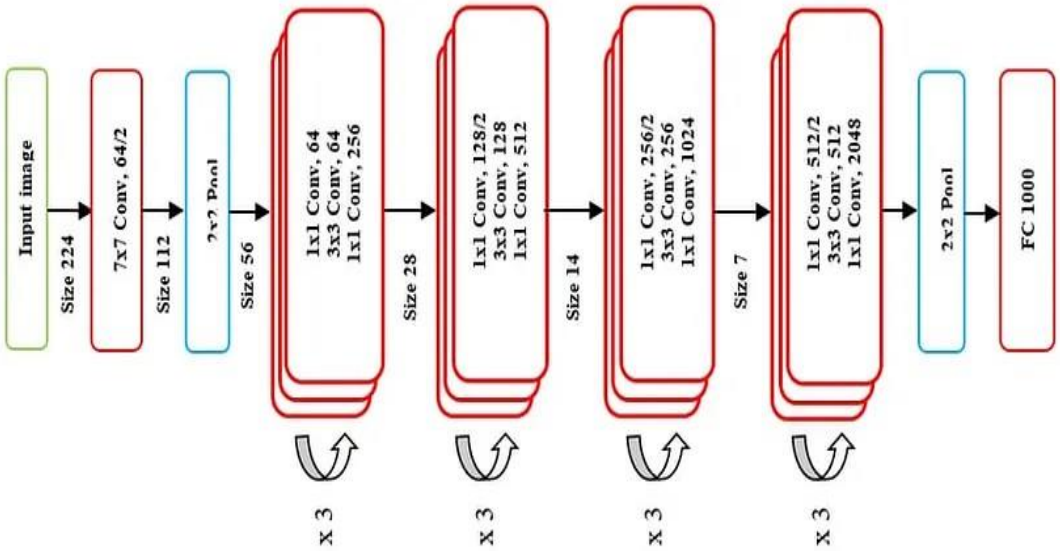


Fig. 6. Architecture of Resnet50 [15]

ResNet 50 is a 50-layer residual network proposed by He et al [16], consisting of 48 convolutional layers, 1 layer and 1 intermediate pool layer

. A residual network is a type of artificial neural network (ANN) that overlays blocks of residuals to form a network. The 50-level ResNet uses a building block bottleneck design.

The bottlenecked residual block reduces the number of parameter and matrix multiplications using 1×1 convolution known as the "bottleneck". This uses a stack of 3 layers instead of 2, so each layer can be trained much faster [17]. As in the

VGG network, the size of the convolutional layer is a 3x3 filter, the size of the input to this model is fixed at 224x224, and it follows some simple constructs: Output for layers with the same number of filters. The

MaxPool

number of filters is doubled by halving the size of the folded output so that the time complexity of each layer is maintained.

The model ends up with an intermediate pooling layer and a 1000 path fully connected layer with softmax. This model has fewer filters and lower complexity than VGG networks, and there are other variants such as ResNet101 and ResNet152 [18].

5.5 Resnet101

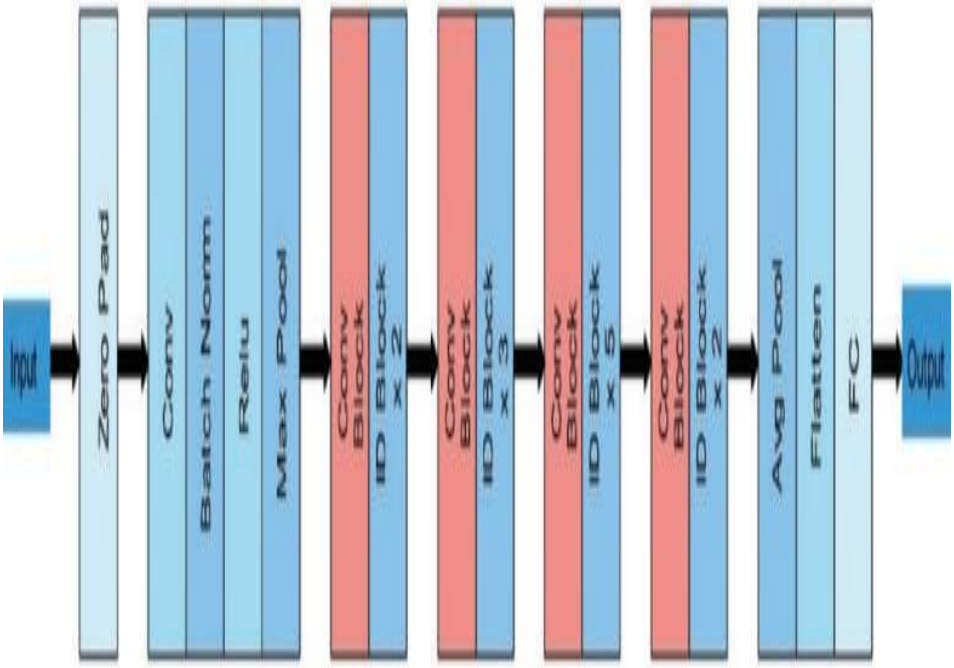


Fig. 7. Architecture of Resnet101[26]

ResNet101 contains 104 convolutional layers comprised of 33 blocks of layers, and 29 of these squares are directly utilized in previous blocks. Initially, this network was trained on the ImageNet dataset, which includes 1000 object classes[31]. This figure demonstrated that the input images are processed in residual blocks, and each block consists of several layers.

5.6 Resnet152

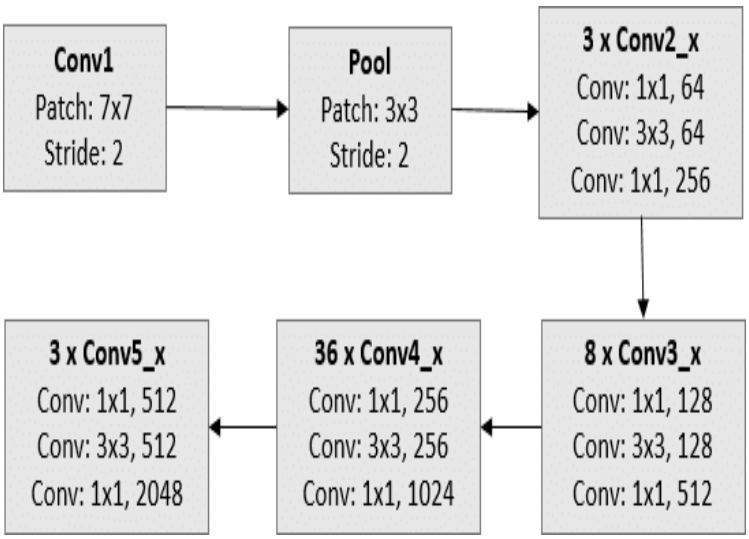


Fig. 8. Architecture of Resnet 152[33]

ResNet model pre-trained on ImageNet-1k at resolution 224x224. It was introduced in the paper Deep Residual Learning for Image Recognition by He et al[33]. Residual networks (Resnet) were proposed as a family of multiple deep neural networks with similar structures but different depths. Resnet introduces residual learning unit structureto alleviate the degradation of deep neural networks. This unit's structure is a feedforward network with a shortcut connection which adds new inputs into the network and generates new outputs. The main merit of this unit is that it produces better classification accuracy without increasing the complexity of the model.[33].

5.7 Densenet121

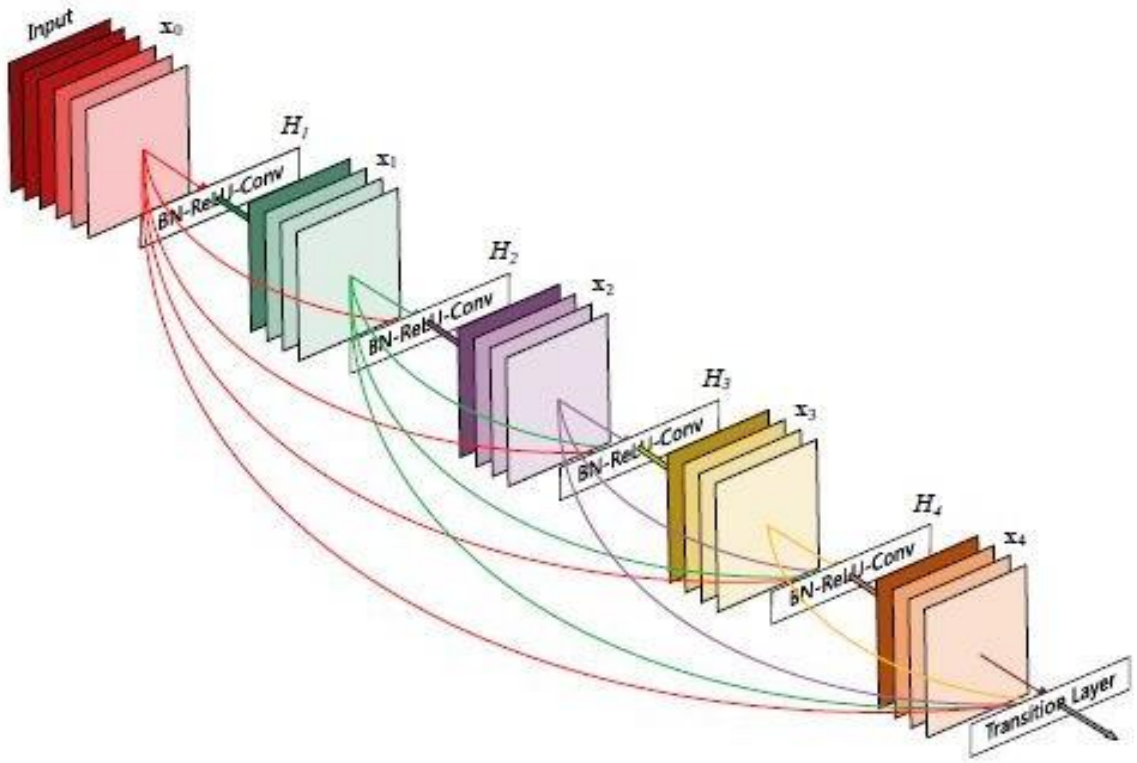


Fig. 9. Architecture of Densenet 121[20]

DenseNet is a CNN where each layer is connected to other layers that are deeper in the network,i.e the first layer is connected to the 2nd, 3rd, 4th and so on,and then same is repeated with second layer.. This is done to enable maximum information flow between the layers of the network[21].DenseNet is specifically designed to improve accuracy degradation due to vanishing gradients in high-level neural networks. Simply put, information is lost before reaching its destination because of the longer path between the input and output layers [22

]..

5.8 Densenet169

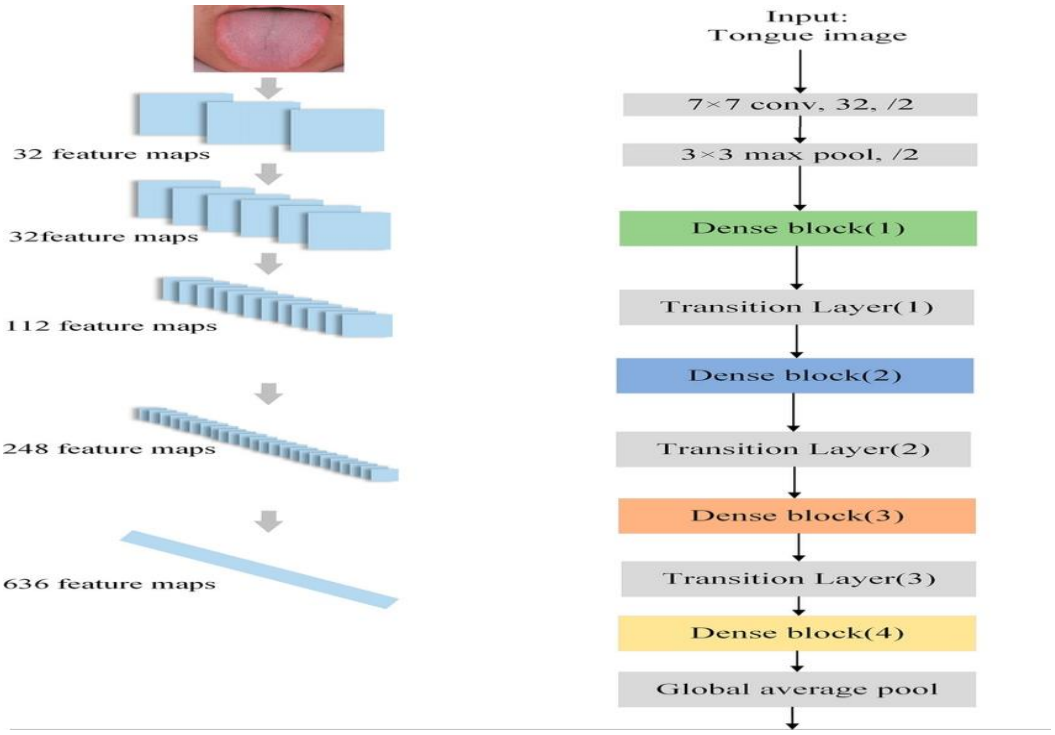


Fig. 10. Architecture of Densenet169 [24]

The densenet-169 model is one of the DenseNet family-group model designed to perform image classification. The main difference with the densenet-121 model is the size and accuracy of the model. This model is larger at just about

55MB in size as compared to the densenet-121 model's roughly 31MB size. It is originally trained on Torch, the authors converted them into Caffe* format. All the DenseNet models have been pretrained on the ImageNet image database.[25].

5.9 Densenet201

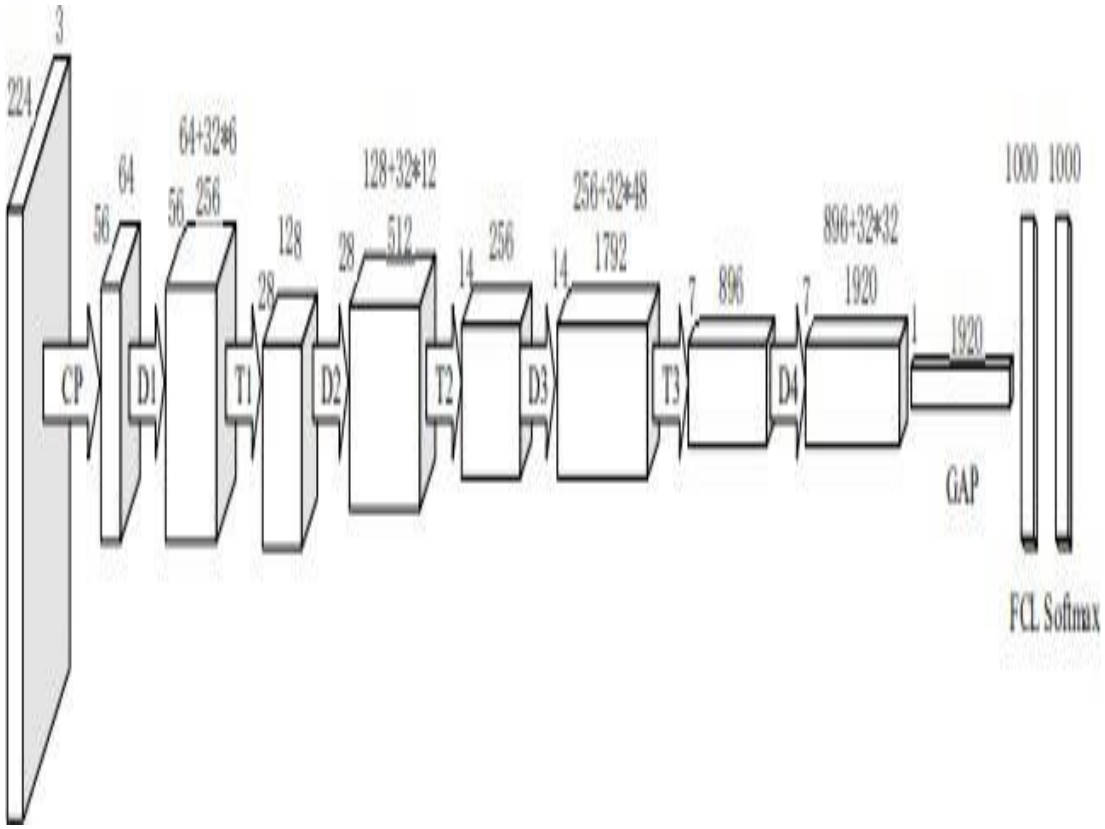


Fig. 11. Architecture of Densenet 201[28]

The dennet-169 model is one of a group of DenseNet models designed to perform image classification. The main difference from the Dendennet-121 model is the size and accuracy of the model. Density-169 is larger at approximately 55MB compared to Density-121 which is approximately 31MB. Originally trained in Torch, the authors converted it to Caffe* format. All DenseNet models were pre-trained on the ImageNet image database.
[30].

5.10 InceptionV3

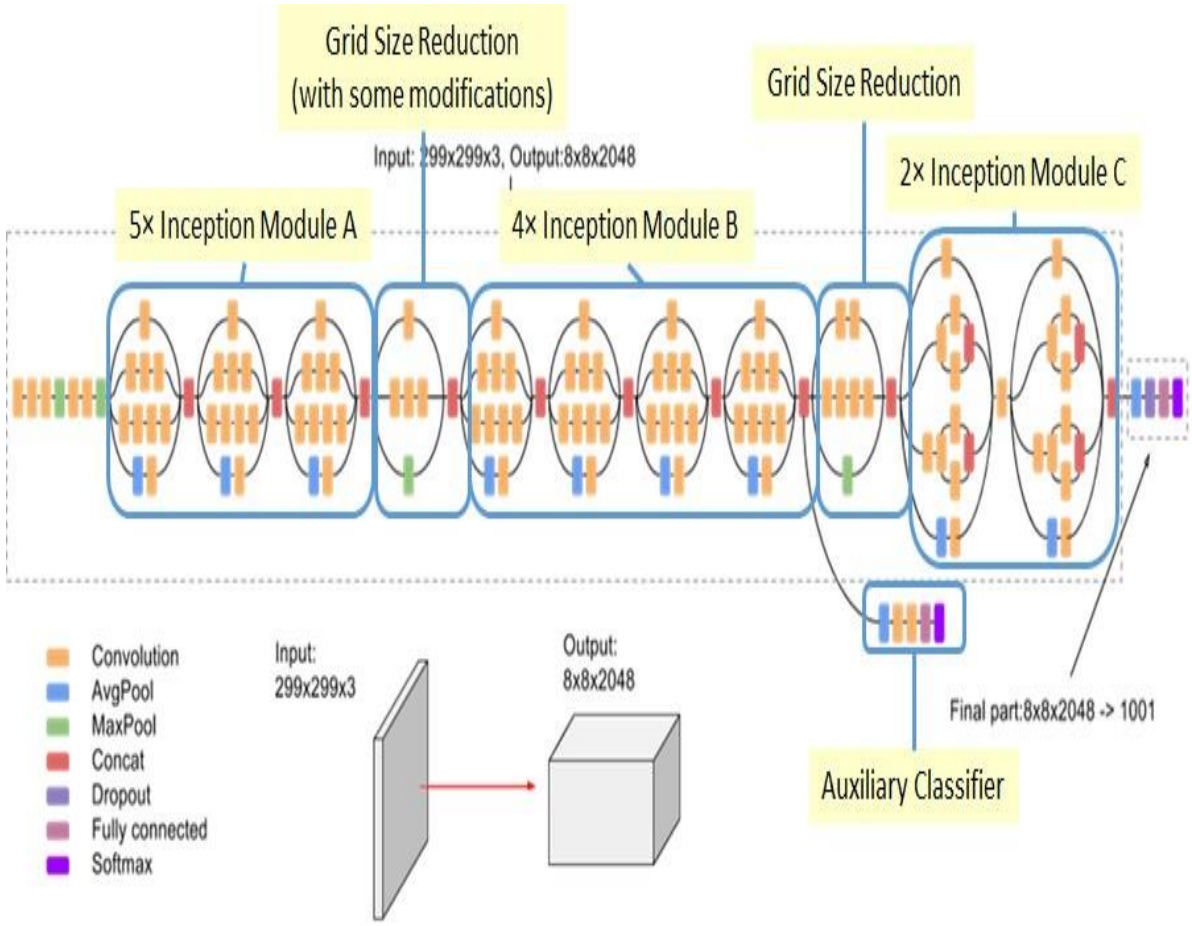


Fig. 12. Architecture of InceptionV3 [19]

Google's Inception V3 is the third in a series of deep learning convolutional frameworks. The initial version of V3 was trained using a 1001 class dataset from the original ImageNet dataset trained with over 1 million training images. Tensorflow interpretation has 1001 classes. original imagenet. Inception V3 was trained to compete in the ImageNet Large Visual Recognition Challenge, where it won first place. Inception V3 is just an improved and optimized interpretation of the Inception V1 model.[22] Several network optimization methods were used in the Inception V3 model to better fit the model.

Improved efficiency and deeper network compared to v1 and v2. Also, V3 has less computational value and uses an additional classifier as a regularizer. Inception V3 is used as a parenthesis image to illustrate the parenthesis of ancient artifacts for each dynasty [27].

5.11 InceptionResNetV2

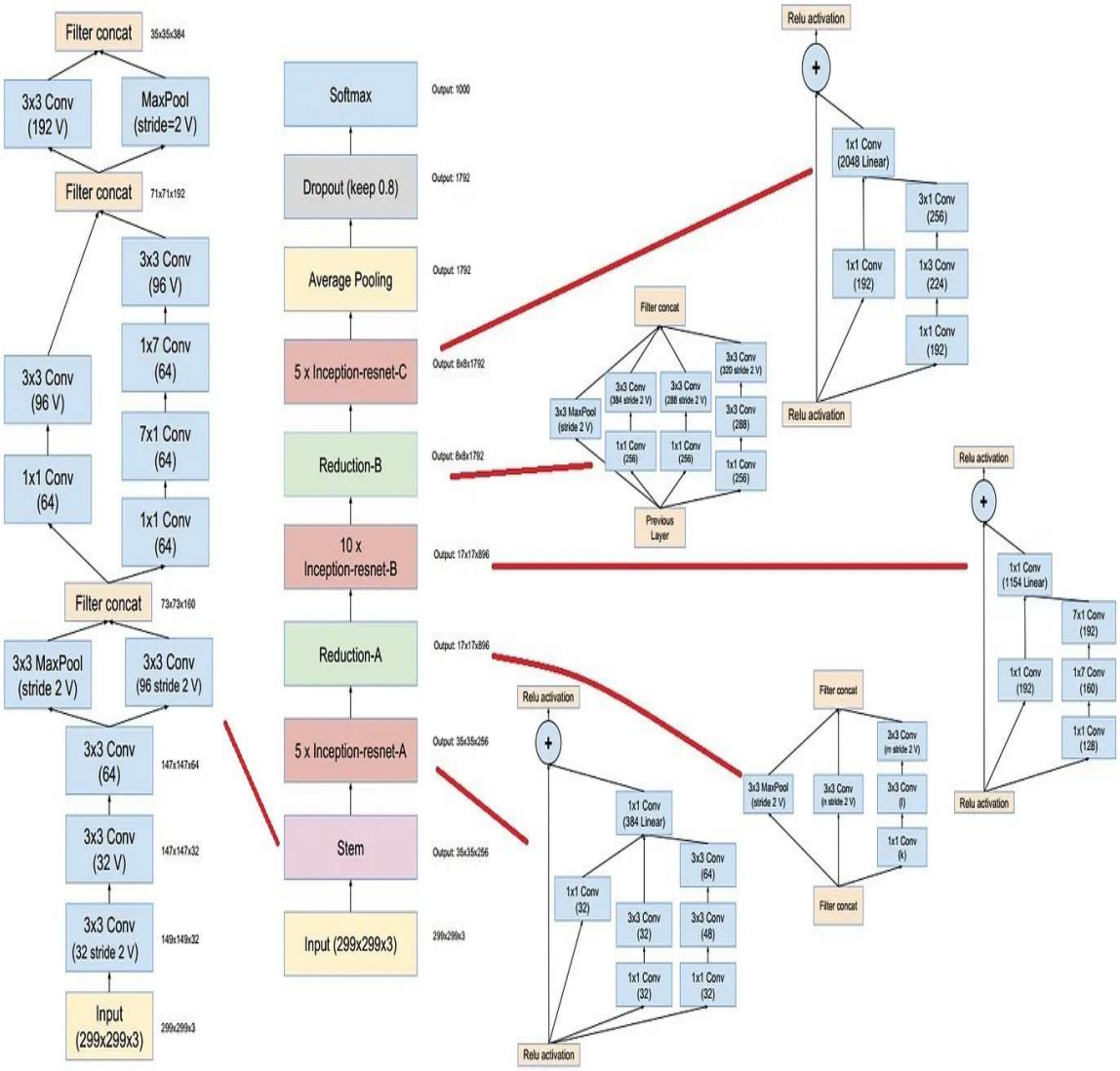


Fig. 13. InceptionResNetV2 architecture[29

Inception-ResNet-v2 is a neural network which is trained on a huge amount of images. This network consists of 164 layers and can classify images into sequences of 1000 objects such as keyboards, mice, pencils and countless creatures.

As a result, the network learned extended dot representations for various images. The web has input images that are 299X299. It is formulated based on a combination of initial structure and residual bonds. In the Inception-Resnet block, convolutional contaminants of different sizes are combined with residual links. The operation of the residual connection not only avoids the problem of declination due to deep structures, but also reduces training time.

The figure shows the Inception-Resnet-v2 trial network armature.

6 Discussion

The best accuracy achieved out of the pre-trained models with the Vgg19 model and the worst with the InceptionResnetV2 model.One of the reasons for difference between the accuracy achieved with these models may be due the different structure of architectures.The Vgg19 model contains 19 layers which includes 16 convolution layers and 5 max pooling layers whereas in InceptionResnetV2 which contains 164 layers and more amount convolution and max pooling layers than vgg19.This shows that the architecture of vgg19 which consists of 19 layers (16 convolution , 5 max pooling) is optimal for the given dataset.

7 Conclusion

This study proposes a real- time pothole discovery system. This system uses Convolutional Neural Network to classify the image into potholes, unpaved, normal road and position of the pothole is brought. All these inputs are maintained in a database and potholes data is transferred to separate authorities of that particular area using automation. The proposed approach can help road conservation authorities to formulate rapid-fire and optimized conduct for road structure repairs. A more sophisticated result with the help of the global position system(GPS) can describe and point out the position of pavement failures. Future Work of Pothole Discovery includes making Android operation and syncing data using API. Another important point is Google Map integration to incorporate potholes in the route. Getting video feeds from road cams. This work can further be extended to describe other pavement torments, road depressions, classify roads as per quality, and depth estimation of potholes.

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Skin Cancer Classification into Multi classes for HAM 10000 Using Deep Convolutional Neural Network and Transfer Learning

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Abstract

Skin cancer is more dangerous disease as it takes large amount of time to cure. Human being suffers from the skin diseases due to bacteria, allergy, fungal infection or various types of viruses present in environment or due to food habits. Now a day's laser technology can be used to cure from the skin cancer but detection of the disease in an early stage is very important factor as the cost of all these treatments are very high. Our point of this work is to foster the framework which recognizes the kind of skin malignant growth by utilizing the HAM 10000 skin disease image dataset. Skin malignant growth might get change because of the climate changes. In his work we are working with the skin images and attempt to distinguish the variety of cancers in early stage by utilizing the Transfer learning approach. Our proposed approach is less expensive as it need only camera to take photographs and our model to show the detected skin cancer as an output. We take digital skin image as input use pre-trained models for feature selection and after preprocessing use deep learning algorithms CNN for the multi class classification. In this work we utilize the Transfer learning models to prepare our model to work on the exactness and improve the efficiency of our model. We work on the Data augmentation to deal with this imbalance dataset As a result we compare the models through the parameters of the evaluation matrix like Recall, Precision, Accuracy and F1 score. Accuracy for different models are 86%,82%,84%,83% for ResNet 50, Inception V3 ,VGG-16and VGG-19 respectively.

Keywords: **Skin cancer, Deep Learning , Transfer Learning, Image Processing**

Introduction

Skin diseases become more dangerous if it is not early stage diagnosed. These are more hazardous than other disease as it affect the emotional and psychological health of the person. It is 4th leading cause of the illness in human being increase the nonfatal burden in the globe. Skin diseases mostly cause due to bad food eating habits, Environmental changes, tension, genetic etc. Most of the people in the world are hesitating to discuss about the skin diseases even though they are not meet the physician for the treatment in the early stage. Most of people don't have knowledge about skin cancer. Another factor due to which skin diseases are cure are unavailability of proper data and the treatment methods vary person to person .As it detect in early stage it can help to cure and also reduce the cost of treatment. Automated skin cancer detection system can help the dermatologist to diagnosis of the different type of cancer in early days which help to start the proper treatment.

The symptoms of the skin diseases are changing and shows after some months or years so person think it's only due to infection and try different remedies due to that its gets detected in later stage of the disease which is then take longer time to cure from it. The patient suffering with skin cancer need more time and money as the cost of the treatment is very high as well as it takes more time to cure from this disease. Lack of medical Knowledge about these diseases and also dermatologist need the more experience for the detection of the skin disease. As well as more challenging task is to detect the stage of the skin cancer by seeing the images as skin images shows little difference in various types of skin diseases. As these disease are due to infection, fungus, genetic problems so when doctor treat the patient Doctor has to take the consider the previous history of the patients regarding disease occurrence in his/her family ,first symptoms, Allergies of any food or environment changes, lifestyle etc. In recent days there is advancement in machine learning and deep learning algorithms we are trying to use these algorithms to get the accurate diagnosis of type of skin cancer. Computer vision is becoming more popular by using image processing with artificial intelligence for accurate analysis of the disease in early stage. Especially for the multiclass skin cancer detection large amount of data is required .In this proposed work deep learning concepts are used. We work on CNN to perform the classification and the pattern recognition. To get an idea about the current research in this field we gone through the various research work done in this area. Various type of skin cancer detection the most important factor is number of features and methodologies used for this purpose to improve the performance of our system. Further paper divided in the four sections Section II Review of Literature to understand the background related to this research and advancement in this area. Section III Methodology and Datasets used for this work .We use the open source dataset HAM 10000 available on the kaggle for our research work. Section IV Results Analysis of the datasets and our automated multiclass skin disease detection system V finally Conclusion and Future.

2. Review of Literature

Number of researcher is working on different Image processing algorithms for
the image preprocessing, image Segmentation. Machine learning algorithms for the Classification model . Deep learning CNN to improve the accuracy of the Classification model. Skin cancer affects the financial as well as emotional health of the patients. As the images of the skin lesions

are looking similar due to that in this paper the researcher work on SVM and glcm algorithms. Skin cancer images are taken and under goes with the preprocessing techniques like segmentation to improve the clarity of the images after that by using the SVM and fuzzy classification is used to classify the images in the different cancer types[1]. Bayes Theory is used to handle the probability descriptors for classify in different classes using the probabilities of different patterns and their features. The various feature selection techniques like wrapper, filter are used to select the appropriate features from the datasets. Handling Skin disorder is very crucial task as in the world near about $1/7^{th}$ percentage of population suffer from it. In dermatology most of the Doctors are going to study different skin disease and disorders. In this study the researcher use the Bayesian and Baye's Net and Bayesian along with the proper techniques for the feature selection to improve the accuracy of the proposed model. Accuracy of the model is 93%.Image processing is use in the classification can improve the performance of the system [2,3]. Mobile Net class efficient model is used .It uses to build light weight deep Neural Networks using the streamlined architecture which used depth wise separable Convolutions. Introduce hyper parameters for the tradeoff between accuracy and latency. It allows to choose the right model size to get the strong performance of the system as compared to the other classification models. They are taken the different applications like face reorganization, finger gain classification, Large scale geo localization and shows with and without hyper parameter selection results[4,5,6].Image processing is the first step towards the finding of the various skin diseases as various image processing techniques like the image enhancement , to convert the blur images into clear images,

Image segmentation and image Compression is used to make image clear. After this it is undergoes with different deep learning algorithms to classify the images in the proper skin disease classes.[7,8]. Cancer Classification of images done by using the concept of Transfer learning ResNet model. Transfer learning takes the previous knowledge to improve the outcome of the system [9, 10].Multimodel ensemble learning is used to deal with the skin diseases. As it use the ensemble learning where the output is generated by considering the output of the different machine learning techniques so that the efficiency of the model is increase[11,12]. Generative Adversarial Networks uses the generative modeling like Convolutional Neural networks. It is unsupervised learning approach where the unlabeled data is present from the input values the appropriate the patterns are recognized. In the approach it uses the generative and discriminative approach to treat the unsupervised problem as the supervised problem. Training a generative model by treating the unsupervised problem. Due to this approach the system accuracy is increase up to 95% to classify the images in the various skin lesions [13, 15]

In machine learning in place of taking the decision from the single model decision from different model is gathered and combine multiple model means ensemble into a single model. The main aim of the use of this technique is to improve the performance of the system by considering the outputs of the different model. To perform the ensemble learning various techniques like voting, Bagging, Boosting and stacking can be used.[20,21]In this work researcher work on the image patch classification using

Convolutional Neural Network to ILD.Shallow Convolutional layer to classify the ILD. Feature extraction and image segmentation techniques to improve the

performance.[22,28] In skin lesion main challenge is that the similarity I the images. To overcome this problem used the data Augmentation, fine tuning and transfer learning. Achieved accuracy up to 92%.Resnet169 to construct mobile android application [26,27].

3. Methodology

In this section, elaborate the methodologies are used for the extraction of the features, Detection and classification of skin cancer images. In our work , First step is to do the preprocessing of the dataset by data cleaning methods, Training model, Visualization of Model for the datasets. Standardization and Normalization of the dataset by using the scaling method. Dataset is huge so we use the dropout so that it can show the results properly. First most important task in CNN is to selection of layers numbers .Dense layer used in CNN for the improvement in the results Last step is to visualize the testing results as an output with the Acuracy,Precision,Recall ,F1 Score. To achieve the more performance in term accuracy we used the Transfer learning approach by transferring the knowledge of related task. In machine learning reuse of knowledge same old task for the execution of new task called as Transfer Learning. It is useful to increase the prediction of new task from the knowledge learned from the old task. This method useful for to reduce the uses of resources and as well as training data amount required for the training of the new model. Knowledge from large amount of data handling can be used to handle the new task without work from the scratch. Transfer learning save the time by reusing the previous time to complete that similar type of task. Most of the data gathered is unlabeled data so it is necessary to handle this data with the pre-trained model to improve the performance of the model. In this work we are going to work with five types of pre-trained models like Resnet 50,Inception V3 ,VGG-16,VGG-19 and GoogleNet. Each and every model has different advantages and disadvantages which can be shown by the accuracy of the model on the same dataset HAM10000.

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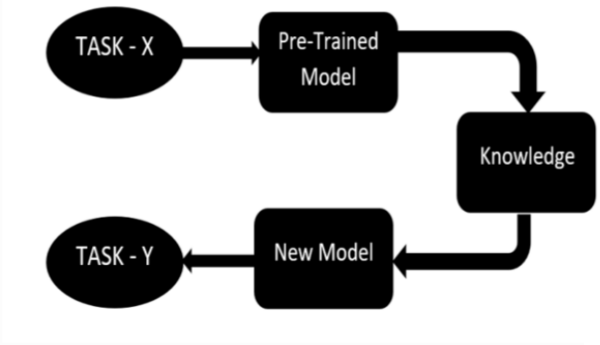

Fig 1 Transfer Learning

3.1 Pre-Trained Models

Blocks with 2D Convolution and Max Pooling layers are consist in Visual Geometry Group.We are working with the two different type of VGG Model VGG16,VGG 19. The difference between these two models are number of layers like VGG 16 having 16 layers and VGG 19 having 19 layers used to train the dataset to improve performance of the system.

3.1.1 VGG16 -

It is a Convolutional Neural Network with
16 layers deep. It's Pre-trained model for the image classification . This network has an image size of 224-by-224 from ImageNet Dataset. VGG 16 with 16 layer is pre-trained models for image classification. It is more accurate and popular due to the increase in the layers to achieve the more training and testing of the model. The network has an image input size of 224-by-224 from ImageNet dataset.

Top-5 test accuracy in ImageNet is achieve up to 92.7% using VGG .It working on 100 classes including 14 million images. It is having the significant improvement over the AlexNet by using the 3*3 kernel size filters in sequence.

VGG 19 as name indicate 16 it has 16layers out of this 13 are Convolutional layers ,5 are Pooling Layers and 3 Dense layers to improve the efficiency of the system.

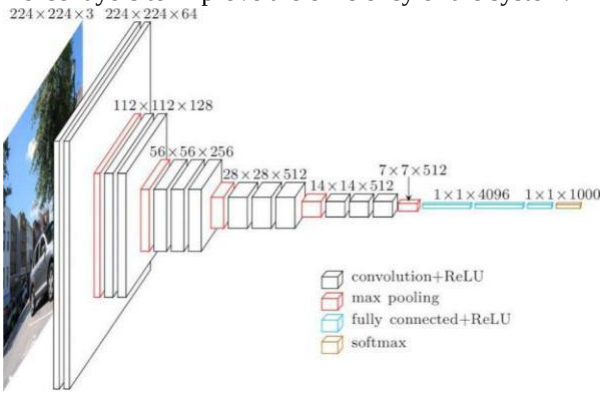

Fig 2 VGG 16 Architecture

To increase the performance of the system in VGG 19 three more Convolutional layers are added. As our results also show that VGG 19 has improved accuracy over the VGG 16.VGG 19 as name indicate 19 it has 19 layers out of this 16 are Convolutional layers ,5 are Pooling Layers and 3 Dense layers to improve the efficiency of the system.

3.1.2 InceptionV3 (GoogleNet)

It is trained as well as built by Google. It is pre-trained Convolutional model with the depth of 50 layers. It is working on the 1000 objects with the ImageNet weights. The size of image 299x299 pixels size is more than network used in VGG19.

It support for the Size 93 MB as well as having top level 1 accuracy as 77.9% and top-5 Accuracy as 93.7%. It is working on
huge number of parameters 23,851,784 with 159 depth of model. Due to that the more training can improve the efficiency of the system by increasing the accuracy of the model.

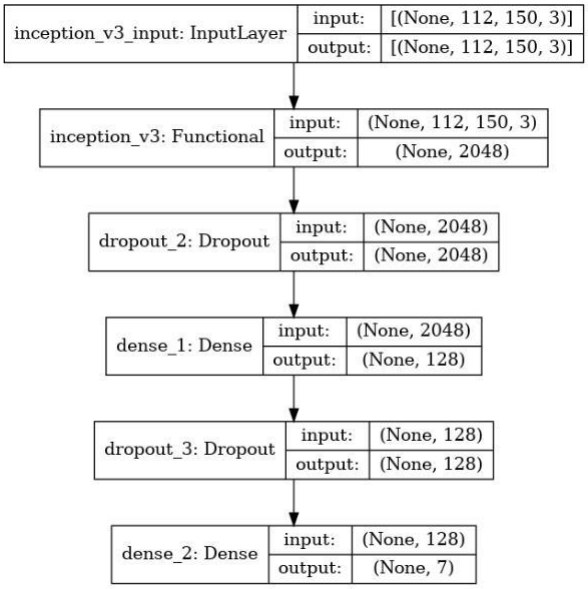

Fig 3 InceptionV3 Layers

3.1.3 ResNet 50

Convolutional Network transfer learning model ResNet-50 with the 50 layers out of this it consist of 48 Convolutional layer 1 pooling layer and the 1 Average pool layer. ResNet 50 it is Residual neural networks which is the one of the type of the artificial neural network (ANN) with the stacking In 2015 Microsoft built this network as well as checks it on different large datasets. The amount of the dataset is up to 1 million images taken from the ImageNet Dataset. Like the VGG 19 it takes the huge size images. The previous models suffer from the accuracy problem as it's become deeper. Also, the ResNet model aimed to tackle or vanishing the Gradient issue as well.

It support for the Size 98 MB as well as having top level 1 accuracy as 74.9% and top-5 Accuracy as 92.1%. It is working on huge number of parameters 25,636,712.

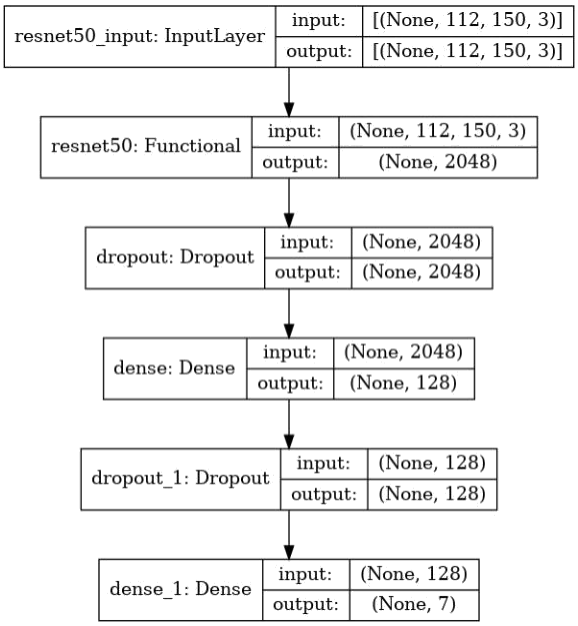

Fig 4 ResNet50 Layers

3.2 Dataset Description

In this work we are working on open source dataset downloaded from Kaggle. We are working on HAM 10000 dataset having a large amount of common pigmented skin lesions Dermatoscopic. The HAM 10000 dataset can be used in ISIC 2018 challenge for the skin cancer detection .It is training set for this challenge for to improve the skin melanoma detection with more accuracy.

The size of the image is 450*650 contain 10,015 labeled images. It include the images of the seven cancer types like Pigmented Benign Keratosis, Melanocytic nevi, Dermatofibroma, Melonoma, Vascular lesions,Vascular Lesion, Basel Cell Carcinoma, Actinic keratosis. Out of all cancer types Melonoma is more deadly cancer. We used the Transfer Learning Models to train our system .Transfer learning help to get the knowledge of the previously train model .To train our HAM100000 dataset worked with the five transfer learning models like ResNet 50 Inception V3, VGG16, VGG19,GoogleNet. In this work Data Augmentation technique for handling the class imbalance problem by creating new images by slightly changing the existing images. Overfitting problem can be handled by using Data Augmentation. Due to this the classes become balance and all pre-trained model can work train properly.

4. Results and Discussion

As we work with the different Transfer Learning approaches to get the knowledge of old learning for the new dataset to increase the performance of the model as well as to reduce the time and cost for the treatment.Fig 5 and 6 shows the training and testing Evaluation Matrix for ResNet 50 pre-trained model include the Recall,Precision, F1-Score and Dataset support used in the model. Fig 7 shows the accuracy values and loss values for Rest50 Pre-trained model. Similarly for the VGG16, VGG19 and Inception V3 we are evaluating the Model and getting the training and testing Accuracy and loss for each model. To achieve the more accuracy and improve the performance of our system used 30 epoch to train the model. Fig 12 shows the summary of the accuracy for the all four models.

Type	precision	recall	f1-score	support
Pigmented Benign keratosis	1.00	0.03	0.06	32
Melanocytic nevi	0.49	0.54	0.51	35
Dermatofibroma	0.51	0.60	0.55	84
Melanoma	0.00	0.00	0.00	10
Vascular lesions	0.40	0.06	0.10	35
Basal cell carcinoma	0.92	0.98	0.95	895
Actinic keratoses	1.00	0.33	0.50	12
accuracy			0.86	0.86
			1103	1103
macro avg	0.62	0.36	0.38	1103
weighted avg	0.85	0.86	0.84	1103

Fig 5Training Evaluation Matrix for the ResNet50

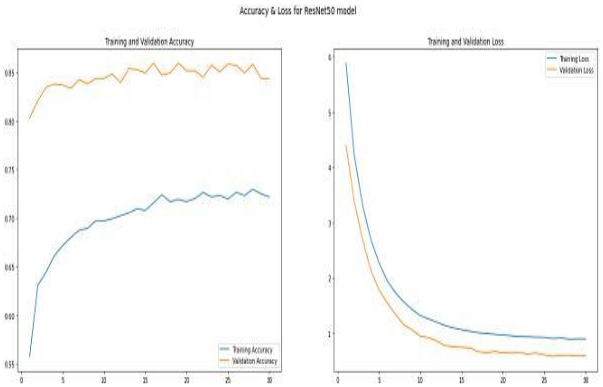

Fig 6 Test Evaluation Matrix for the ResNet50

Type		precision	recall	f1-score	support
Pigmented keratosis	Benign	0.00	0.00	0.00	32
Melanocytic nevi		0.50	0.20	0.29	35
Dermatofibroma		0.45	0.20	0.28	84
Melanoma		0.00	0.00	0.00	10
Vascular lesions		0.00	0.00	0.00	35
Basal cell carcinoma		0.84	0.90	0.91	895
Actinic keratoses		0.00	0.00	0.00	12
Accuracy				0.82	1103
Macro avg		0.63	0.38	0.21	1103
Weighted avg		0.72	0.74	0.77	1103

Fig 7 Accuracy and loss for ResNet 50 Model

Type		precision	recall	f1-score	support
Pigmented keratosis	Benign	0.0	0.0	0.0	32
Melanocytic nevi		0.47	0.23	0.31	35
Dermatofibroma		040	0.35	0.37	84
Melanoma		0.00	0.00	0.00	10
Vascular lesions		0.50	0.11	0.19	36
Basal cell carcinoma		0.88	0.99	0.93	895
Actinic keratoses		1.00	0.25	0.40	112
Accuracy				0.84	1103
Macro avg		0.46	0.27	0.31	1103
Weighted avg		0.79	0.84	0.69	1103

Fig 8 Test Evaluation Matrix for the Inception V3

Type	precision	recall	f1-score	support
Pigmented Benign keratosis	0.89	0.09	0.16	264
Melanocytic nevi	0.50	0.63	0.55	452
Dermatofibroma	0.59	0.40	0.48	945
Melanoma	0.00	0.00	0.00	101
Vascular lesions	0.70	0.20	0.31	1029
Basal cell carcinoma	0.77	0.98	0.86	5110
Actinic keratoses	0.96	0.35	0.51	128
Accuracy			0.74	8029
Macro avg	0.63	0.38	0.41	8029
Weighted avg	0.72	0.74	0.69	8029

Fig 9 Test Evaluation Matrix for the VGG 16

Type	precision	recall	f1-score	support
Pigmented Benign keratosis	1.00	0.03	0.06	32
Melanocytic nevi	0.33	0.09	0.14	35
Dermatofibroma	0.36	0.43	0.39	84
Melanoma	0.00	0.00	0.00	10
Vascular lesions	0.20	0.03	0.05	35
Basal cell carcinoma	0.89	0.99	0.94	895
Actinic keratoses	1.00	0.08	0.15	12
Accuracy			0.84	1103
Macro avg	0.63	0.38	0.25	1103
Weighted avg	0.72	0.74	0.80	1103

Fig 10 Test Evaluation Matrix for the VGG 19

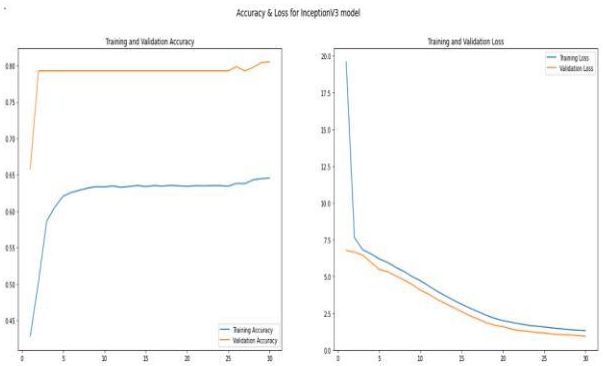

Fig 11 Accuracy and loss for Inception V3 Model

Model Name	Final Accuracy
ResNet50	86.400000
InceptionV3	82.410000
VGG-16	84.040000
VGG-19	83.770000

Fig 12 Accuracy for all four models

Conclusion

A techniques for HAM 10000 dataset has been implemented by using the pre-trained deep Neural Network ResNet50,VGG 16,VGG 19 and Inception V3.The proposed system classify the input skin cancer images into seven different types. Due to the Data Augmentation our model work efficiently despite data set having imbalance data. The proposed method evaluated by the

Evaluation parameters likes Precision Accuracy, F1 Score , Recall and Support. As a result we compare the models through the evaluation matrix parameters. Accuracy for different models are 86%,82%,84%,83% for ResNet 50,Inception V3 ,VGG-16 and VGG-19 respectively. This will help Doctors to detect the disease in the early stage and gives appropriate medication due to accurate detection of the Skin cancer type. Improve the lifespan of the patient and reduce the cost of the treatment.

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Enterprise Resource Planning System: Case Studies and Implementation Strategy

Abstract—**In this paper, we have discussed the basic purpose of an ERP system and how it helps the company. We have also discussed all the factors and needs that decide the implementation process of an ERP system. We have also discussed case studies of two different companies that implemented ERP within their architecture and found great help. We have also researched the proper technology stack and the proper strategy that will help us in building the right ERP system for our case. In this paper we concluded on how beneficial an ERP system can be, if implemented properly.**

Keywords—Enterprise Resource Planning, Case Studies, Requirement Analysis, Implementation process.

I. Introduction

Enterprise Resource Planning (ERP) systems are software systems that help organizations to manage their business processes. They are typically used to manage financial data, inventory data, and manufacturing data. However, they can also be used to manage customer data, supplier data, and partner data [1].

ERP systems can help companies to manage their customer relationships in several ways. First, they can help companies to track customer orders and to manage customer accounts. Second, they can help companies to generate customer reports and to analyze customer data. Third, they can help companies to create and to manage customer loyalty programs. Finally, they can help companies to integrate their **customer relationship management (CRM) systems with their ERP systems [1].**

II. Need of ERP

Why do we need ERP? The question persists in every organization. Well in simple words it is a piece of software that is going to link all your departments together and going to help you drive more sales.

Some of the other reasons include the following:

1. To improve efficiency and productivity: An ERP system can help to automate and streamline many business processes, making it easier and faster for employees to get work done.
2. To reduce costs: An ERP system can help to reduce the costs of doing business by eliminating the need for duplicate data entry, manual processes, and paper-based records.
3. To improve customer service: An ERP system can help to improve customer service by providing employees with quick and easy access to customer information.
4. To improve decision-making: An ERP system can help to improve decision-making by providing managers with real-time data and analytics.
5. To improve security: An ERP system can help to improve security by providing employees with access to only the data and information they need.
6. To be prepared for growth: An ERP system can help to be prepared for growth by providing the foundation for a scalable and flexible business.
7. To improve decision-making: An ERP system can help to improve decision-making by providing managers with real-time data and analytics.

III. Ease of Use

In a nutshell, ERP is a software that helps businesses manage their core operations in a more efficient and effective manner. By automating and integrating various business processes, ERP provides real-time visibility into critical data and information, which in turn helps businesses make better informed decisions, improve operational efficiencies, and drive growth.

While ERP systems vary in terms of functionality and features, they typically include modules for finance, accounting, human resources, inventory management, customer relationship management, and supply chain management.

ERP systems are complex and can be difficult to use, particularly for small and medium-sized businesses that may not have the resources to invest in training and support. However, there are a number of factors that can make ERP easier to use, including choosing the right system for your

business, working with a reputable and experienced implementation partner, and providing adequate training for your employees.

When it comes to choosing the right ERP system for your business, it is important to consider your specific needs and requirements [3]. There is no one-size-fits-all solution, and the best ERP system for your business will depend on a number of factors, including the size and complexity of your operations, your industry, and your budget.

Once you have selected the right ERP system for your business, it is important to work with a reputable and experienced implementation partner. A good implementation partner will have a deep understanding of your business and will be able to help you configure the system to meet your specific needs. They will also be able to provide **ongoing support and training to ensure that your employees are able to use the system effectively**.

Finally, it is important to provide adequate training for your employees. ERP systems are complex and can be difficult to use, so it is important to make sure that your employees are properly trained on how to use the system. Training should be ongoing and should cover all aspects of the system, including how to enter data, how to generate reports, and how to troubleshoot problems.

IV. Implementation Technique

ERP systems are typically used to track and manage information related to **financials, manufacturing, human resources, and supply chain management**. ERP implementations can be complex and time-consuming, often taking years to complete. In order to ensure a **successful ERP implementation**, organizations should carefully plan and execute their project. Additionally, it is important to select an ERP system that is a good fit for the organization's specific needs.

Once an organization has selected an ERP system, they will need to implement the software. The implementation process include a set of steps listed as:

1. **Define business requirements**: The first step in any ERP implementation is to define the organization's business requirements. This step is important in order to ensure that the selected ERP system will meet the organization's needs.

2. **Select an ERP system**: Once the organization's business requirements have been defined, they can then select an ERP system that is a good fit. There are a variety of ERP systems on the market, so it is important to select one that will meet the organization's specific needs.

3. **Install the ERP system**: Once an ERP system has been selected, it will need to be installed. This process can be complex and time-consuming, so it is important to carefully plan and execute the installation.

4. **Configure the ERP system**: After the ERP system has been installed, it will need to be configured to meet the organization's specific needs. This step can be complex, so it is important to have a clear understanding of the organization's business requirements.

5. **Train employees**: Once the ERP system is up and running, employees will need to be trained on how to use the system. This step is important in order to ensure that employees are able to effectively use the system.

6. **Go-live**: Once the ERP system is up and running and employees have been trained, the system is ready to go-live. This is the final step in the ERP implementation process and marks the start of using the system in production.

V. Case Study I (Walmart)

Walmart is an American multinational retail corporation that operates a chain of hypermarkets and grocery stores. Headquartered in Bentonville, Arkansas, the company was founded by Sam Walton in 1962 and incorporated on October 31, 1969 [3]. As of January 31, 2020, Walmart has 11,484 stores and clubs in 27 countries, operating under 55 different names [3].

The company operates under the name Walmart in the United States and Canada, and as Best Price in India. In October, Walmart announced a partnership with Microsoft to use the latter's Azure cloud platform and artificial intelligence tools to improve its online shopping experience and speed up its digital transformation. The move was seen as a direct challenge to Amazon, which has been a major competitor of Walmart in the e-commerce space[2].

Some of the changes that came into the company after integration of this ERP are:

1. A cloud based enterprise system framework that helped the company to keep a track over all the resources and keep them organized.
2. Integration of Blockchain based solutions for an evolving growth.
3. Driving a more innovative environment and building a healthy environment in between the company.
4. Driving sales patterns and developing a better customer experience.
5. Developing better customer loyalty programs that will enable the company to drive more sales and attract more customers.

On the contrary it also provides some other benefits like integration of Microsoft 365. -Improved collaboration and communication: Microsoft 365 includes tools such as Yammer, SharePoint, and OneDrive for Business that can help improve communication and collaboration within an organization. Increased productivity: Microsoft 365 includes tools such as Office 365, which can help users be more productive [4].

Better security: Microsoft 365 includes tools such as Azure Active Directory and Microsoft Intune that can help improve security for an organization. Lower costs: Microsoft 365 can help organizations save money on their IT costs [4].

Artificial intelligence is one another factor that comes with this integration. The potential for AI in business is growing. According to a recent report from McKinsey, AI has the potential to create $13 trillion in value across the global economy by 2030 [5]. And businesses are already starting to see the benefits.

The type of ERP system used by Wal-Mart is SAP ERP Financials. SAP is the top provider of business programmes in the world.

Wal-Mart chose this type of system for its capability to sustain the company's worldwide growth and effectively react to changes in trade and regulatory landscape. It uses this type of ERP since it enables it to maintain growth and steer the developing business and regulatory landscape. SAP also enhances the company's fiscal position. Wal-Mart trusts that SAP's experience in assisting International corporations with their fiscal systems will result in more elasticity and scalability in their company (Monk& Wagner, 2009). [8]

Wal-Mart planned to implement its ERP system in a period of four years. It executed this ERP system internationally in phases. The first phase was completed by the year 2010. [8]

In a recent survey from PwC, 72% of respondents said AI would help them grow their business. And nearly half (49%) said AI would help them improve their decision making [5].

1**. Improve customer service**

One of the most obvious ways AI can help businesses is by improving customer service. By using AI to automate customer service tasks, businesses can free up employees to focus on more important tasks. And AI can also help businesses provide better customer service by providing more personalized service.

For example, AI can be used to recommend products to customers based on their past purchases.

2. **Increase sales**

AI can also be used to increase sales.By using AI to analyze customer data, businesses can identify potential upsell and cross-sell opportunities. AI can also be used to create targeted marketing campaigns that are more likely to convert.

3. **Improve efficiency**

AI can also help businesses improve their efficiency. By automating tasks, businesses can reduce the need for employees to do them. This can free up employees to focus on more important tasks. And by using AI to streamline processes, businesses can improve their overall efficiency.

4. **Make better decisions**

AI can also help businesses make better decisions. By using AI to analyze data, businesses can identify trends and make better decisions about their business. AI can also help businesses automate decision making.

For example, AI can be used to approve or deny credit applications.

5. **Collaborative Planning, Forecasting and Replenishment**

Customer demand forecasting plays a very important role to efficiently manage cost savings with respect to inventory. The presence of the Retail Information System enables Wal-Mart to see in real time the availability of merchandise/inventory in each store.

Rather than doing demand forecasting, what Wal-Mart does is collaborative forecasting and replaces the goods that have been sold. As a retailer, Wal-Mart requests suppliers only with the goods that have been sold and replaces the exact quantity. This process helps Wal-Mart to avoid the Bullwhip effect. Barcode, Radio Frequency Identification, Massively Parallel Processor and Point Of Sale.[8]

The Point-Of-Sale helped Wal-Mart to identify inventory deductions and resupplies. This POS was connected to the Retail Information System and became an integral part of demand forecasting. [8]

To further track the flow of inventory over the supply chain and the type of the item that leaves the store, RFID and Barcodes were used. Wal-Mart standardized the bar-coding of items across all suppliers and when delivered by the supplier the barcodes are scanned and fed into the central database, creating an inventory list. RFID tags are microchips with built in antennas, these chips hold information about the product. Whenever the chip comes in contact with the receiver, the data in the chip is taken into the system. This enables Wal-Mart to track the item across the supply chain.[7]

The main advantages of RFID are to improve logistic efficiency, save time identifying merchandise, convenience in checking inventory and reducing human labor. Wal-Mart is not able to fully migrate into RFID based SCM because of the investment involved in RFID, the RFIDs capabilities to work on wet, metallic and glass pallets and finally the requirement for all suppliers to move to RFID. The Massively Parallel Processor (MPP) is the central system that holds massive amounts of data regarding the sales, inventory and POS transactions. The main purpose of the MPP is to keep track of stock and movement.

VI. Case Study II (Western Digital)

Western Digital Corporation (WDC), is an American company. It designs, manufactures and sells data technology products, including storage devices, data center systems and cloud storage services [6]. Founded in 1970, the company has its headquarters in Irvine, California. As of September 2019, Western Digital employed around 74,000 people. The company has a long history of innovation. It was the first to introduce the 5.25-inch hard disk drive (HDD) in 1980 and the first to market the 3.5-inch HDD in 1983.

In 1986, Western Digital introduced the world's first hard disk drive with a 10-megabyte capacity. The company has since continued to innovate, introducing the first 1-terabyte HDD in 2007 and the first 10-terabyte HDD in 2013. Western Digital is a leading provider of storage solutions, including HDDs, solid state drives (SSDs), and flash-based storage products [6].

The company's products are used in a wide range of applications, including personal computing, enterprise

storage, data center servers, and cloud computing. In recent years, Western Digital has been focused on growing its business in the flash-based storage market [6]. The company has made several acquisitions in this space, including SanDisk in 2016 and Tegile Systems in 2017. Western Digital has a strong presence in the enterprise storage market. The company's enterprise storage products are used by major corporations and government agencies around the world.

Western Digital and Oracle have partnered to provide customers with a complete cloud storage solution. Western Digital provides the hardware and Oracle provides the software.

This partnership provides customers with a complete solution for storing data in the cloud. Western Digital provides the hardware and Oracle provides the software.

This partnership provides customers with a complete solution for storing data in the cloud [7]. Western Digital provides the hardware and Oracle provides the software. This partnership provides customers with a complete solution for storing data in the cloud [7]. It helped WD in various ways:

1. Human resource management.
2. Income Processing.
3. Business analytics and forecasting.
4. Comprehensive dashboards and reporting.

The Situation: Standardizing to One Cloud-based System

After major acquisitions, Western Digital experienced challenges with disparate processes and software. Instead of choosing one of the on-premises Enterprise Resource Planning (ERP) systems already in use, the company wanted to standardize on one cloud-based system across its entire organization.

Oracle Fusion Cloud ERP Implementation Benefits

Since implementing and standardizing on Oracle ERP, Western Digital has experienced substantial process and efficiency improvements.

Western Digital was able to rationalize 3,000 application modules, many of them redundant. With the data consolidation, company executives can view a single report that shows total spend and granular spending breakdowns across all departments.

With more than 2,000 applications across the three companies, management selected out-of-the-box adapters from Oracle Integration to limit project cost, risk, and delivery time. Quickly connecting Oracle ERP with SaaS systems, including Workday and Salesforce, as well as on-premises analytics applications, has also helped the company automate the end-to-end process of collecting data from business systems for real-time operational reporting and faster analytics refresh times. Previous ERP refreshes that took 24 to 48 hours were reduced to only 5 seconds.

Using Oracle Cloud, Western Digital reduced the number of cost centers from more than 15,000 to around 3,000. Additionally, Western Digital slashed the time it takes to approve purchases, as it streamlined the process from about 16 layers to five or fewer.

In addition, Oracle Cloud ERP's regular, automatic updates have enabled the company's decision-makers to use modern features more quickly than with on-premises applications.

VII. Conclusion

On the contrary, an ERP system can be extremely beneficial to a company by providing accurate and timely information that can help make better informed decisions, improving communication and collaboration between departments, and increasing operational efficiencies. However, before implementing an ERP system, it is important to carefully consider the needs of the organization and to select a system that will fit those needs.

Additionally, the implementation process can be complex and time-consuming, so it is important to have a clear plan and dedicated resources in place to ensure a successful implementation. The research on ERP systems has shown that there are many benefits to be gained from their implementation. However, there are also a number of challenges that need to be overcome. In order to ensure that an ERP system is successful, it is important to carefully consider the needs of the organization and to select a system that is best suited to these needs. It is also important to ensure that the system is properly implemented and that all users are trained in its use.

In the discussed case studies we observed the companies streamlined their processes under one piece to tech and that helped them in keeping it all linked. Or we can say in simple words an ERP system can link all the departments whether it is CRM, sales or HRM. They all know they stay connected with each other and this helps in the growth of the company. A successfully implemented ERP can result in better department collaboration, better growth and happy customers. Some benefits of a successfully implemented ERP system include:

Increased Efficiency

An ERP system can help to increase the efficiency of an organization by automating and streamlining many of the organization's business processes. This can free up employees' time so that they can focus on more value-added tasks.

Improved Decision-Making

An ERP system can provide managers with real-time data and analytics that can be used to make more informed decisions.

Reduced Costs

An ERP system can help to reduce the costs of an organization by automating and streamlining many of the organization's business processes. This can help to reduce the need for manual labor and can also help to reduce the need for paper.

Increased Customer Satisfaction

An ERP system can help to increase customer satisfaction by providing customers with real-time information about the status of their orders. This can help to improve communication and can also help to reduce the chance of errors.

Improved Business Processes

An ERP system can help to improve the efficiency and effectiveness of an organization's business processes. This can help to improve the quality of the organization's products and services.

Acknowledgment

We gratefully acknowledge the support, guidance and encouragement of our Guide Assistant Professor Dr. Rashmi Thakur ma'am and our colleagues who supported this idea and always encouraged us to go beyond ordinary.

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Web App to Manage Residential Societies

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Abstract- **Everyday life in the city has many important things to deal with. Tasks that are essential to our day to day lives, such as water supply, repairs, important notices, events, and security, come under housing society management. For the most part, housing societies still use old methods to handle these tasks. The use of traditional methods in today's era certainly has some limitations. Priority notifications, alerts, and a lot of other information that may not be delivered properly to residents in the current scenario as most things are done manually. It also lacks transparency about how the funds are being used in society. To overcome the problems caused by the lag of traditional systems, we are developing a web application that will be an automated system to reduce overhead.**

Keywords: Housing society management, Web application, and automated system.

I. PROBLEM STATEMENT

Proper functioning of housing societies has become an integral part of our lives. Society management contains many important activities that unconsciously occupy a large part of our lives. Society authorities are often tired of handling records stored in manual files. Complaints from the residents of the housing society are solved simultaneously with the excel sheet containing the contact information of the union member and the detailed information of the residents. This gets even worse when everything is done manually. Residents are concerned that despite registering the complaints with the authorities, if the problem has not been resolved then no one knows about the status of complaints. These are the common problems identified which are faced by societies. Without automation and the use of the latest tools, managing a residential complex is too time-consuming, requires too much human resource, costly and inefficient. World has evolved and most of us, regardless of where we work, want to combine the latest technologies in our day to day activities. So changing the way housing societies work is beneficial, increases efficiency, and saves time and resources.

II. INTRODUCTION

The web application is designed to manage the day to day activities of housing society. In most of the housing societies, most of the work is still done manually. Since most of the things are done and saved on papers it is very difficult to keep track and manage all the work. Most of the daily operations of the housing society will be automated by this system for managing societies. There is a lack of automated systems that carry out all the regular tasks in the housing society so that the residents are aware of what is happening there. The system also charges individual flats or selects units based on location or a set fee. Upon submitting their apartment bill, members get access to bills for payments. The most frequent issues that residential communities encounter will be addressed by this system. Management committee can track expenditures of the society using this system and make better plans for the future.

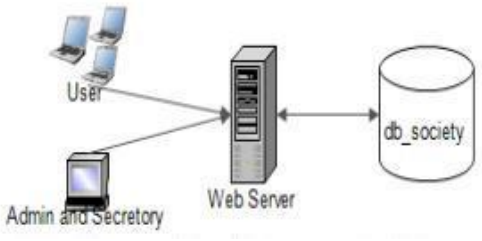

Figure. 1, Generalized system Architecture of the Web application.

The web application's system architecture in Figure 1 shows how different users interact with the database and the society's server. The data is stored in a database from where data is retrieved via this web server. Web applications are becoming very popular in today's world since they do not need to be downloaded on every user's device. Given the state of the Indian economy, web applications are a technology that every second citizen may access. Internet computing has undergone a revolution thanks to the functioning of powerful, decentralized

devices. By decreasing effort and fostering reliable communication, this idea can significantly help in finding a solution to the problems faced by residential societies. As a tool for resident alerts, meeting reminders, and managing complaints, this website is ideal. Due to these features, this web application will offer a wiser, better and more secure mode of communication between society members and the administrators. The web application maintains this data in the SQL database which has its own benefits, and it has a system design where the administrator has all the rights to send notifications, update bill amounts, arrange meetings, etc.

III. LITERATURE SURVEY

Housing Society Management: To solve the shortcomings of the existing systems, this project came up with an easy and secure method of communication through an Android app. There was a feature in this application that made communication between society members possible. Various functions of the community, such as complaints, announcements, meetings, rules, suggestions, and electrical connections, are provided at the same time so that residents can freely use any function. This android application also reduced the workload of society authorities by providing administrators facilities due to which they do not have to monitor information availability only through the backend.

Society Management System: This app has features like audit, parking, notification button and message board. Management module kept the maintenance list for all flats in the Society. - The administrator maintains and updates the maintenance list for all apartments in the community. Expected service fee and users have to pay a predetermined amount for maintenance. The manager manually clicks on the corresponding apartment with the name. The parking section provided the user with a detailed map of the status of the parking space. By seeing the availability users can reserve a vehicle parking space.

Study of Implementation of Society Management System: Notifications and other useful features were available in their society management app. User interface was easier for society members to make use of messaging functionality. Project developed was highly reliable and brought transparency in the society. But frequent notification can interrupt the society members even though they may be important. To implement the proper working of the application for a particular society, it was needed to visit these different societies and get to know what their daily activities and requirements were.

Society Management Application on Android: This community maintenance system is designed to address the most common problems faced by residential communities. This application is a cloud-based system for handling the daily tasks of housing societies. Coordination is required between each governing body and the providers of these services to ensure that appropriate accommodation is provided. The system allows employees/ guards/ owners to log in using a unique QR code containing name, password, address and phone number.

Housing Society Management Web Application with recommendation system: This web application has helped improve the interaction of society members by allowing them to communicate with one another by joining or becoming members of cultural or sports groups. Through this application, residents of the society can easily send their complaints and suggestions through the application without having to meet the authorities in person. Additionally, the app will be updated as soon as complaints or suggestions are resolved. The app helped residents to get up-to-date information related to social events conducted by society members.

IV. PROPOSED METHODOLOGY

The systems existing today had some shortcomings, we felt the need to curb using our proposed system. This system has a lot of major advancements when compared to present ones. This takes care of automated man to man conversation by itself without need of any other authority. The prime use-cases this application addresses and the offerings which are provided are as follows:

1. Maintenance Pay Scheduler

Maintenance has always been a toubling task and part of a society. It’s quite a time taking task in letting all the people know of their bills and pending

dues. Also then collecting dues from them makes another hassle. Also to give them very frequent reminders of the dues is a struggling task sometimes in itself for the authority. Using this prominent feature, the authority involved in managing members can quickly send an e-gen pay schedule to gather dues in any forms from all flat owners or renters.

2. Maintaining Records of Dues

The paying of the bill is considered one of the tasks of utmost importance. But, it's like sometimes they are not able to get the maintenance bill notification or sometimes they are unable to spare time to physically pay the dues or charges on time. Our Society Web Application attempts to curb the issue and provides truly amazing and an easy answer to pay dues bills. This also makes sure to remind the user of their current month maintenance dues bill payment. Some residents can pay their dues bills using and upi or swipe payment gateway by sitting at the comfort and reliability of their flats and need not find any concurrent authority people for making their pay dues. They can find an option to
get the completion status of their dues pays of payment and get a receipt instantly in no time at their conveniences.

3. Manage Complaints

One of the very irritating experiences of any flat owner is their issues being unaddressed and unanswered. Also there are some issues that can affect other flat owners as well. So the Society Web Application provides a surface of Complaint. Where complaints can be added and as they are answered their status can be updated to completion as well. Also transparency can also be made whether the issue is legit or not. If a legit issue is raised, It's taken into the system and systematic resolutions are carried out. Also the issue raiser is notified if the status of their complaint is changed. The records are also saved as what are the frequent issues pertaining in the society so that for further stages, Presolved resolutions can be made in action and save time.

4.Communication Management

A residential community or a considerable society is more like a small fragment where various families remain intact together irrespective of any race, religion or genre. Ranging from a child to an oldie society has all a wide variety of people without any biases towards any individual. The gap that is usually a sort of comm-gap is one of the most important problems and also a major shortcoming between them. Through the My Group that has a Connections feature i.e The ShoutBox section of the web application, the members can connect or tree form with other members in the community or society, they can speak with them and discuss various major non-major important informations, discussions regarding organizing of any kind of events and casual talks with each other imperatively and efficiently without any disruption to the process.

5. Notice System and management

Any residential society conducts a number of events and various festival celebrations. Also there are various official and unofficial events happening in a society. Permissions should be taken. Each member of the society must be addressed while making any decision for conduction of any kind of an Event or Meeting. Therefore, The Resident welfare association or the event conducting authority can publish the notices and be able to reach all the respective members of the society instantly. They are also able to see how many members have received and have read the notice. Societal residentials will get an insta notification and emailed about any happenings in the society and also to grasp and queue the necessary proceedings instructed in the informed booklet for a smooth process and completion of the events and meetings.

6. Visitor Notification

Unnotified Visitors and unidentified guests can sometimes be a threat to society members. So it becomes a necessity to improvise the visiting arrangements beforehand. This would help to avoid all kinds of mishaps or security infringements and would be able to save a lot of hassle if the members are already aware who is coming to their houses and will lead to a more safer security management. Hence it leads to a safer society. The proposed system has a feature of visitor notifications. It works in such a way that whenever there is any guest or visitor for any society member. Their entails are entered in the web application and proper detailed entry is made. Then the visitor gets a notification of incoming visitors. The respective flat owner approves of this notification. The visitor or guest is allowed to mark an entry in the premises of society.

V. IMPLEMENTATION AND RESULTS

Fig. 2 - Home Page

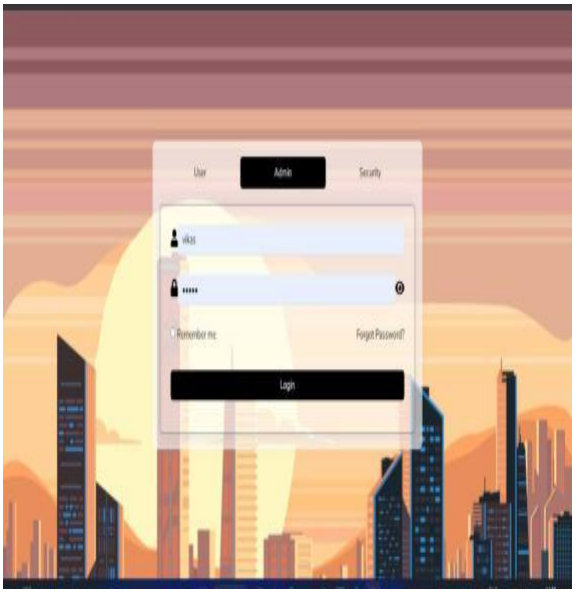

Fig. 3 - Login

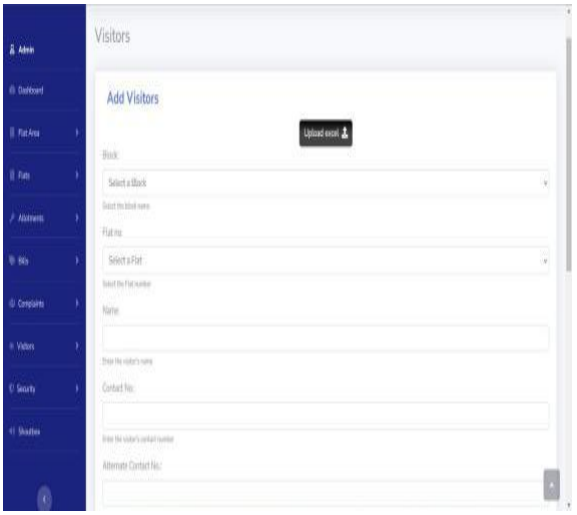

Fig. 7 Add Visitor

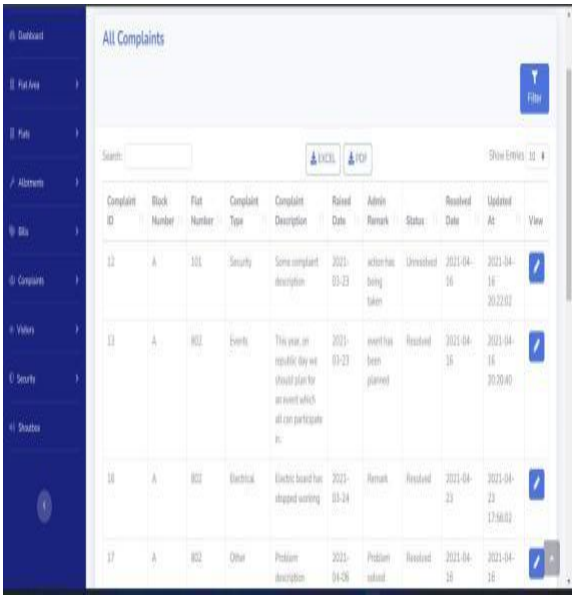

Fig. 8 - All Complains

Fig. 4 - Admin DashBoard

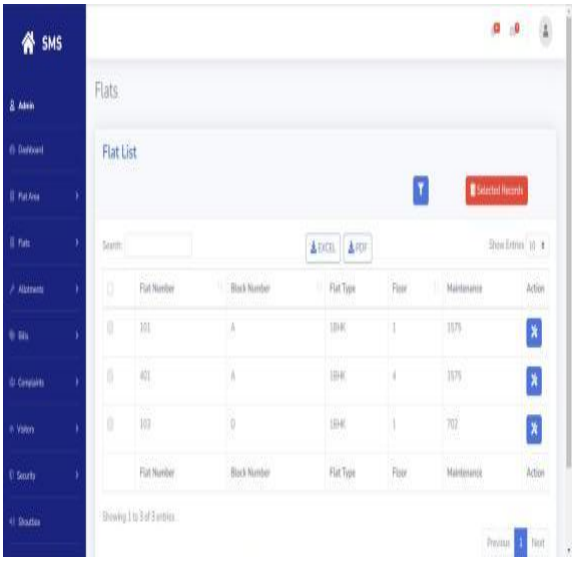

Fig. 5 - Flat list

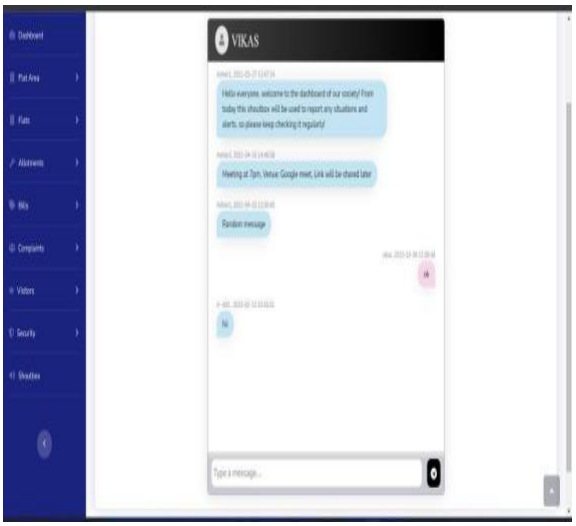

Fig. 9 - Chat box

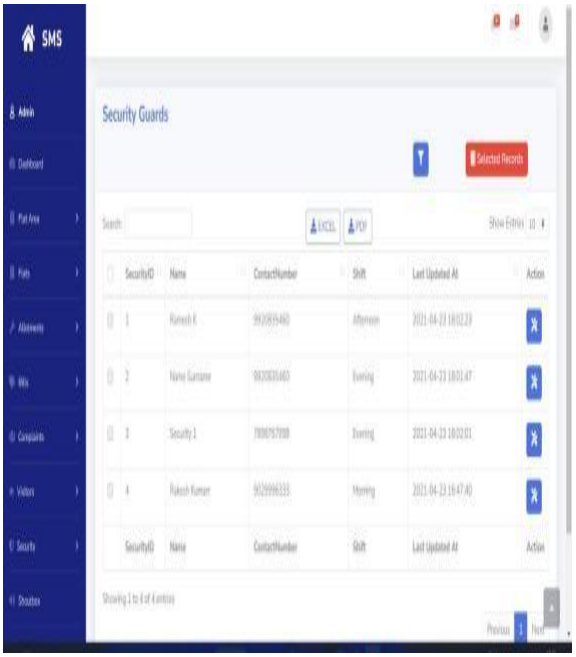

Fig. 10 - Manage Security Guard

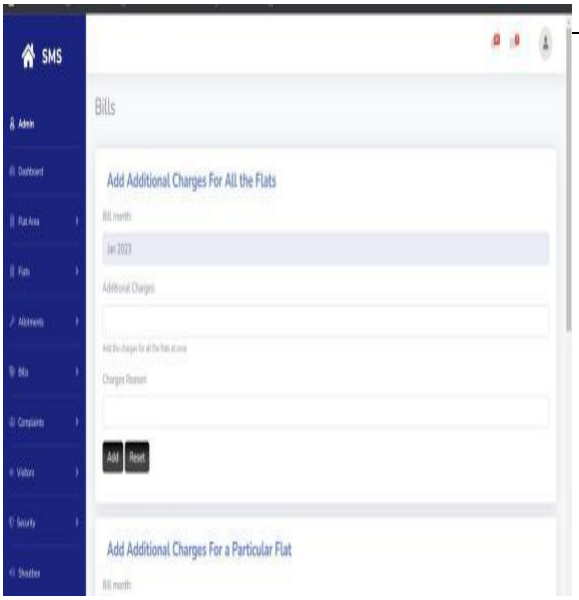

Fig. 6 Generate Maintains

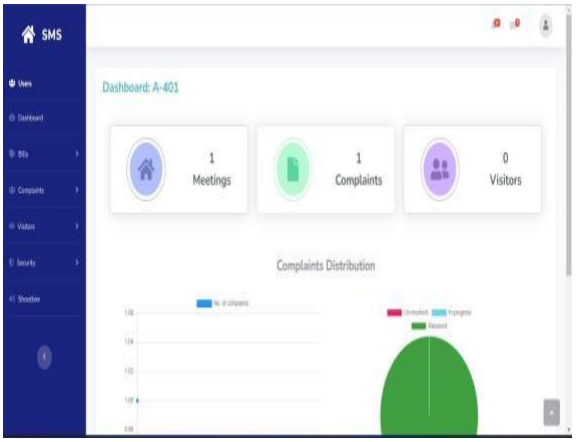

Fig. 11 - User DashBoard

Fig. 12 - User Bill View Page

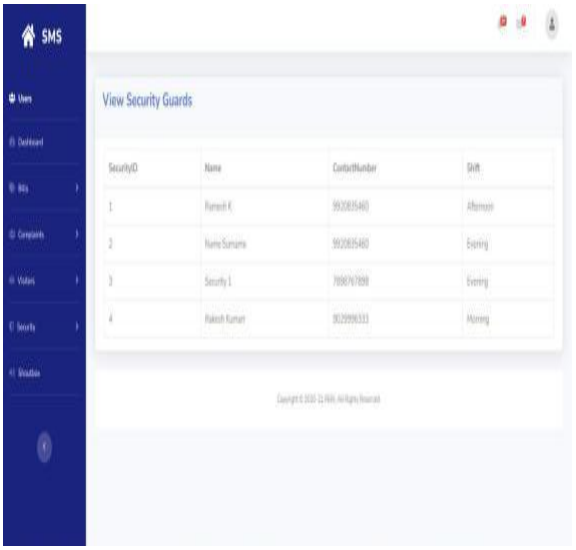

Fig. 13 - Security Guard List

CONCLUSION

We have constructed a web application for residential housing societies to accelerate their management and to reduce the human efforts and errors to increase a crystal clear transparency between the society members and core management authorities. This effort also helps to reduce the time and constructive applied endeavors for non-automated communication in a society by providing them notifications and important information to the members of a residential society in the reliable and transparent way.

VII. ACKNOWLEDGMENT

We gratefully acknowledge the support, guidance and encouragement of our Guide and mentor Dr. Anand Khandare Sir (Dy. HOD - Computer Engineering Department) for this novel work.

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Heart Failure Prediction System Using Ml

Dr Harinder K. Bali, Chairman

Abstract: **. In the last fifteen year, HFs become still endudred the leading causes of death. One person dies almost every 34 seconds from HF. Diagnosis of HFs is an essential task and yet intricate task to perform accurately and efficiently in the hospital and clinic. These things are motivated to build a Web-based HFPS application using ML algorithms. This proposed system can reserve problem by accurately predicting the presence of HF in the patient. ML is an emerging technology of AI that solved the various type of classification problem by producing accurate output. ML algorithms are applied to forecast the HF of the patient.**

The major killer cause of human death is Heart Failure (HF).

Many people die due to this disease. Lots of researchers have been discovering new technologies to procrastinate the disease before its too late for helping healthcare as well as people.

Keywords- HF, ML

I. INTRODUCTION

India accounts for one-fifth of the total deaths occurring from stroke and ischemic heart disease, especially in younger adults according to the World Health Organization. “Cardiovascular diseases affect Indians a decade earlier than their western counterparts and nearly 3 million people die of stroke and ii. heart attack every year. The most unfortunate part is that Cardiac Sciences, Paras Hospitals, Panchkula.

This paper tries to explore and implement various machine learning algorithms and analyze which one among them provides the best accuracy with a wide array of data provided. We also attempt to visualize the data and form a connection between various factors

II. PROBLEM STATEMENT

In heart failure, the heart can no longer pump enough blood around the body. The heart muscle is either too weak or not elastic enough. Different parts of the heart may be affected too. The type of medication people use for the treatment of heart failure will depend on the type of heart failure they have.

Left-sided heart failure: The left ventricle of the heart no longer pumps enough blood around the body. As a result, blood builds up in the pulmonary veins (the blood vessels that carry blood away from the lungs).This causes shortness of breath, trouble breathing or coughing – especially during physical activity. Left-sided heart failure is the most common type.

Right-sided heart failure: Here the right ventricle of the heart is too weakto pump enough blood to the lungs. This causes blood to build up in the veins (the blood vessels that carry blood from the organs and tissue back to the heart). The increased pressure inside the veins can push fluid out ofthe veins into surrounding tissue. This leads to a build-up of fluid in the legs, or less commonly in the genital area, organs or the abdomen (belly).

Biventricular heart failure: In biventricular heart failure, both sides of theheart are affected. This can cause the same symptoms as both left-sided and right-sided heart failure, such as shortness of breath and a build-up of fluid.

III. . OBJECTIVE

. The main objective of this research is to develop a heart prediction system. The system can discover and extract hidden knowledge associated with diseases from a historical heart data set.

. Heart failure prediction system aims to exploit data mining techniques onmedical data set to assist in the prediction of the heart failure.

IV. . LITERATURE REVIEW

. Kalghatgi et al. [2] presented a Neural Network Approach based on theBig Five Test to predict the personality of individuals depending on tweets published on Twitter by extracting meta-attributes from tweets. Which areused to analyze one’s social behavior. The authors followed a four-step process which is Data Collection from tweets, Preprocessing, Transformation and Classification. Although neural networks are used topredict personality there are limitations such as countering fake information, automatic analysis of tweets and relying on just Twitter is not enough to predict someone’s personality but only user behavior and trends.

. Allan Robey et al [3] proposed a system to reduce the load on the HumanResource department of companies by having two sides: organization and candidate oriented. The authors claim that the proposed system will be more effective to shortlist CVs from a large pool making sure that the ranking is fair and legal. The main difference between the existing system and the proposed system is that instead of just scanning the CVs, the authors propose to conduct an aptitude test and a personality test for personality prediction.

iii. Juneja Afzal Ayub Zubeda et al [4] worked on a project to rank CVs using Natural Language Processing and Machine Learning. The system ranks CVs in any format according to the company’s criteria. The authors propose to consider candidate’s GitHub and LinkedIn profile as well to get a better understanding making it

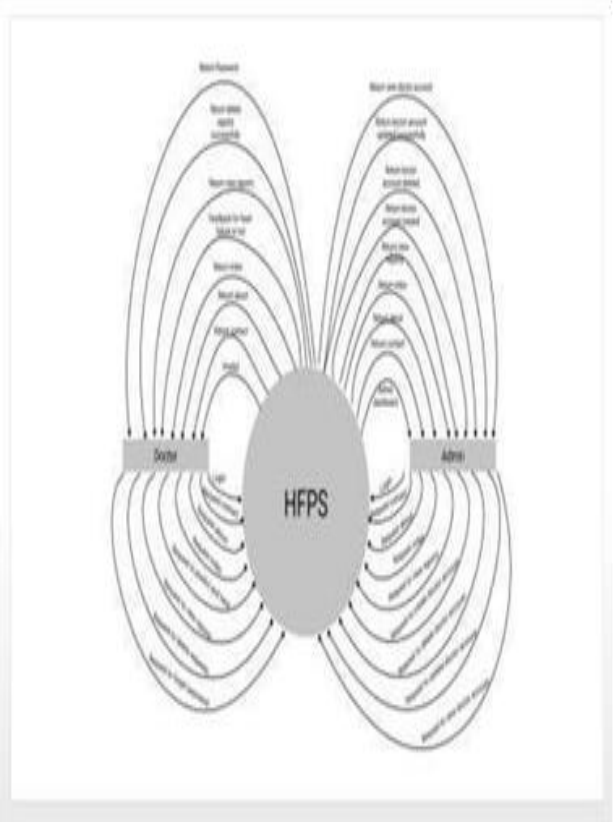
easier for the company to find a suitable match based on skillsets, ability and most importantly, personality.

V. DATA COLLECTION

1) Dataset : As manual data collection is time-consuming, we collected candidate resumes through a lot of websites and personal interaction with potential job seekers taking the total count to 708 CVs. The collected CVs were in PDF and DOCx format.

Methodology : The methodology of software development is the method in managing project development. There are many models of the methodology are available such as Waterfall model model, Incremental model, RAD model, Agile model, Iterative model and Spiral model. However, it still need to be considered by developer to decide which is will be used in the project. The methodology model is useful to manage the project efficiently and able to help developer from getting any problem during time of development. Also, it help to achieve the objective and scope of the projects. In order to build the project, it need to understand the stakeholder requirements.

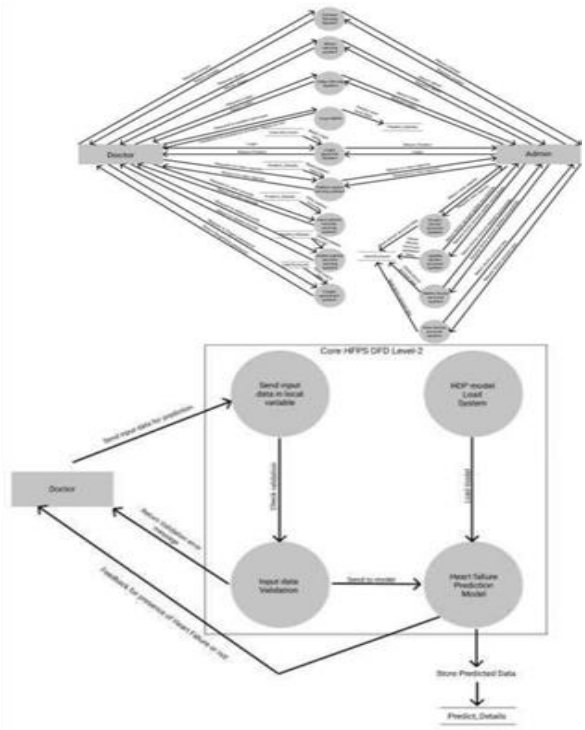
2) For parsing CVs, we have used pyre sparser- a simple resume parser used for extracting important features such as name, email, id, description, skills from CVs. Pyre sparser supports PDF and DOCx files. The parsed data is then stored in a CSV file.



VI. . PROPOSED SYSTEM

DFD is the abbreviation for Data Flow Diagram. The flow of data of a system or a process is represented by DFD. It also gives insight into the inputs and outputs of each entity and the process itself. DFD does not have control flow and no loops or decision rules are present. Specific operations depending on the type of data can be explained by a flowchart.

Data Flow Diagram can be represented in several ways. The DFD belongs to structured-analysis modeling tools. Data Flow diagrams are very popular because they help us to visualize the major steps and data involved in software-system processes



Before training our model, we label encoded the Personality column of our dataset. Our final dataset had 708 rows and 6 rows. Using the sklearn library, we have used 70% of our data for training purposes and 30% for testing the results. For predicting the personality of a prospective candidate, we have used various machine learning algorithms like Logistic Regression, Naïve Bayes, Random Forest, Support Vector Machine (SVM) and KNN.

VII. LOGISTIC REGRESSION

It is an algorithm analogous to Linear Regression, except it predicts whether something is True or False. It is a popular algorithm for solving classification problems like Binary Classification (Pass/Fail, Rain/No Rain).

- Naive Bayes

In probability, Bayes' theorem is used to compute the conditional probability. Thetheorem forms the basis of the Naive Bayes classifier, a classification algorithm that assumes strong independence assumptions between the features. Accordingto the algorithm, each feature in the problem makes an equal and independent contribution to the outcome.

- kNN

kNN stands for k-nearest neighbors, a supervised machine learning algorithm capable of solving both regression and classification problems. Intuitively we can think of the proverb 'Birds of the same feather flock together as similar to kNN.

The algorithm assumes that

similar data points usually occur in close proximity.

The keywords in Table 1 will be matched by the mentioned class. Using PhraseMatcher class, our algorithm searches for the keywords and gives a score from a range of 0-10 according to the occurrence of OCEAN keywords in one's CV. After assigning scores as shown in the table below, the algorithm labels eachdata point as dependable, extraverted, lively, responsible, or serious. Thus, we output a CSV file with degrees of the 'Big five' traits as all the columns. Each datapoint has been labelled as either dependable, extraverted, lively, responsible,or serious as given in Table 2.

SVM

Support vector machine is a supervised machine learning algorithm used to dealwith data for classification and regression analysis. The goal of SVM is to find a hyperplane in N-dimensional space (N- number of

features) that can easily classify the data points.

- Random Forest

Random forest is another ensemble technique used for classification and regression tasks. It uses multiple decision trees to produce the output. Bagging orbootstrap aggregation are used to train the random forest algorithm's "forest. After training our model on all of the algorithms, we realized that our predictions turned out to be rather poor. Even our best models could only find an accuracy ofabout 30 percent. Another factor was that our training and testing datasets had very different distributions. While our training data was a little imbalanced, the testing data was even more imbalanced. But when we put ourselves in the shoesof an employer, we realize that he would want to hire someone who is 'responsible' and 'lively' more than anything else. Thus, our problem now turns into a binary classification problem (1- responsible or lively 0-others)

Technical Feasibility:

The Classification algorithm is a Supervised Learning technique that is used to identify the category of new observations on the basis of training data. In Classification, a program learns from the given dataset or observations and then classifies new observation into a number of classes or groups. Such as, Yes or No,0 or 1, Spam or Not Spam, cat or dog, etc. Classes can be called as targets/labels or categories. In our project , using various algorithms like Naïve Bayes, RandomForest and support vector machine, we aim to classify candidates based on their personality.

Financial Viability:

As of now, since the dataset is limited, NO financial help is required. The Online GPU provided by the Google Collab is sufficient for training and evaluating the model. Though, to deploy the model on a website and to host the website onlinewe need to buy a domain which may cost around 500 rupees per year with somemaintenance cost. As a future scope, once the site is hosted and becomes popular, the number of users will increase hence the dataset increases too. With ever increasing data, training classification model will become

difficult on the free GPU which was provided by Google Collab hence we may need to buy Google Cloud GPU

which costs around 3-5 USD for 40 GB per GPU.

VIII. CONCLUSION

In this paper, we have used various Machine Learning Algorithms such as Logistic Regression, Naive Bayes, Random Forest, SVM and KNN for Personality prediction using CV Analysis. We have presented an effective heart disease prediction model based on machine learning techniques. The effectiveness of our model has been evaluated with and without anomalies using various classifiers. Experiment results showed that RF, SVM, LR classifiers achieved better accuracy in the dataset without anomalies compared withdataset with anomaly instances. Again, our anomaly detection model is able to effectively recognize the anomalies in the data. In future, we will focus on additional experiments to measure the effectiveness of our model, and also on the model effectiveness in other application areas like IoT systems.

We gratefully acknowledge the support, guidance and encouragement of ourguide, Mr. Shailesh Sangle sir for this project.

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Gesture Enabled Commands for Laptops/PCs

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Abstract - **Computer Interaction has evolved from keyboard to touchscreen and now from touchscreen to touchless gesture based interaction. In defence sector, touchless UI can be used in Robotic army, bomb diffusion, flying jet or military car, etc. Proposed hands-free software will provide users more flexibility in their workspace by automating various actions such as switching tabs, saving and printing files, and so on. This is an end to end desktop application because it is more secure than web application and provides a more user friendly experience. Also this is interacting with os operations so it will provide more enhanced performance. Specific commands and All mouse activity(Left Click, Right Click, Scroll through) is used in a system to enhance System performance. FaceNet is used for user face authentication. And as part of data collection mediapipe extracts keypoints from gestures. Multilayer perceptron appreciates various relationships between the features through feedforward and backpropagation to train the model. This model will be user specific. All information about the user and gesture is stored in a database.**

Keywords: *Deep Learning, Neural Network, FaceNet, Mediapipe,*

I. INTRODUCTION

In this period of time where we all are going through an online phase we are educating ourselves, attending meetings, surfing

documents, etc. Suppose If you are reading a research paper from a distant place and suddenly you need to let your pc scroll the pdf a little bit up or zoom it, In that case you need to come close to your pc and give the command. So our problem statement falls under the domain of smart automation and the main objective of the problem statement is to make an application that controls functionalities of a computer using hand gestures via integrated webcam. We will create a hands-free software that will be further used in various fields like medical for surgery, military for bomb defusing, even for communication through sign language

II. LITERATURE REVIEW

[1] The signals utilized by RADAR technology can pass across mediums without being constrained or hampered. can pass through insulation. The signals first begin to penetrate the materials and gather the relevant data. possess the ability to gauge an object's motion velocity. need not be transported by any means. can concurrently target several items.

[2] The segmentation of hand gestures is accomplished in this study by developing a skin color model and an AdaBoost classifier

provide users more flexibility in their workspace by automating tiny actions such as switching tabs, saving and printing files, and so on. It will also be useful in media players or while reading documents/files. A simple gesture could pause or play the movie or increase the volume even while sitting far from the computer screen. You can easily scroll through an eBook or a presentation while having lunch or even if your hands are oily. Also this solution can

based on haar to account for the specificities of skin color for hand motions. Additionally, hand movements are denatured with one frame of video being cut for analysis.

[3] A relic, the Kinect sensor was first made for the Xbox 360 and later, with the Kinect Adapter, for the Xbox One series. You can play interactive games, snap pictures, and more with Kinect thanks to its built-in camera. You may choose which apps can use the linked Kinect and whether it is turned on in the settings on compatible Xbox systems.

[4] Munir Oudah claimed that hand gestures might be employed in a variety of industries, including gaming, robotics control, virtual

environments, personal computers and tablets, home automation, and clinical and health applications. A variety of categories, including stance and motion, dynamic and static, or a combination of the two, were used to group hand signals. The study analyses the research on hand gesture approaches and lists advantages and disadvantages for various situations. It assesses performance using manual segmentation, classification algorithms, and computer vision approaches that deal with similarity and difference points. It has experimented with a variety of hand gesture techniques, including the Instrumented Glove Approach and the Computer Vision Approach (Color-Based).

[5] Color recognition is the foundation for hand tracking. In order to initialize the software, color is sampled from the hand. Using a threshold and the sampled color profile, the hand is then separated from the background. Each color in the profile generates a binary image, which is then added together.

[6] Smit Parikh took up the challenge of creating an application that uses hand gestures to manage some specified computer capabilities via an embedded webcam. In order to make labor easier, the paper suggested a hand gesture recognition system for identifying motions and turning them into certain actions. According to the report, this system will be pursued utilizing OpenCV to record motions and be interfaced with using Django, React.Js, and Electron. The system's training method is YOLO, and the database will be where the gestures are saved (MongoDB). The main objective of the paper is to give the system's user the best possible experience. It has shown a survey on hand gesture recognition, applying it in various application domains and also examining existing solutions.

[7] In this paper, the proposed system adopts a model based on the sensors estimating distance and executing a specific function in response. Using a trigger and an echo as inputs, an ultrasonic sensor may determine the distance of the hand by measuring the time it takes for sound waves to be transmitted and received. Depending on how far away the hand is from the sensor, a particular function is performed. The sensor, which we refer to as the left sensor and right sensor, is hooked to the computer at the top of the screen on both corners for quick operation. Two sensors are being used for a variety of tasks.

[8] In this paper, the proposed system is to subtract background from the image to extract the moving foreground from the static background. A white color arc as arc of reference was proposed to detect the number of fingers and for faster processing by considering only intersected pixels.

[9] It uses continuous-wave radar, like Frequency Modulated Continuous Wave (FMCW) radar, which transmits and receives data in a continuous wave, as opposed to pulsed radar, like Ultra Wideband Impulse-Radar (UWB-IR), which transmits short-duration pulses at first.

[10] It can accurately detect gestures even in low-resolution picture mode, and it has very high precision in complex and gloomy environments.

III. COMPARATIVE STUDY

Sr.No.	Year	Author	Title	Objective	Gaps
1.	2021	Hand Gestures Recognition Using Radar Sensors for Human-Computer Interaction: A Review	Sung Ho Cho, Sarfaraz Ahmed, Karam Dad Kallu, Shahzad Ahmed	The signals utilized by RADAR technology can pass across mediums without being constrained or hampered. can pass through insulation. The signals first begin to penetrate the materials and gather the relevant data. possess the ability to gauge an object's motion velocity. need not be transported by any means. can concurrently target several items.	Operates in a confined and regulated space. Typically, there must be line of sight between the hand and the sensors. Recognition potential is frequently constrained to a small group of users and their hands at one location.
2.	2018	Jing-Hao Sun; Ting-Ting Ji; Shu-Bin Zhang; Jia-Kui Yang; Guang-Rong	Research on the Hand Gesture Recognition Based on Deep Learning	The segmentation of hand gestures is accomplished in this study by developing a skin color model and an AdaBoost classifier based on haar to account for	In this sense, the human hand is separated from the complex background, and the CamShift algorithm also makes it possible to track hand gestures in real-time. Then, a

				Additionally, hand movements are denatured with one frame of video being cut for analysis.	that have been detected in real time in order to achieve the recognition of 10 common digits. Research indicates 98.3% accuracy.
3.	2012	Zhengyou Zhang	XBOX Kinect	A relic, the Kinect sensor was first made for the Xbox 360 and later, with the Kinect Adapter, for the Xbox One series. You can play interactive games, snap pictures, and more with Kinect thanks to its built-in camera. You may choose which apps can use the linked Kinect and whether it is turned on in the settings on compatible Xbox systems.	Only if Kinect is activated is the camera usable. If you've disconnected or turned off your Kinect, the camera won't function and apps won't be able to access it. When Kinect is turned on and prepared to take still or moving pictures, a light next to the camera lens on the left side of the sensor illuminates.
4.	2020	Munir Oudah	Hand Gesture Recognition	One of the solutions, Color-Based Recognition by using	The gaps in this study led us to the conclusion that the hand must be kept at a

, Ali	Based on		
Al-Naji and	Computer	Glove Marker, is	particular distance from
Javaan	Vision: A	convenient to use and	the computer in order to
Chahl	Review of	less expensive than that	avoid causing issues.
	Techniques	of the sensor data	Another drawback that

				glove.	we observed was there were multiple expensive sensors being used.
5.	2015	Shashank Salian, Pranav Ganorkar, Dhiren Serai	Hand Gesture recognition and cursor control	Color recognition is the foundation for hand tracking. In order to initialize the software, color is sampled from the hand. Using a threshold and the sampled color profile, the hand is then separated from the background. Each color in the profile generates a binary image, which is then added together.	Due to the lengthy process of first capturing the image, extracting it, and then extracting the hand using a threshold, the application's performance is not very efficient.
6.	2020	Smit Parikh, Srikar Banka, Isha Lautrey, Isha Gupta, Prof Dhanaleksh mi Yedurkar	Human-Comp uter interaction using dynamic hand gesture recognition to conveniently control the system	Excellent processing speed; it can handle 45 frames per second and understands generalized object representation.	The system performs worse than CNN in terms of recall and localization error, fails to identify nearby objects because each grid can only suggest two bounding boxes, and has difficulty identifying small

					objects.

7.	2021	Gopi Manoj Vuyyuru, Malvika Ramesh Shirke	Performing Basic Tasks on Computer using Hand Gestures & Ultrasonic Sensors	In this paper, the proposed system adopts a model based on the sensors estimating distance and executing a specific function in response. Using a trigger and an echo as inputs, an ultrasonic sensor may determine the distance of the hand by measuring the time it takes for sound waves to be transmitted and received. Depending on how far away the hand is from the sensor, a particular function is performed. The sensor, which we refer to as the left sensor and right sensor, is hooked to the computer at the top of the screen on both corners for quick operation. Two sensors are being used for a variety of	The concept put out in this study uses ultrasonic sensors to identify gestures, which has the drawbacks of a short testing range, imprecise readings, and rigid scanning techniques. The suggested configuration calls for a lot of gear and is somewhat pricey.

		response. Using a trigger and an echo as inputs, an ultrasonic sensor may determine the distance of the hand by measuring the time it takes for sound waves to be transmitted and received. Depending on how far away the hand is from the sensor, a particular function is performed. The sensor, which we refer to as the left sensor and right sensor, is hooked to the computer at the top of the screen on both corners for quick	rigid scanning techniques. The suggested configuration calls for a lot of gear and is somewhat pricey.

8.	2016	Mr. Sudarshan G. Ghuge, Mr.Santosh G. Karkhile	Operating an Application Using Hand Gesture Recognition System	In this paper, the proposed system is to subtract background from the image to extract the moving foreground from the static background. A white color arc as arc of reference was proposed to detect the number of fingers and for faster processing by considering only intersected pixels.	A drawback to this solution is limitation of gestures as only five gestures can be performed. Dynamic gestures can be performed using the proposed idea.
9.	2021	Sung Ho Cho, Sarfaraz Ahmed, Karam Dad Kallu, Shahzad Ahmed	Hand Gestures Recognition Using Radar Sensors for Human-Computer Interaction: A Review.	It uses continuous-wave radar, like Frequency Modulated Continuous Wave (FMCW) radar, which transmits and receives data in a continuous wave, as opposed to pulsed radar, like Ultra Wideband Impulse-Radar (UWB-IR), which transmits short-duration pulses	Operates in a confined, supervised space. The hand and the sensors often need to be in line of sight. Recognition potential at one place is frequently constrained to a small group of users and their hands.

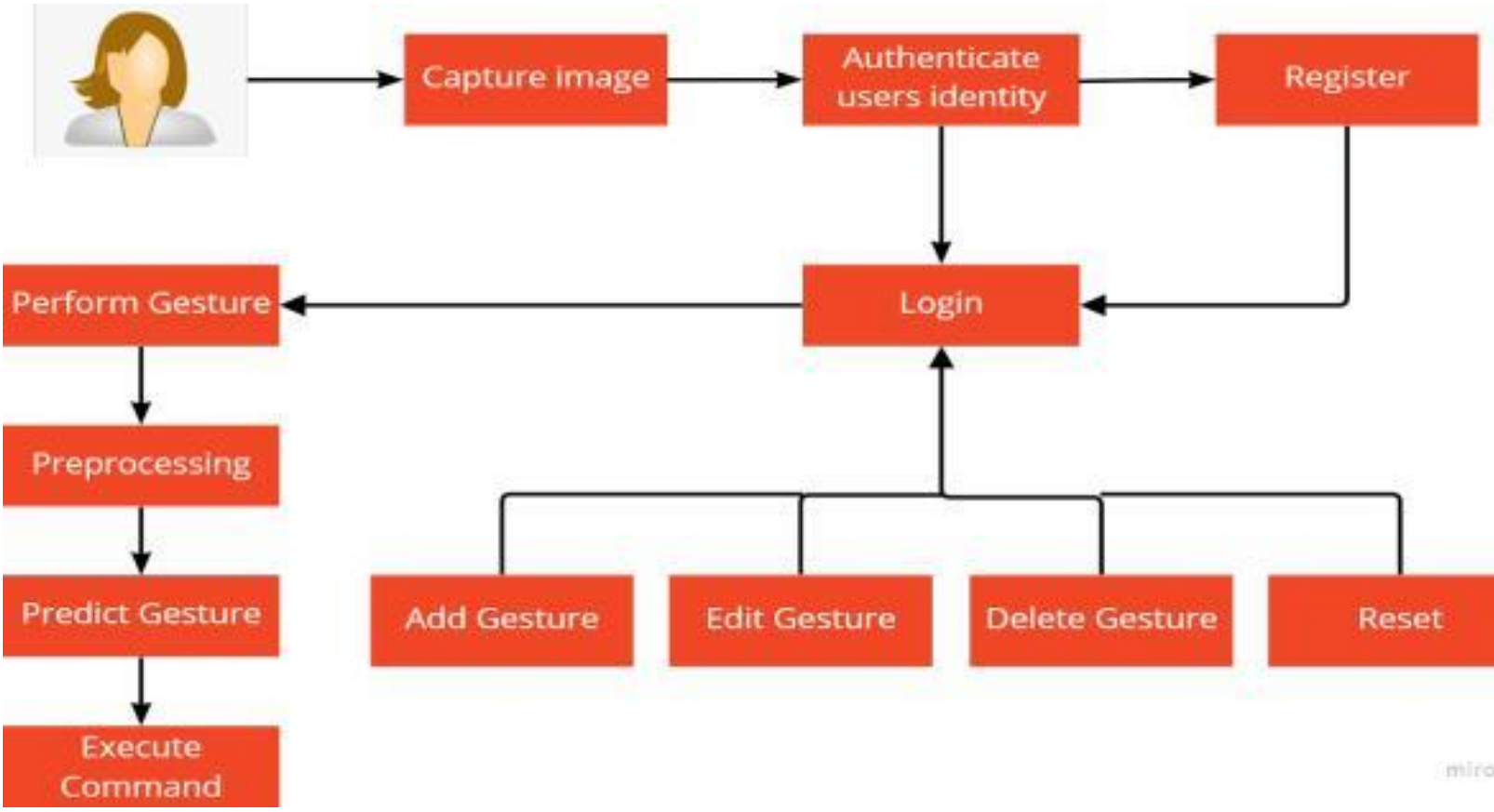
				at first.	

10.	2021	Real-Time Hand Gesture Recognition Based on Deep Learning YOLOv3 Model.	Abdullah Mujahid, Mazhar Javed Awan, Awais Yasin, Mazin Abed Mohammed, Robertas Damaševičius, Rytis Maskeliūnas, Karrar Hameed Abdulkareem	It can accurately detect gestures even in low-resolution picture mode, and it has very high precision in complex and gloomy environments.	Takes a lot of time to process the data, and using the dataset for training requires powerful computing power.

IV. METHODOLOGY

The entire project is divided into three major components with each one being further broken down into multiple modules for low coupling and easier management. The components are as follows:

1) The Authentication module
    a) Login module
    b) Registration Module
2) Gesture recognition system
    a) Static gesture
    b) Dynamic gesture
3) Customization
    a) Add gesture
    b) Edit command
    c) Delete gesture
    d) Reset to default



4.1 Architectural design of system

Face recognition will be used to authenticate the user, and only authenticated users will be able to access the application.

1. The webcam will be used by the programme to identify and conduct actions associated with those gestures. This application will be running in the background while the user runs other programs and applications.
2. The authorized user can additionally personalize the activities that must be

performed in response to a specific gesture

V. CONCLUSION

We are developing a single application that will include all the customization and gesture command features that earlier offerings lacked.

Our research leads us to the conclusion that adopting different Deep learning algorithms can improve the performance parameter.

The user will be able to perform numerous daily tasks with gestures in this desktop programme. As a result, the gestures in this case will be mapped to distinct commands that will enable the user to effortlessly perform any shortcut key using a single motion.

As a result, we'll add multi-headed deep learning models that can recognise hand key points. These key points will then be used as inputs by the deep learning model, which will predict the gesture given by users in varying environments.

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Digitization and Real Time Translation of Oral and Written Material for Indian Languages

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***Abstract*– Understanding diverse languages is challenging for humans. Since there are more than 22 official languages in India, it is quite challenging for a human to be fluent in all of them. In these situations, communication becomes problematic, and interpreters may be needed. The availability of human interpreters cannot be guaranteed at all times. This brings the Machine Translation (MT) technology into play. MT replaces words from one language with words from another. The goal of this project is to use natural language processing (NLP) to translate languages in real time utilising real-time audio as an input. Computers are used to teach themselves new languages. The suggested system will translate real-time English audio into Indian language, provide audio output in Indian language, and accept real-time English audio as input. OpenNMT will be used by the translation engine, along with NLP and Tensorflow libraries will be used in the project.**

Keywords– Machine Translation, Word sense disambiguation, Natural Language processing, OCR, automatic translation, OpenNMT

Introduction:

A revolutionary shift is currently affecting the translation industry. Digital technology and the internet have ongoing, pervasive, and significant effects on translation. The translation revolution is pervasive, encompassing everything from crowdsourced translation to the growth of automatic internet translation services. This revolution has significant and far-reaching effects on human languages, civilizations, and society. New ways of thinking and communicating about translation that fully account for the significant changes in the digital domain are urgently needed in the Information Age, also known as the Translation Age. Michael Cronin walks readers through the history of translation's interaction with technology before examining the current hot button concerns. He also explores the social, cultural, and political ramifications of these rising digital technologies. Students of modern languages, translation studies, cultural studies, and applied linguistics should read Translation in the Digital Age since it has connections to many other fields of study.

Motivation:

Machine translation is primarily motivated by the need to create computer models of natural languages for analysis and production.[1] This particular piece of work is relevant to the multidisciplinary study of

computational linguistics in AI. Three main reasons drive this kind of research: 1) The goal to build intelligent computer systems is the first. 2) Second, the goal of language science and cognition is to have a better understanding of how people communicate using natural language. Users of this application will benefit from improved English language comprehension.[2]

Problem Statement:
Information and knowledge are readily available in today's society, but understanding the material might be difficult owing to language barriers. To close this gap, we plan to develop a system that would allow everyone to easily grasp content in their mother tongue.

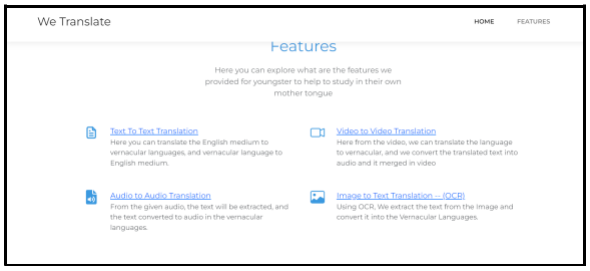

Figure 1: User Interface

Objective of project:
The idea is intended to allow users to perform various operations on a daily basis to perform different translations for a vernacular medium student.

How it will work:

- The application needs authentication of the student.
- This application will be used to translate text and help for pronunciation.
- This also will help users to translate audio in one language to audio in another language through tools like video captioning.
- Video to video and image to text translation for users to perform different tasks on this software.

Scope:
The system scope for our project is as follows:

1. Design and construction of the system such as the website.
2. Using Python, NLP modules like NLTK are used.
3. Models such as OpenNMT can be used.

Literature Survey:

Models	Techniques	Findings	Gaps
SPEECH RECOGNITION: FEATURE EXTRACTION	Linear Predictive Coding (LPC)	Method for extracting static features. The resolution of a spectral analysis is fixed along an arbitrary frequency range.	Although the human ear's frequency sensitivity is almost logarithmic, frequencies are weighted equally on a linear scale.
	Mel-Frequency Cestrum Co-efficient (MFCC)	It is the feature extraction technique that is most similar to how people actually perceive auditory speech.	MFCC values are not very robust in the presence of additive noises. Normalization is required
	Dynamic Time Warping (DTW)	It is used to cope with different speaking speed. Simple hardware implementation.	Difficulty in selecting the reference template.

		Simple Approach Errors due	The pre-recorded templates are fixed. Template training and matching become impractical as vocabulary size increases. Continuous speech recognition is not possible.
SPEECH RECOGNITION: PATTERN MATCHING	Template Based	to segmentation or classification of smaller acoustically more variable units is avoided. It is speaker dependent.	
	Knowledge Based	Uses the information regarding linguistic, phonetic and spectrogram.	Explicit modelling variation in speech is difficult to obtain and use successfully, so, this approach is impractical.
	Neural Based	Complete a challenging recognition task. decreases the modelling unit. able to be applied to create hybrid models	
	Statistical based	Present models use this approach	Low accuracy of priori modelling presumption reducing its trend
	Hidden Markov Model (HMM)	HMMs are simple, automatically trained and computationally feasible to use.	Lack in discrimination property for classification
SPEECH TO TEXT CONVERSION	Artificial Neural Network based Cuckoo Search Optimization	Quick and simple convergence rate improves the speech recognition system's recognition accuracy.	Not effective in modelling time-variability of speech

Table 1: Literature survey

Methodology:

The first step in the actual digital encoding process is the conversion of printed or handwritten text into a digital version. Processing of Digital Entries (Text Input Methods). Each of the five techniques is briefly discussed in the next section. The printed document is scanned or turned into a pdf first. During this process, a scanner can be used to scan each page of text, producing a pdf file as a consequence. As a result, a digital copy of the entire book is feasible. The fundamental advantage of this approach is that the original text will be displayed digitally in its original form, without any textual distortion.

The text's primary flaw is that it is just used in this process for visual access and not necessarily for further processing, analysis, or interpretation. The second choice is to use OCR technology to scan or create a PDF out of ancient text pages. Pages of scanned text will be read by the programme, which will also identify printed letters and translate digital characters into digital. A digital version of the text named Digital Introduction to Old Indian Texts will eventually be created from the first 25 charactersIt has become a popular way to develop digital translations of many ancient texts written in Roman, Chinese, Japanese, cuneiform, and hieroglyphics. In many cases, these texts are properly translated into digital versions containing a small number of error-correcting errors before being made available on the digital forums. However, apart from his work on OCR techniques for Indian texts over the last 30 years, it cannot be said that he has had the same success with Indian texts. We have failed to develop good OCR technology for Indic scripts that can master ancient Indian texts, read them conscientiously, visualise them correctly, and translate

them into high-quality digital versions. Therefore, converting ancient texts into digital versions using Indic OCR systems is not a very practical proposition in the current situation. A third option is to use the photo page for digitization. In most cases, text objects stored on microfilm or download versions can be downloaded into the cyber world as digital versions. While not the best way to put documents on a digital platform, it is useful in situations where access to original documents is beyond the reach of researchers. It is worth noting that many old manuscripts whose pages are fragile and unusable for scanning or OCR work can be digitised first on thin film, which can be digitised continuously. Option to save text input directly to the digital interface. Some data entry operators can machine-readable all text using a Unicode-compliant visual encoding interface using the RTF (UTF-8) codec. In this case, as long as the text produced goes through a strong process of text clarity, text familiarity, verification and validation, the text can be produced in a very reliable and trustworthy manner.

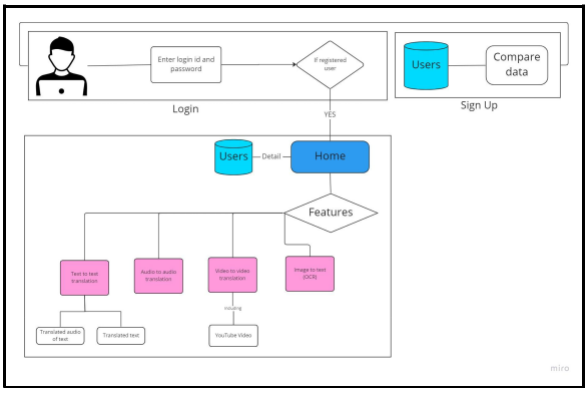

Figure 1: Flowchart Diagram

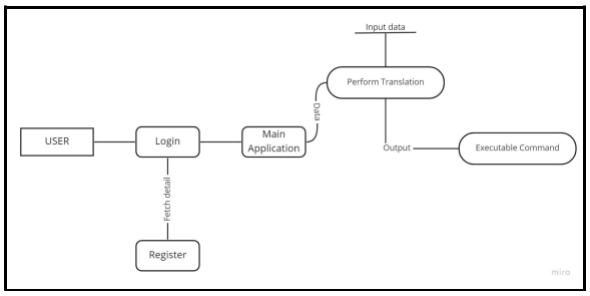

Figure 2: DataFlow Diagram

Result and Discussion:

The automated translation system is discussed in this work. A different strategy was used in this work to describe how to improve the translating system, but there are still certain issues that need to be addressed, including morphological analysis, speech marking sections, chunks, parsing, and word sense disambiguation.[3] The performance of morphological analysis, speech marking section, chunk, parsing, and word sense disambiguation will be improved in the future as part of our effort to develop the Hindi to English machine translation system. To provide the best translation in the realm of computer translation, the concept of separation is crucial.[4] We segregate a certain domain idea under unsupervised observation. We employ a Hindi English WordNet technology that draws on glossing and other dictionary data. As a result, Hindi to English translation software will work better and Word sense disambiguation will perform better.[5] In this essay, we have identified the issues with the real-time translation systems that are currently in use and have proposed novel fixes to improve both the accuracy and the speed of the system. We have also done extensive research on the methods already in use and have examined the opportunities offered by the current systems to implement the same.

Acknowledgement:

I would like to thank my dissertation advisor, associate professor Vaishali Nirgude ma'am, for her encouragement, support, and help with this original work.

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[7]

Chat Application With Profanity Check And Integrated Video Conferencing

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Abstract - **The use of chat applications has increased to a large extent because it provides users with the facility to interact with their family and friends instantly. But these chat applications are being used for carrying out some unethical practices like cyber-bullying, online harassment, etc and there is a need to find a way to curb this issue. This paper aims to give a clear insight into solutions currently being employed or suggested to overcome this problem and to identify the drawbacks associated with these solutions on a large scale. It also proposes a working model for chat apps with profanity detection based on the gaps identified which can detect foul language and thus it can significantly reduce these unethical practices prevalent today in the world of social media.**

Keywords: ***Profanity, Foul Language, Chat Application, Video Conference, Media Sharing, Natural Language Processing***

I. INTRODUCTION

Since the beginning of time, communication has been a way of sharing thoughts, emotions, data, and information with others. With the advent of languages, people started expressing themselves both verbally and

through writing. Now, by connecting to the internet, computers anywhere in the globe
may exchange data. Different computer technologies have improved data transport and communication.
Virtual interactions are becoming more and more popular as a means of social communication. The ability of chat applications to replicate the feel of a real-time conversation virtually has helped them become increasingly popular across a variety of applications, including gaming group messaging in a live chat, e-learning, team communication using chat

rooms, and file sharing among coworkers. But while planning how we want to develop our web app, it's important to keep our consumers' experience in mind. What key attributes and capabilities are required to create a web chat application that keeps users interested.

II. MOTIVATION

With the internet being used the most in today's environment, everyone has sometime or the other experienced cyber bullying or online hate. This has become a problem that needs to be addressed with a huge amount of concern. No human being should be subjected to unwanted abuse, which has been quite prevalent in modern society. Children, who are naïve and

innocuous should not be burdened by trauma or fear instead of being instilled with curiosity and aspirations. Every human being has the right to be spoken with respect and courtesy and there is a need to ensure that this right is being accessed by everyone on the internet where the exploitation of the freedom of speech has become a new norm. This step would potentially cut off cybercrimes and make the internet much healthier.

Apart from a healthier internet, there's also the need for a convenient one stop solution for all our communication needs. Currently existing products don't offer every feature desired by a modern user all in one package, for media sharing and online chatting a product/ service is being used and to make live, one to one or group video calls another service. The video conferencing solutions lack in providing robust and reliable media sharing from within their products/ services. This continuous transition between different products for using different sets of features is a cause for great inconvenience.

III. LITERATURE SURVEY

The rise of profanity in recent years has been alarming. This has led to the compelling need for a reliable method to control such profanity.

Reading through several study studies reveals that an ideal integration of Natural Language Processing and Machine Learning would help create the necessary specific model.

[1] This research paper aims to maintain security, however it does not focus on the web application's performance , which results in a longer response time for the user. [2]The approach to the problem in this paper is quite generalized as no key differentiating feature has been introduced to encourage large-scale adoptability of the product and is limited to a few selected subset of users. [3] A drawback to the given solution in this paper is that it is limited to only within private networks. It introduces a very peculiar problem by limiting the use to private networks.

[4] The idea proposed in this paper doesn't allow the user to send the message if the model detects the context of the message is negative, which means it reads the message even before it is sent at the sender's side. [5] This paper focuses on developing a filter for chat applications where each message is checked for toxicity using Deep Learning and Natural Language Processing, where the focus is on understanding the context of each message. [6] This paper introduced the working and implementation of encrypted chat applications. It describes how the messages are encrypted on device before moving to server using various cryptographic algorithms like DES, AES and RSA. Computer vision techniques are used for encrypting image

IV. METHODOLOGY

The entire system is a web based application and can be broken down into three different modules, the chat application, the video conferencing module and the profanity check model.

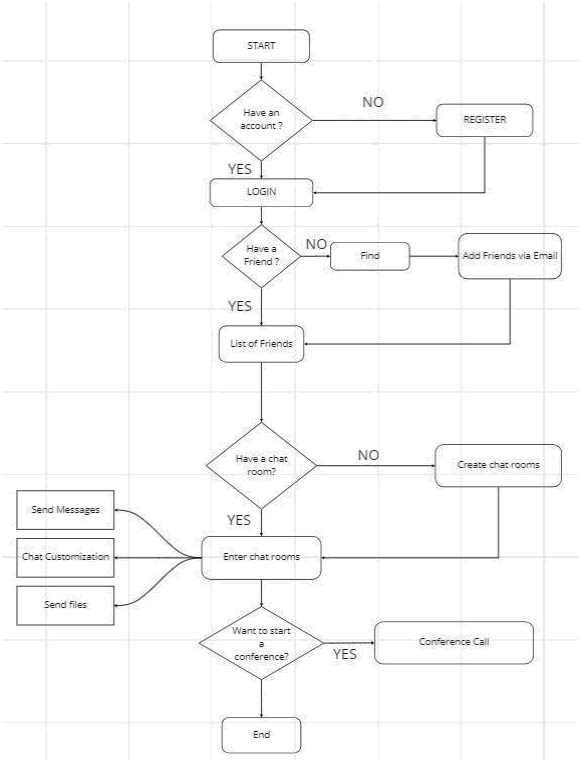

Fig 1. Flowchart of System

1) The login page will be displayed before the chat page when a user accesses the chat page. User login information is necessary. The user must first register if he/she doesn't have an account.
2) Users must have a friend after logging in before starting a chat. As a result, if a user doesn't already have a friend, they can add a friend directly from the email.

3) The user can start a chat immediately, if they have contacts in their friend list.

4) The application will then check to see if the user is already in a chatroom with the specified user . If the chat room is not present then the user will enter it to begin a chat session .
5)Finally, data will be sent and received.

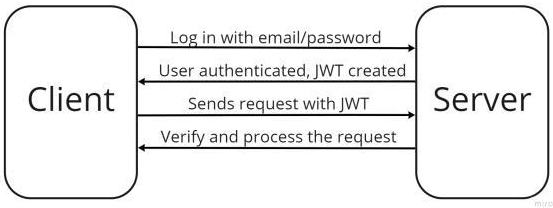

Fig 2. LogIn Process

Conferencing Module:

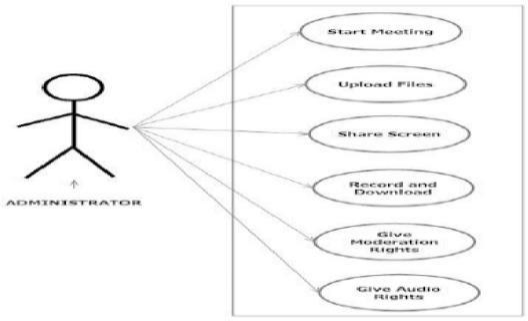

Fig 3. Use Case Diagram for conference - Admin

The administrator gains access to every part of the model and are permitted to make changes when necessary, add and remove moderation rights, allow or deny the users to draw on the white board, allow or deny the users screen sharing or recording, allow or deny audio rights to users, give exclusive audio right to self and upload files

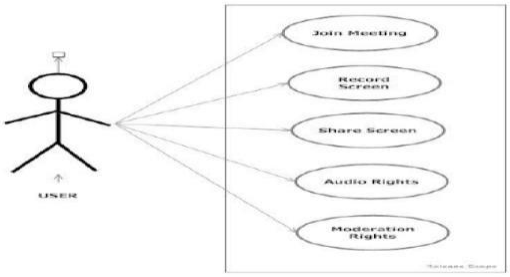

Fig 4. Use Case Diagram for conference - User

The user is only permitted to join the meeting when invited via an email, record screen, share screen, use the white board, and audio when given permission by the administrator.

Server Side Implementation: Server-side has relied on Node JS and MongoDB databases. Node JS is fast, capable of handling a large number of simultaneous connections with high throughput, which is equivalent to high scalability. MongoDB and Node JS have often been used together because of their using JSON so no need to spend time transforming the data between them making it easy to deal with each other. In addition, MongoDB provides TLS that makes a secure connection . To perform a client request passes through several steps that are:
Step 1: Initially, must run the MongoDB connection then run the Node JS from Command Prompt. At this stage, the server is ready to receive the client's request.

Step 2: When the client sends a request, the server receives the HTTP request in JSON format. The request then parsed.
Step 3: The HTTP request is compared with the base path if it is matched, it is handed to the Express framework.
Step 4: The Express receives the HTTP request and routes it to the specific endpoint that matched it. In case of not matching with any of the routes will display errors in Command Prompt. Otherwise, it will be forwarded to the controller which handles the required function. Step 5: Make a request to MongoDB database by mongoose for processing function.
Step 6: When the data is fetched from MongoDB database and the required operations are done, Node JS receives the response then sends to the client

Profanity Check Module:

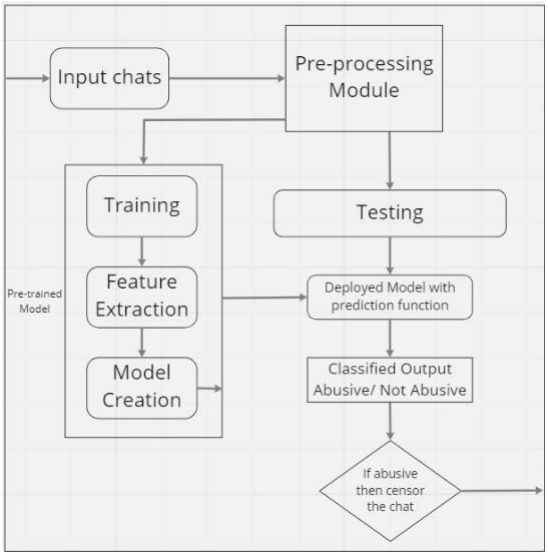

Fig 5. Profanity Check Model

Whenever a message is sent, it will pass on through the profanity check module. This module will pre-process the chat i.e removal of punctuations, numbers, conversion of text to lower case and NLP concepts of removing stop words, stemming, tokenization, named entity recognition and parts of speech tagging, it gives keywords from the chat. These keywords will be passed on through our trained model to decide the sentiment of the chat (abusive or normal).

V. CONCLUSION

We are building one application that will incorporate all the features for chatting as well as hosting meetings which previous products failed to provide.
From our research we can conclude that, the performance parameter can be improved by using the React framework, the concept of

virtual space improves the performance rate by only altering the space created for that specified request instead of making a call for the altering of the whole work area. So MERN stack is the best optimal technology to be used based on performance.

In this chat application the user will be able to type in their own language after selecting the language of their comfort, then the text will be recognized and translated to the language opted by the end user.

So, we will incorporate multi-headed machine learning models that are capable of classifying messages sent by users into varying degrees of toxicity. This application will track the use of offensive and vulgar language on chats on the platform in order to prevent users from becoming disrespectful which may play a role in changing how users interact.

VI. Acknowledgement

We the members of Group A08 would like to express our special gratitude to our institute, Thakur College of Engineering and Technology, our Principal sir - Dr. B. K. Mishra, Head of Department - Mrs. Harshali Patil, and our mentor Dr. Sheetal Rathi, for giving us this opportunity to work on solving the identified problem statement. We are developing a WebApplication named “PROTALK” by using various programming tools, Frameworks in multiple languages along with the assistance of Kaggle for the dataset. This has greatly helped us in expanding our knowledge. The project will be completed within the given scheduled time under the guidance of our mentor. We would also like to expand our deepest gratitude to all those who have directly and indirectly guided us in developing this project..

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Online Student Evaluation and Assessment: Improving Student Performance through Technology

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Abstract— **Online learning has become a widely adopted mode of education in recent years, and with it comes the need for a reliable and efficient evaluation system. In order to address this need, this project aims to improve the assessment process for teachers and students. It provides a simple and effective way for teachers to assess student performance and for students to receive necessary tools and resources for their assignments. The system keeps students engaged with interactive features and performance analysis. Additionally, it delivers a more comprehensive evaluation of students' performance by considering different elements such as class participation, group work, and assignments. To maintain the authenticity of the finished assignments, unique certificates would be generated. This platform also implements measures to prevent instances of cheating among students. This enables teachers to have a better understanding of a student's overall competence.**

Keywords—assessment, student, certification, analysis

I. INTRODUCTION

The main aim of this project is to bridge the gap between student-teacher interaction in the online mode. To achieve this, separate modules have been created for both teachers and students, each with unique functionalities. Both the teacher and student have individual login systems for secure access.

Teachers can create courses that students can join, and the teacher or faculty in-charge can assign different tasks and assignments that are time-based. To prevent cheating during exams, the system has been designed to be tab-restricted, which means that students will receive a warning each time they switch tabs, and time will be deducted accordingly. Professors can also award students with certificates based on their performance in specific activities. These certificates can be verified using an ID generated during the certificate creation process.

In addition to promoting student-teacher interaction, the project also prioritizes students' access to proper learning resources. With this in mind, a note sharing feature marketplace has been implemented, where students can access and share learning materials. The website has been designed to be dynamic and user-friendly, incorporating modern technologies.

II. COMPARITIVE STUDY

The demand for effective online evaluation has significantly increased in recent years, as the recognition of distance learning and online education has led educational institutions to revamp their delivery methods, teaching strategies, and learning environments [1]. Online delivery has the potential to offer numerous benefits in promoting sustainable education, such as offering academic opportunities to students from diverse backgrounds, and broadening the dissemination of education [2].

However, the current online assessment system for students is outdated and does not offer the same benefits as the traditional offline system. Most online evaluations only provide a general overview of a student's performance, without highlighting their mistakes, and do not offer any opportunities for interaction with the teacher. Additionally, the online system is prone to cheating as students can easily switch tabs and access external resources. Table 1 shows the acceptance rate of an online e-learning platform Google Classroom for a dataset of 305 people [3].

Table I
Students Acceptance of Google Classroom

Attribute	Values	Population	Percentage
Gender	Male	78	26%
	Female	227	74%
Age	18-22	242	79%
	23-28	35	12%
	28+	28	9%

Education is a crucial aspect of an individual's growth and development, and it is essential to have a system in place that promotes a culture of learning, generates genuine interest in the subject matter, and provides students with the necessary resources to succeed [4]. With the vast amount of information available online, online learning has tremendous potential to positively impact the future of ed-tech. Improving online learning and assessment would play a significant role in shaping this future, and making the necessary enhancements to an already expanding system is vital [5]. Effective teaching techniques are crucial to a student's ability to absorb and understand the information being delivered, and good instructors create an environment that supports this learning.

The most noticeable issue found in the current system, as revealed by the comparative study, is the lack of a suitable learning environment for students and inadequate assessment system. To address this, the ideal solution would be a system that facilitates student learning and resolving doubts, with a user-friendly grading system.

III. TECHNOLOGIES USED

The website has been developed using the latest technology stack to ensure a seamless user experience. For the front-end, the proposed system has utilized ReactJS and Material UI. ReactJS is a highly effective JavaScript library that makes front-end development easier, and its component reusability and state handling capabilities making it the ideal choice. Material UI, a library of functional components, has further enhanced the user interface, making it visually appealing and interactive.

The back-end of the website has been built using NodeJS and ExpressJS. NodeJS is an event-driven asynchronous JavaScript runtime that is designed for building scalable network applications, making it perfect for the use case. ExpressJS is a minimal and flexible web application framework that provides a robust set of features for web and mobile applications, making it an ideal choice for the project requirements.

To store the data required by the application, MongoDB, a NoSQL database, and Firebase, a cloud-based database has been utilized. MongoDB provides a flexible database schema, which makes it an ideal choice for the proposed application. However, as MongoDB only allowed for video storage in chunks, Firebase was used to store the video lectures in their entirety. Firebase provides a range of features, including messaging, authentication, and storage, making it the ideal choice for this purpose. For testing the post and get methods, Postman has been used.

IV. WORKING & CHARACTERISTICS

The website has been designed and developed with three key modules in mind, each serving a specific purpose. These modules include the Student Module, Teacher Module, and Certification Module, each of which has been equipped with various functionalities to meet the specific needs and requirements. The website encompasses several key features, including:

• **Login system**: The website boasts a sophisticated login system that elegantly separates the set of features intended for students from those for teachers. This segregation is achieved through the utilization of a classifying attribute known as "type," as depicted in Fig. 1. To ensure the appropriate level of access, separate login credentials have been created for each group. The login system has been implemented using PassportJS and a session management mechanism, which securely stores the user's information. This information is then used to authenticate and validate each user's access to their respective modules.

The website's design considers the need to maintain a clear distinction between the student and teacher modules. This is to prevent unauthorized access and ensure that the website is used in an orderly, ethical, and organized manner. As a result, students cannot access the teacher module, and teachers cannot access the student module. This clear assignment of roles and responsibilities helps maintain the integrity of the learning community and reduces the potential for confusion or hastiness.

• **Creating & joining courses**: This platform aims to provide a comprehensive and organized learning experience for students and teachers alike. With its course creation module, teachers have the ability to create subject-specific courses that students can enroll in. These courses are designed to help reduce the amount of paperwork involved in the education process and provide an efficient means of grading and assessment.

The teacher is responsible for assigning tasks and assignments to students within the course. To prevent multiple entries from the same student, a unique course code is generated upon course creation and is distributed to students for enrollment purposes. This code is then used to verify the student's identity and grant access to the course.

The implementation of course-based classrooms helps streamline the organization of coursework, allowing teachers to focus on lesson planning rather than administrative tasks [6]. The digital grade book reduces the need for physical paperwork and eliminates the repetition involved in manually grading several assignments. It also prevents the physical strain associated with manual grading.

Inclusion of assignments in these courses is a crucial aspect of the platform. Assignments promote independent learning, as students are encouraged to work their way around the questions and overcome difficulties. Each time a student completes an assignment, they become more capable of independent learning, which is a valuable life skill.

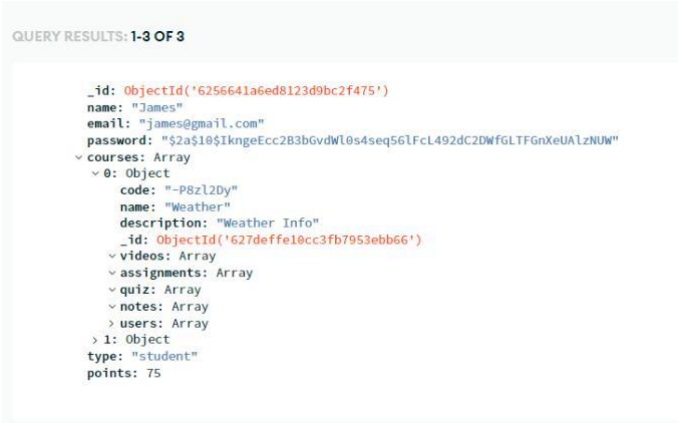

Fig. 1 User Schema Example

• **Video lectures**: The platform includes a video lecture feature, which is particularly beneficial for students who miss classes. The flexibility of the video lectures allows students to learn at their own pace and revisit certain concepts if they haven't understood them, promoting self-learning [7]. The combination of body language and tone of voice in video lectures makes the learning experience more engaging and impactful compared to the written word. Research has shown that video learning is beneficial for students in many ways, including motivation, learning depth, and critical thinking skills.

In a flipped classroom, students view video lessons as homework and engage in discussions with teachers during class time. The use of visual and aural clues in video learning enhances students' understanding and retention of new information. James McQuivey, an analyst with Forrester Research, states that one minute of video is equivalent to almost 1.8 million written words. Studies show that the combination of visual and audio learning leads to high engagement and improved outcomes [8].

The video lecture feature also enables the dissemination of educational knowledge to classrooms around the world [9]. A teacher from the comfort of their home can easily create a video tutorial for students, promoting cultural understanding and social empathy through information sharing. The platform's video uploading feature is an important tool for facilitating this type of global education.

• **Time Based Assignments**: Additionally, the platform's time-limited assignment feature as seen in Fig. 2, further promotes the integrity of the evaluation process. By setting a deadline for submission, the teacher minimizes the opportunity for students to engage in copying or cheating behaviors. Once the time limit has passed, the assignment is automatically submitted, and all marked answers are saved, providing a precise evaluation of the student's understanding and abilities. This feature not only ensures the validity of the evaluation process but also encourages students to prioritize their time and focus on their coursework.

Fig. 2 Time Based Assignments

• **Anti-Cheating System:** Platforms like Swayam provide intuitive assignments to students, but they lack anti-cheat measures [10]. To counter this, the platform has measures in place to prevent cheating during online exams. The students are warned a few times against changing tabs during the exam, and after that, any violation of this rule would result in a penalty such as deduction of time or reduction of scores. These measures aim to create a fair and equal evaluation process for all students, ensuring that their performance is based on their own abilities and understanding of the subject. The platform also promotes academic integrity and helps prevent any kind of unethical behavior. This way, students are encouraged to perform to the best of their abilities and achieve their full potential.

Fig. 3 Certificate on Course Completion

• **Reward System**: Rewards play a crucial role in an efficient behavior management method in the classroom. Both intrinsic and extrinsic motivation are important for driving students to perform well and follow expected behaviors.

Intrinsic motivation is when students find pleasure in their work and engage in it simply because they enjoy it. This can be fostered through compliments, individually demanding assignments, and completing academic work purely out of a desire to learn. On the other hand, extrinsic motivation involves providing more tangible rewards such as pencils, erasers, stickers, and even candy. It's important to provide rewards that are fair and consistent for all students, and also unique for each assignment.

Extending rewards to students helps to promote positive and appropriate behavior in the classroom. Students are encouraged to follow class rules, be kind to each other, and prioritize safety, among other positive behaviors. With appropriate student behavior, teachers are able to focus on lesson content and interactive activities, rather than spending time on classroom discipline.

Offering rewards also motivates students to give their full effort when attempting class projects, assignments, and various tasks. When a reward system is in place, students tend to show increased interest and participation in everyday classroom activities. The goal of assigning homework is to reinforce the subject matter, and without homework completion, students are not able to practice what they have learned. By rewarding students for completed projects and homework assignments, both in groups and individually, the teacher can promote a better understanding of the lesson.

Finally, it's important to note that after the student completes a set of assignments, they can be rewarded with a

certificate. The certificates can be auto-generated and will contain the student's name, course name, date of completion, email address, and a credential ID as seen in Fig. 3, which can be used to verify the credibility of the certificate. This helps to remove any concerns regarding the creation of fake certificates, as they cannot be validated.

Overall, a reward system is an effective tool for promoting positive behavior and encouraging students to be more productive in their learning.

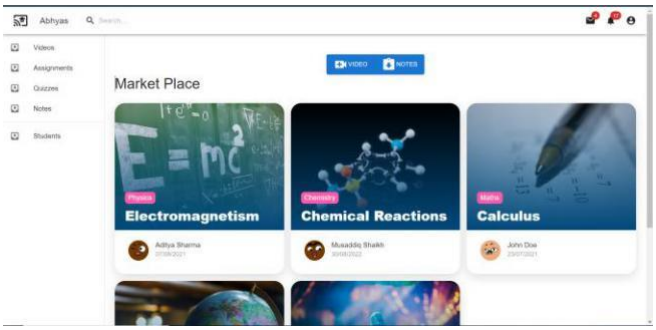

Fig. 4 Marketplace for Sharing Resources

• **Marketplace**: This helps students who do not have access to schools or colleges to get hands on high quality notes for further education and expand their knowledge base, as these notes can be accessed from anywhere with an internet connection. This also helps to bridge the gap between students from different socio-economic backgrounds, as all students will have equal access to the resources shared on the platform.

In addition, having a library of resources and study materials readily available can greatly benefit students in the long run. It can save students time and effort in searching for resources, and it also provides a platform for students to share their own resources with others. This not only supports student learning but also encourages collaboration and teamwork, which are crucial skills for success in both academic and professional settings.

In addition to notes, students can also share study tips, learning techniques, and other resources that have helped them excel in their studies. This can help create a supportive and collaborative learning environment where students can share their experiences and help each other grow.

Overall, the marketplace provides a unique opportunity for students and teachers to collaborate, share, and grow together, making the process of learning more efficient and enjoyable. An example of the mentioned feature can be seen above in Fig. 4.

• **Interactive whiteboard:** Interactive whiteboards are transforming the way education is delivered in the classroom. In addition to the many benefits, such as increased engagement and better learning experiences, there are even more advantages to using an interactive whiteboard in the classroom.

Firstly, interactive whiteboards promote collaboration between students and teachers. Fig. 5 shows both teacher's and student's perspective while using the whiteboard feature. With the use of interactive whiteboards, teachers are able to present learning materials in a more interactive way, allowing students to participate in the learning process by asking questions, providing answers, and working together on projects and assignments. This type of collaboration fosters a supportive learning environment, where students feel comfortable to engage with the material and each other, resulting in a deeper understanding of the subject.

Moreover, interactive whiteboards allow for immediate feedback and assessment. With the use of technology, teachers can quickly assess students' understanding of the material through interactive activities, polls, and games. This type of assessment not only helps teachers gauge students' learning but also provides students with instant feedback, allowing them to address any misunderstandings and reinforce their learning [11].

Interactive whiteboards also make it possible for students to save slides, which can be easily reused and adapted for future classes. This not only saves time but also ensures that all the lessons are consistent and up to date.

Interactive whiteboards are cost-effective and eco-friendly. As mentioned earlier, the use of interactive whiteboards reduces the need for traditional teaching supplies, such as paper and markers, reducing the overall cost of running a classroom. Furthermore, the use of technology also reduces the use of paper, which is not only good for the environment but also saves schools and colleges money on printing and purchasing resources.

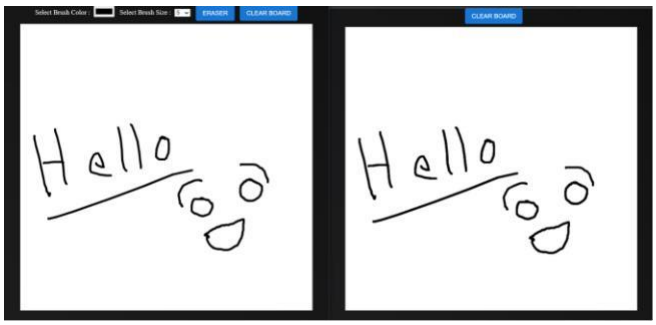

Fig. 5 Interactive Whiteboard for E-Learning

• **Analytics Dashboard:** One of the key features of the project is the Analytics Dashboard. This dashboard provides an in-depth analysis of the student's performance and their engagement with the course material. The Analytics Dashboard provides a comprehensive overview of the student's learning progress and provides insights into their strengths and weaknesses. The dashboard also helps teachers to identify the areas in which the student needs improvement, enabling them to customize their teaching approach accordingly. The analytics dashboard allows teachers to track the progress of each student in real-time and make data-driven decisions to enhance the learning experience. This feature provides teachers with the necessary information to create a personalized learning plan for each student, helping them to achieve their learning objectives and reach their full potential.

V. FLOWCHART

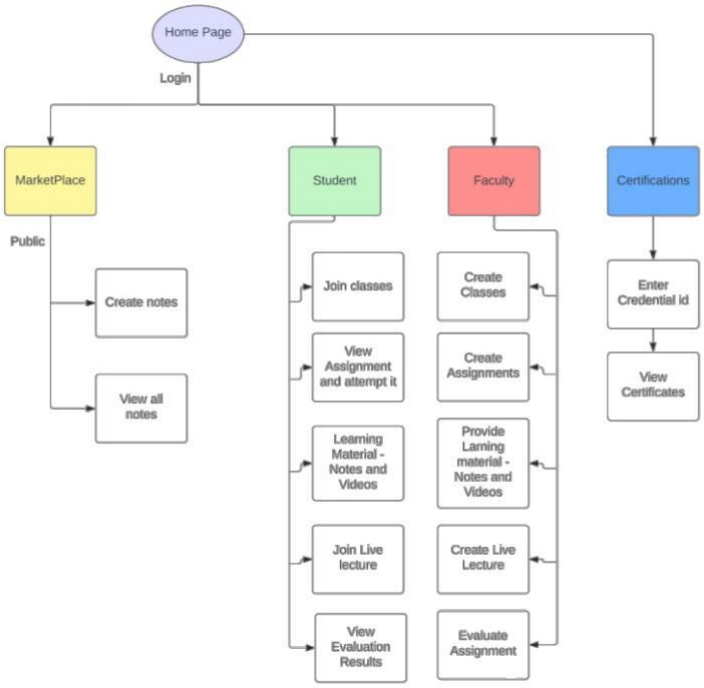

Fig. 6 Basic Architecture of the Project

Abhyas is a comprehensive platform for learning, teaching, and sharing knowledge that offers numerous features and benefits for both students and teachers. As mentioned in Fig. 6, here are some additional details about each of the four main modules:

1. Marketplace:

The marketplace is a platform where users can share their knowledge by uploading and selling their notes, video tutorials, and study materials. This platform serves as a hub for students and teachers to access a wide variety of resources and learning materials, making it easier for students to find the information they need to succeed in their studies. In addition, it also provides an opportunity for individuals to monetize their knowledge and skills by selling their materials to other students and teachers.

2. Student:

The student module is designed specifically to support students in their learning journey. This module includes a personalized profile that displays the student's certifications, as well as a dashboard that allows the student to access their enrolled courses, assignments, notes, live lectures, quizzes, and pre-recorded videos. With this module, students have everything they need to study effectively and efficiently, all in one place.

3. Faculty:

The faculty module is designed for teachers to create classes for their students, manage course materials, and assess students' progress. With this module, teachers can easily create classes, add assignments and quizzes, and keep track of student progress. Teachers can also assign certificates to students to recognize their achievements and progress, providing motivation and encouragement for the students to continue their studies.

4. Certifications:

Certifications are an important aspect of Abhyas, as they serve as a validation of the student's knowledge and skills. Certifications can be created by teachers, or they can be earned by students by completing a set number of quizzes from a particular class. Each certification includes a unique credential that can be used to verify the authenticity of the certificate, along with other relevant details, such as the student's name, course, and date of completion.

In conclusion, Abhyas is an innovative platform that provides students and teachers with a comprehensive solution for learning and teaching. With its numerous features and benefits, Abhyas makes it easier for students to access the information they need to succeed in their studies, and for teachers to create and manage effective learning environments.

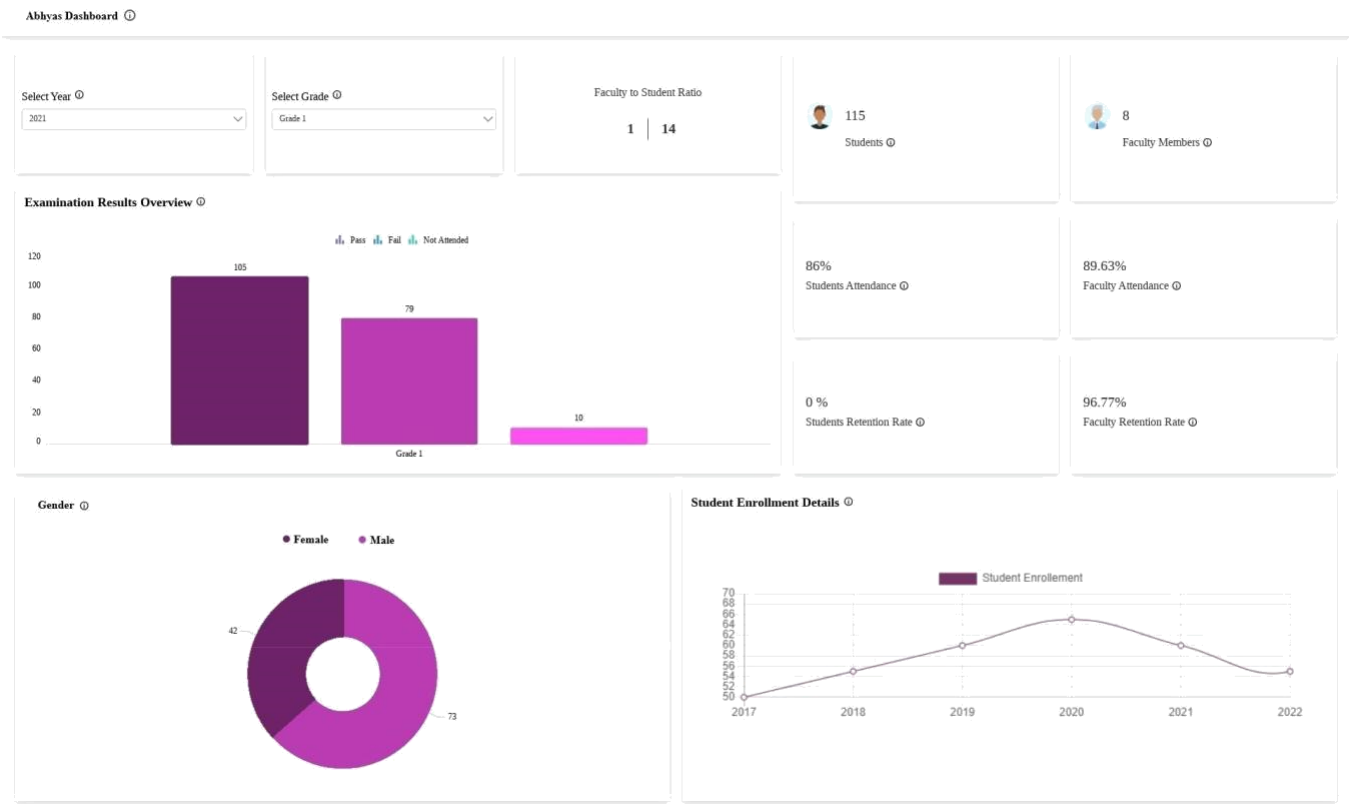

Fig. 7 Dashboard for Student Analytics

VI. CONCLUSION

With a thorough consideration of the various factors that greatly impact the current system of online learning, a meticulous study of the different methods and approaches in place has been conducted. Through this, several areas for improvement have been identified and necessary innovative and practical features to enhance the existing model of online learning and assessment have been developed. The proposed system aims to offer a comprehensive solution that meets the needs of both students and instructors, providing a seamless and efficient experience for all parties involved. The implementation of this project will be instrumental in furthering the advancement and success of online education.

VII. FUTURE SCOPE

The evaluation of performance in a test is an important aspect of any educational system. It helps students to understand their strengths and weaknesses and work towards improving in areas where they may be lagging behind. By feeding the results of these tests into a machine learning algorithm, the system can more accurately identify weak subjects and provide personalized recommendations for improvement. This can be a valuable tool for both students and educators alike. To make the system even more accessible and user-friendly, it can be ported into a mobile application that is easily loaded and used on the go.

Additionally, a reward system can be implemented to encourage students to actively participate in the platform. This reward system can recognize not just the completion of assignments but also the most active contributors and resource sharers in the marketplace. This will create a sense of community and encourage students to collaborate and share resources with each other.

To further enhance the system, the question sets in the assignments section can be broadened to include preparation for interviews and competitive examinations. This will not only help students to prepare for these important events but also give them a sense of the types of questions they may encounter in the real world. To keep track of individual performance, charts and graphs can be used to represent the academic growth of each student for each subject. This will provide a visual representation of progress over time and allow students and educators to track their success.

ACKNOWLDEMENTS

We are deeply grateful to our guide, Mrs. Pratibha Prasad, for imparting her vast knowledge and expertise, providing valuable feedback and mentoring us every step of the way. We would also like to thank our principal, Dr. B.K. Mishra, for providing us with the resources and facilities necessary to carry out our research. Finally, we are thankful to Thakur College of Engineering and Technology for providing us with a nurturing and dynamic environment where we could thrive academically and intellectually.

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[12]

Face Mask Detection System Using Machine-Learning Algorithms

Raj Mazgaonkar,Ankush Kushwaha,Parth Langi,Anisha Prajapati,Dr. R.R.Sedamkar

Abstract: **. The world has not yet fully Recover from this pandemic and the vaccine that can effectively treat Covid-19 is yet to be discovered. However, to reduce the impact of the pandemic on the country's economy, several governments have allowed a limited number of economic activities to be resumed once the number of new cases of Covid19 has dropped below a certain level. As these countries cautiously restarting their economic activities, concerns have emerged regarding workplace safety in the new post- Covid-19 environment. To reduce the possibility of infection, it is advised that people should wear masks and maintain a distance of at least 1 meter from each other.Deep learning has gained more attention in object detection and was used for human detection purposes and develop a face mask detection tool that can detect whether theindividual is wearing mask or not. This can be done by evaluation of the classification results by analysing real-time streaming from the Camera. In deep learning projects, we need a training data set. It is the actual dataset used to train the model or performing various actions. Global pandemic COVID-19 circumstances emerged in an epidemic of dangerous disease in all over the world. Wearing a face mask will help prevent the spread of infection and prevent the individual from contracting any airborne infectious germs. Using Face Mask Detection System, one can monitor if the people are wearing masks or not. Here HAAR-CASACADE algorithm is used for image detection. Collating with other existing algorithms, this classifier produces a high recognition rate even with varying expressions, efficient feature selection and low assortment of false positive features. According to this motivation we demand mask detection as a unique and public health service system during the global pandemic COVID-19 epidemic. The model is trained by face mask image and non- face mask image**

Keywords- : COVID-19 epidemic, HAAR- CASACADE algorithm, mask detection, face mask image, non-face mask image...

I. INTRODUCTION

1.1 Motivation

Amid the ongoing COVID-19 pandemic, there are no efficient face mask detection applications which are now in high demand for transportation means, densely populated areas, residential districts, large-scale manufacturers and other enterprises to ensure safety. The absence of large datasets of 'with_mask' images has made this task cumbersome and challenging.

1.2 Application

Our face mask detector doesn't use any morphed masked images dataset and the model is accurate. Owing to the use of MobileNetV2 architecture, it is computationally efficient, thus making it easier to deploy the model to embedded systems (Raspberry Pi, Google Coral, etc.). This system can therefore be used in real-time applications which require face-mask detection for safety purposes due to the outbreak of Covid-19. This project can be integrated with embedded systems for application in airports, railway stations, offices, schools, and public places to ensure that public safety guidelines are followed.

II. PROBLEM DEFINITION

1. To create our face mask detector, we trained a two-class model of people wearing masks and people not wearing masks.

2. We fine-tuned MobileNetV2 on our masks/no mask dataset and obtained a classifier that is ~99% classifier.

3. We then took this face mask classifier and applied it to images by:

Detecting faces in images Extracting each individual face

4. Our face mask detector is accurate and since we use the MobileNetV2 architecture,it's also computationally efficient.

III. TECHNOLOGY USED

3.1 Hardware and Software Requirement

Operating Environment

- Operating System: Windows 8
- Processor: Intel I3 or Higher
- Memory: 4GB or more

Programming Language used : Python 3.9.9 (64-Bit)

Product Functions

- Preprocessing
- Training the Images
- Face Mask Detection
- Message Passing

Coronavirus disease 2019 has affected the world seriously. One major protection method for people is to wear masks in public areas. Furthermore, many public

service providers require customers to use the service only if they wear masks correctly. However, there are only a few research studies about face mask detection based on image analysis. In this paper, we propose RetinaFaceMask, which is a high-accuracy and efficient face mask detector. The proposed RetinaFaceMask is a one-stage detector,

which consists of a feature pyramid network to fuse high-level semantic information with multiple feature maps, and a novel context attention module to focus on detecting face masks. it will help the system to run the overall system to prevent the spreading the Covid 19 and easy to control the mob in a cost effective way. An Iot Component will send a message to the Concerned authority that it will help the entire system to function very smoothly.

3.2 Description of libraries used Name Version Tensorflow 1.15.2

Keras 2.3.1

Imutils 0.5.3

Numpy 1.18.2

opencv-python 4.2.0.* matplotlib 3.2.1

scipy 1.4.1

Tensorflow :- TensorFlow is a free and open-source software library for machine learning and artificial intelligence. It can be used across a range of tasks but has a particular focus on training and inference of

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Tensorflow :- TensorFlow is a free and open-source software library for machine learning and artificial intelligence. It can be used across a range of tasks but has a particular focus on training and inference of

platform and free for use under the open- source Apache 2 License.

Matplotlib :- Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using general-purpose GUI toolkits like Tkinter, wxPython, Qt, or GTK.

SciPy :- SciPy is a free and open-source Python library used for scientific computing and technical computing. SciPy contains modules for optimization, linear algebra, integration, interpolation, special functions, FFT, signal and image processing, ODE solvers and other tasks common in science and engineering.

IV. IMPLEMENTATION

4.1 Data Description

Step 1: Data Visualization

In the first step, let us visualize the total number of images in our dataset in both categories. We can see that there are 690 images in the ‘yes’ class and 686 images in the ‘no’ class.

The number of images with facemask labelled ‘yes’: 690

The number of images with facemask labelled ‘no’: 686

Step 2: Data Augmentation

In the next step, we augment our dataset to include more number of images for our training. In this step of data augmentation, we rotate and flip each of the images in our dataset. We see that, after data augmentation, we have a total of 2751 images with 1380 images in the ‘yes’ class and ‘1371’ images in the ‘no’ class.

Number of examples: 2751

Percentage of positive examples: 50.163576881134134%, number of pos examples: 1380

Percentage of negative examples:

49.836423118865866%, number of neg examples: 1371

4.2 Data Preparation

Step 3: Splitting the data

In this step, we split our data into the training set which will contain the images on which the CNN model will be trained and the test set with the images on which our model will be tested. In this, we take split_size =0.8, which means that 80% of the total images will go to the training set and the remaining 20% of the images will go to the test set.

The number of images with facemask in the training set labelled ‘yes’: 1104

The number of images with facemask in the test set labelled ‘yes’: 276

The number of images without facemask in the training set labelled 'no': 1096

The number of images without facemask in the test set labelled 'no': 275

After splitting, we see that the desired percentage of images has been distributed to both the training set and the test set as mentioned above.

4.3 Choice of Model

Step 4: Building the Model

In the next step, we build our Sequential CNN model with various layers such as Conv2D, MaxPooling2D, Flatten, Dropout and Dense. In the last Dense layer, we use the 'softmax' function to output a vector that gives the probability of each of the two classes.

4.4 Model Training and Validation

Step 5: Pre-Training the CNN model After building our model, let us create the 'train_generator' and 'validation_generator' to fit them to our model in the next step. We see that there are a total of 2200 images in the training set and 551 images in the test set.

Found 2200 images belonging to 2 classes. Found 551 images belonging to 2 classes.

Step 6: Training the CNN model

This step is the main step where we fit our images in the training set and the test set to our Sequential model we built using keras library. I have trained the model for 30 epochs (iterations). However, we can train for more number of epochs to attain higher accuracy lest there occurs over-fitting.

history =

model.fit_generator(train_generator,

epochs=30,

validation_data=validation_generator,

callbacks=[checkpoint])

>>Epoch 30/30 220/220

[==============================]

– 231s 1s/step – loss: 0.0368 – acc: 0.9886 – val_loss: 0.1072 – val_acc: 0.9619

We see that after the 30th epoch, our model has an accuracy of 98.86% with the training set and an accuracy of 96.19% with the test set. This implies that it is well trained without any over-fitting.

Step 7: Labeling the Information

After building the model, we label two probabilities for our results. ['0' as 'without_mask' and '1' as 'with_mask']. I am also setting the boundary rectangle color using the RGB values.['RED' for 'without_mask' and 'GREEN' for 'with_mask]

labels_dict={0:'without_mask',1:'with_mas k'}

color_dict={0:(0,0,255),1:(0,255,0)}

Step 8: Importing the Face detection Program

After this, we intend to use it to detect if we are wearing a face mask using our PC's webcam. For this, first, we need to implement face detection. In this, we are using the Haar Feature-based Cascade Classifiers to detect the facial features.

face_clsfr=cv2.CascadeClassifier('haarcasca de_frontalface_default.xml')

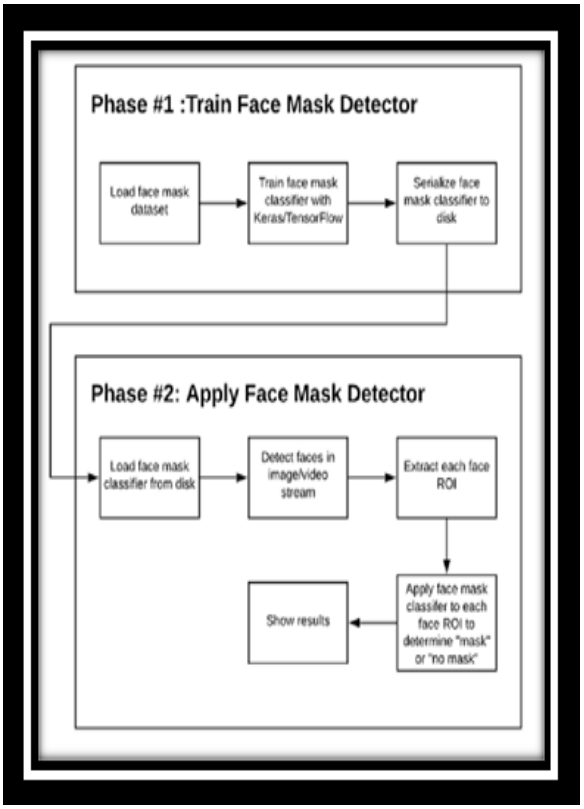
This cascade classifier is designed by OpenCV to detect the frontal face by training thousands of images. The .xml file for the same needs to be downloaded and used in detecting the face. We have uploaded the file to the GitHub repository.

Step 9: Detecting the Faces with and without Masks

In the last step, we use the OpenCV library to run an infinite loop to use our web camera in which we detect the face using the Cascade Classifier. The code webcam = cv2.VideoCapture(0) denotes the usage of webcam.

The model will predict the possibility of each of the two classes ([without_mask, with_mask]). Based on the higher probability, the label will be chosen and displayed around our faces.

Flow Chart of FaceMask Detection System

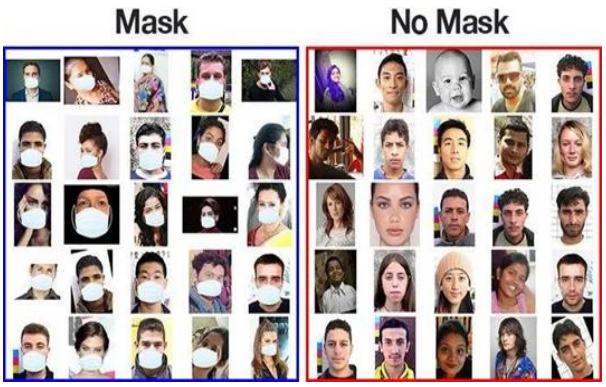


Face Mask Detection in webcam stream: The flow to identify the person in the webcam wearing the face mask or not. The process is two-fold.

1. To identify the faces in the webcam 2.Classify the faces based on the mask.

Identify the Face in the Webcam:

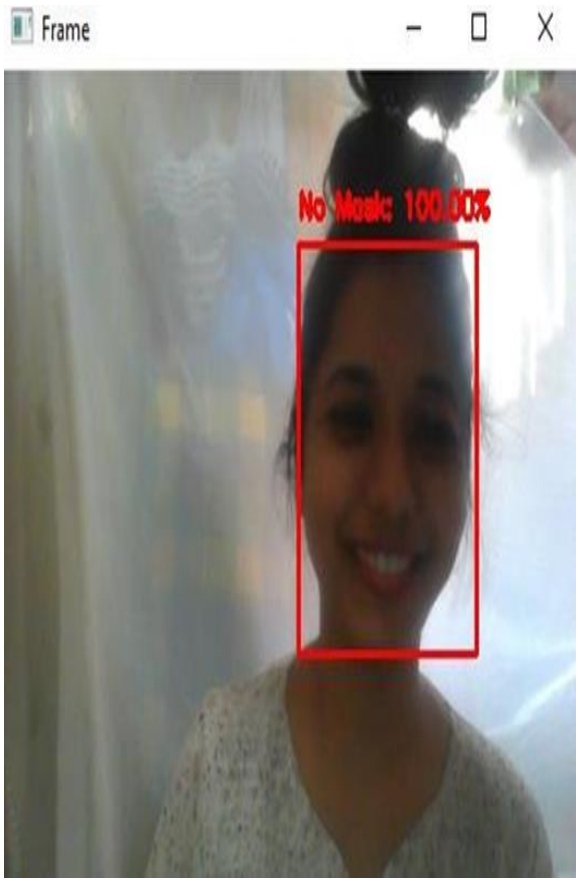
To identify the faces a pre-trained model provided by the OpenCV framework was used. The model was trained using web images. OpenCV provides 2 models for this facedetectorTraining Dataset :



Result and Analysis

REAL TIME INPUT :

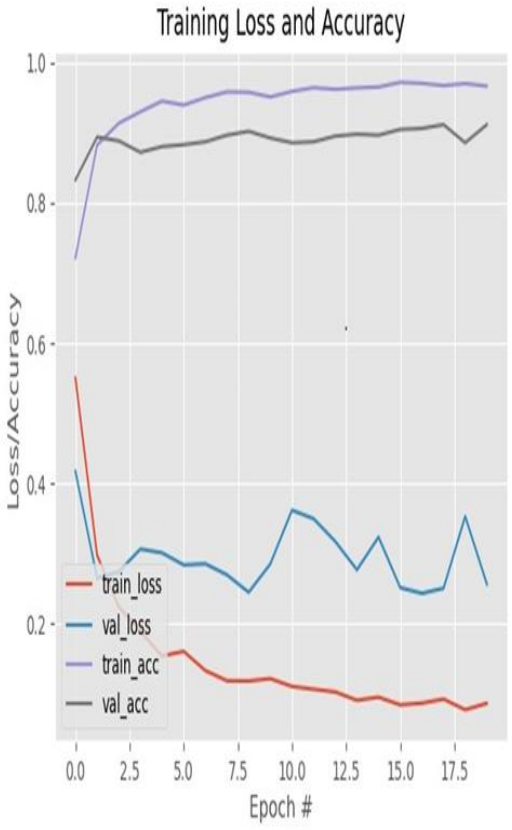
Live webcam



Here we can see that our mode is 100 % sure or accurate that a person is not wearing a mask.

Here we can see that our mode is 89.13 % sure or accurate that a person is wearing a mask.

V. REAL TIME OUTPUT :



VI. CONCLUSION AND FUTURE SCOPE

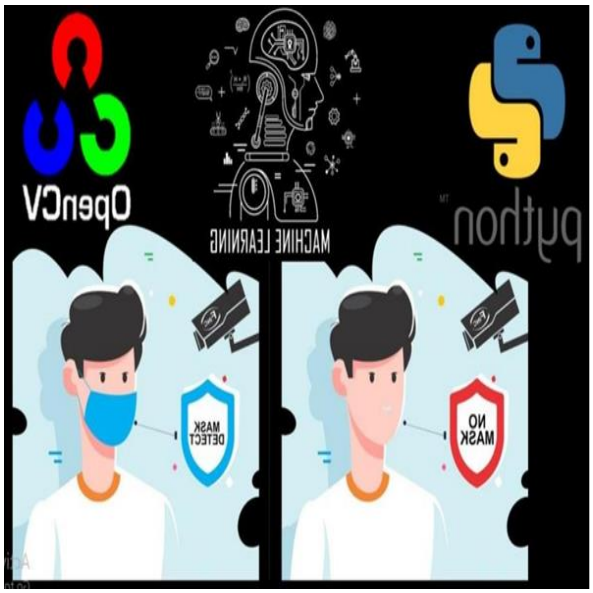
In this project, we have proposed a novel face mask detector, namely FaceMask Detection System, which can possibly contribute to public healthcare. The architecture of FaceMask Detection System consists of CNN as backbone, FPN as the neck, and context attention modules as the heads. The strong backbone ResNet and light backbone MobileNet can be used for high and low computation scenarios, respectively. In order to extract more robust features, we utilize transfer learning to adopt weights from a similar task face detection, which is trained on a very large dataset. Furthermore, we have proposed a novel context attention head module to focus on the face and mask features, and a novel algorithm object removal cross class, i.e. ORCC, to remove objects with lower confidence and higher IoU. The proposed method achieves state-of- the-art results on a public face mask dataset. An Iot component is added to the System to display the messages in a hardware. the data from the program is collected by the Iot

hardware and it will dispalyed as the warning signal to the concerned authority.

Future Scope :

some countries with strong vaccination records may now have lower immunity than others but If suppose in future we come across similar condition like COVID19 and lockdown is again applied on the whole world, our project will be most helpful during such pandemic condition. We will link our python code / software to a hardware like self opening doors like in malls and other public places where the door will not open until a person is wearing a mask. This will help people to be more protected and safe. As far as the efficiency of our project goes, we can enhance the accuracy of this model by more image Training , and also proper lighting and usage of efficient cameras the accuracy of the system can be improved.

Semester 5 poster (for reference):



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https://youtu.be/Ax6P93r32KU

Indian Sign Language Recognition: A Comparative study

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Abstract— **There are different ways for communication between normal people and physically impaired people. Out of those commonly used way is sign language. Sign language is natural language used by physically challenged people for communication between their communities as well as with normal people. Sign language changes country wise. Each country uses its own sign language and some with more than one. Due to this diversity sign language recognition is very challenging and complex. Researchers have made significant advancement in the field of recognition of sign language and it is ongoing. Existing research focuses on different portions of sign language recognition with processing, segmentation, feature extraction, classification using machine learning algorithms, deep learning approaches or sensor based. This paper covers overview of all approaches used, pros n cons of existing systems and future scope in this field.**

Keywords: - Deep learning, Feature extraction, Gesture recognition, Internet of things, Machine learning, Sign language.

I. INTRODUCTION

Sign language is natural language used by deaf people has its own lexicon, grammar. This is most commonly used method of communication for deaf and dumb community. Sign language varies country wise. Each country has uses own native sign language. Significant work is made by researcher in Indian Sign Language. But, Indian Sign Language (ISL) recognition is complex due to its diversity and use of two hands for performing gestures. The challenges in sign language recognition are detecting hand gestures, head movements, facial expressions, hand shapes, finger detection, rotation of hands, etc. In addition to this, inaccurate gesture, occlusion, speed of movements can produce complexity in recognition. Human speech generates 1D signal whereas sign language generates 2D signals from input data when captured in digital format.

Sign language recognition is growing area in human computer interaction. Gesture recognition, action recognition, feature extraction helps in human computer interaction, human robot interaction and communication between hearing impaired and speaking people. Gesture can be recognized by vision based or glove-based approach. In glove-based approach, users have to wear sensors and bear sensor hardware in entire operation. In vision-based approach, use of image processing techniques, video processing algorithms used to detect hand movements, head movements along with facial expression.

Many research works have been done with image processing, feature extraction methods, segmentation methods, classifier-based approaches, glove-based approach, vision-based approach, using static gestures, dynamic gestures, video processing, artificial neural network, CNN, RNN, deep learning, support vector machine and IOT technologies. Although use of neural networks, deep learning algorithms and sensor recognition giving greater accuracy, the recognition of sign language from video input with different execution speed is challenging task to address. Another challenge is use of dataset. Standard datasets are not available for all sign languages. Mostly, researchers are creating their own dataset for training and testing of systems.

This paper is intended to provide a comparative study of sign language recognition and identify gaps that need to be addressed, what is achieved till now and future direction of research. This paper is organized as: Section 2 introduces an overview of sign language recognition. Section 3 covers comparative study existing systems. Section 4 presents research gap and challenges. Section 5 Conclusions.

II. AN OVERVIEW OF SIGN LANGUAGE RECOGNITION

Sign language recognition, gesture recognition plays important role in bridging the communication gap between hard of hearing

people and normal people. A block diagram of sign language recognition is shown in fig. 1. The flow of proposed system is as follows: input to system is video containing signs, image frames, noise elimination, feature extraction, classification. The output is text or speech indicating sign from input video.

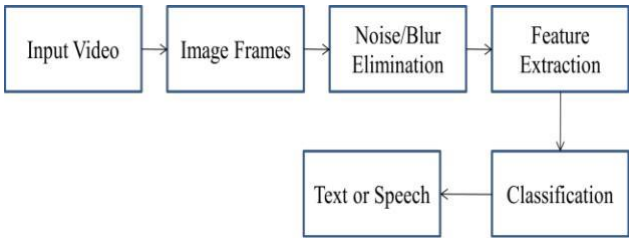

Figure1. Block diagram of sign language recognition

Preprocessing:

A process of removing noise from data by varies stages like filtering, sampling, normalization is called preprocessing. The raw data captured by camera or other capturing devices may get corrupted due to noise or environmental conditions. Direct processing of such data may not be suitable for system performance.

Feature Extraction:

A feature is characteristics of an entity. Feature extraction is process of deriving informative values, image dimension reduction and reduction in data size which improves performance of classification and recognition.

Classification:

Classification is process of identifying class of data. Feature vector from training dataset used to train classifier. In testing phase, trained classifier predicts class of sign. Input sign can be image or video. Different classifiers available are: Artificial neural network, k-Nearest Neighbor, Hidden Markov Models (HMM), Naïve bayes, Support Vector Machines (SVM), etc.

III. LITERATURE REVIEW

In [1], system created based on vision-based approach taking video sequence as input and extracting spatial features from them using CNN, RNN algorithm. American Sign Language dataset is used. Problem faced in testing facial features and different skin tones which led to loss of accuracy.

In [2], the approach of data driven system for extraction of spatial and temporal features using 3D-CNN from video stream is proposed. To improve performance dynamic dataset captured with Kinect sensors is used. This approach achieved Jaccard Index score of 0.836. In future direction, capturing temporal information from video with convolution strategy is not gives better result on dynamic sign language recognition.

In [3], a vision-based gesture recognition approach is proposed which recognizes single handed signs, double handed signs and finger spelling alphabets of Indian Sign Language (ISL) from video input with accuracy of 91% in finger spelling alphabets, 89% accuracy in single handed signs. 3D gestures, non-manual signs not considered in system.

In [4], selfie video-based sign language recognition method on mobile platform is introduced. Sign language feature space is created by processing video frames. Artificial neural network, minimum distance classifiers used for training and testing purpose. Word matching score is considered for performance measurement. Real time constraints in background of video vary due to movement of selfie stick.

In [5], multi model framework is designed for recognition of sign using Leap motion and Kinect sensors. Along with sign gestures facial data plays important role in sign language communication. 51 dynamic sign words collected as dataset for gesture recognition. Recognition rate of single hand and double hand gestures are 96.05% and 94.27% respectively.

In [6], model of 3D sign language recognition proposed based on graph kernels. The approach used is a relative range of joint relative distance to extract motion features of hand, fingers. Dataset contains 500 signs of ISL (Indian sign language).

A comparative study of different sign language recognition techniques is shown in Table 1.

Table1. Comparison Table

Reference	Technique or Algorithms used	Remark	Accuracy
[7]	Rule based method, Dynamic Time Warping-based methods for words. Sentence interpretation using inverted indexing.	Increased vocabulary size accuracy rate decreases	Average recognition rate: 96.25%
[4]	Minimum Distance and Artificial Neural Network classifiers. Segmentation, Pre-filtering and contour detection with Gaussian filtering used.	Single handed signs, background of video changes due to selfie stick movement reduces accuracy	Word matching score: 90.58%
[8]	Convolutional Neural Networks, Softmax regression method is adopted in classification.	Constant video background	Recognition rate: 92.88 %
[6]	Depth matrix, a dynamic naive Bayes classifier and 1-nearest neighbor strategy used	Computation of Depth matrix takes a maximum of 2ms time	Accuracy: 96.2% Mean accuracy: 95.2% of dynamic gesture dataset
[15]	Hand gesture using web camera, HSV color algorithm, dilation and mask operation, Convolutional Neural Network (CNN)	More alphabet recognition to improve accuracy of system.	90%
[16]	Support vector machine (SVM), deep learning-based classification used for emergency hand gestures	More sample need to be added in dataset & improve the efficiency of SLR, HGR techniques.	Multiclass SVM with accuracy 90%. Deep learning method accuracy 96.25%.
[14]	Faster R-CNN model, ResNet-50, C3D model, I3D model, Feature Pyramid Network (FPN), I3D with RGB-MHI, I3DCRGB-MHI	After adjustments in model classification accuracy increased to 92.43%. In future, testing will be on continuous SLR domain.	71.95% classification accuracy with single image, different models accuracy 89.30%, 90.18% & 91.13%.
[9]	NumPy, Scikit-learn, Pandas, Tensor Flow (version: 2.0), core-i7 processor with NVIDIA GeForce GTX 1050 Ti GPU (CUDA Cores: 768), Python 3 (version: 3.6) and 16 GB physical memory. NVIDIA Tesla K80 GPU, Google Colab platform.	Creation of open-source, high quality BSL dataset for future researchers.	Character recognition accuracy, f1-score, precision, recall values of 91.67%, 91.47%, 93.64%, 91.67% and 97.33%, 97.37%, 97.89%, 97.33% for digit recognition.
[10]	ATMEGA 2560 microcontroller board, robotic hand, Android-based mobile application with speech recognition capabilities, materials (expandable rubber, bathroom Slippers, straw pipe, tiny rope) and three servo motors	Considered only single hand ASL but ASL can also be communicated using two hands and also can include the facial expression. This prototype can extend to two hands with fully robotic body.	Accuracy 78.43% and an average response time is 2s.
[13]	Conductive knit, coupling with an accelerometer, deploying machine learning. The glove an ST microcontroller, long short-term memory (LSTM) neural network, a leave-one-experiment- out cross validation this methodology used.	They have shown the potential ofcombining machine learning with novel soft sensors with state-of-the-art microcontrollers.	Accuracy of 96.3% of segmented and predictions 92.8% with real-time streaming trails

IV. RESEARCH GAP AND CHALLENGES

The parameters used for performance measurement are accuracy, f-score, precision, recall, efficiency, robustness, dataset or dictionary size, speed, power consumption and cost. But, not all researchers use all mentioned parameters for evaluation. The survey reveals that even though number of research papers covering Indian sign language recognition problem. There are some constrains and challenges not yet handled and there is scope for improvement.

Research Gap and Challenges:

1. There are no any clear norms which help in selection of feature extraction techniques.
2. There are no standard specifications for input images or video.
3. Selection of classifier for recognition is challenging.
4. Complexity in two handed signs not yet resolved completely.
5. Image or video background variation is constraint in processing.
6. There is no standard dataset.
7. Signer independence
8. Static gesture recognition

V. CONCLUSION

The comparative study indicates that, advancement of Indian sign language recognition research based on videos. Still, full fletched generalized system is not yet available which covers all aspects of Indian sign language recognition. This paper is addressing the challenges in recognition of gesture, sign language and future area of research. Use of more deep learning approaches, IOT techniques for gesture and sign language recognition can improve accuracy and performance of the system.

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Comparative Investigation of Machine Learning and Deep Learning Methods for Univariate AQI Forecasting

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***Abstract*— The air quality index is a quantitative measure used by governments around the world to quantify air pollution as a numerical value. Forecasting hourly AQI is a complicated task as the data is very fluctuating, making it difficult for models to understand patterns. Advancements in machine learning and deep learning models has shown increased growth in time series applications across different domains. This research studies different machine learning and deep learning-based techniques for AQI forecasting for six different locations across the city of Mumbai. The results of these techniques are evaluated using standard metrics such as RMSE and MAPE. Linear regression and its regularized variants, LSTM and GRU for the single step ahead dataset, have obtained the most accurate forecast. All the models have miserably failed for multi-step ahead variant of dataset. Result obtained by SARIMAX model has outperformed several machine learning algorithms.**

***Keywords*—** *AQI; Machine Learning; Deep Learning; LSTM; GRU;*

I. INTRODUCTION

As per World Health Organization, across globe, 9 out of 10 people live in locations where air quality exceeds normal WHO guideline limits, resulting in 7 million premature deaths annually [1]. Degradation in air quality can happen due to vehicular traffic, industrial waste, cigarette smoke, organic compounds, etc. This activity generates a lot of harmful gases, which can make the surrounding air hazardous
[3]. Government agencies across the globe use the air quality index (AQI) as a health monitor to measure the concentration of harmful gaseous as well as particulate pollutants in the air. The air quality index (AQI) informs people about the quality of the air they breathe. The AQI is based on a linear relationship between air pollutants like PM10, CO, NO2, SO2, Ozone, and others [6]. Precise forecasting techniques are a must so that people with any respiratory morbidity can take the necessary precautions before stepping out.

To make accurate forecasts, data plays a crucial role in the entire process. The AQI is a univariate time series, which means that it has only one variable that changes over time. Models are trying to forecast future values of AQI using its past values at different time intervals. Univariate time series are actually trying to learn the relationship between variables under observation and temporal information. It is collected using sensors located at different locations. Due to malfunctioning or abnormal weather conditions, the sensors might not work, resulting in inconsistent data. However, filling these missing values based on data distribution is a great challenge [4].

With the advancement of machine learning (ML) and deep learning (DL), every day there are new univariate time series applications being built. Because time series must be stationary [12] for traditional statistical methods such as ARIMA and its variants to make precise forecasts, differencing or log transformation is required, additional processing that is not needed when using machine learning-based methods. Because of their ability to generalize and be robust, RNNs and their variants have become more viable methods for making accurate predictions in recent years than traditional statistical methods.

The intention of this study is to compare and build an hourly air quality index forecasting model using the SARIMAX method, powerful ML models like linear regression, support vector machine, lasso regression, ridge regression, K-Nearest neighbour regression, and random forest, and extremely potent DL models like RNN, LSTM, and GRU. The organization of the paper is as follows: Section 2 contained related work in the fields of univariate time series analysis and models that have worked specifically for AQI forecasting from around the world. Section 3 deals explain three different pipelines followed for this experimentation. Section 4 of the paper shows data visualization and results were compared using performance metrics.

II. LITERATURE REVIEW

Hong et al. [2] investigated various air pollutants and the API for Labuan, Malaysia, and concluded that exponential smoothing techniques produce better results for CO and SO2, whereas the SARIMA model produces better results for PM10, NO2, O3, and API. In this paper [3], the authors have compared the LSTM and ARIMA models and proposed an LSTM model with some hyperparameter settings.

Authors [5] claim that ANN, SARIMAX, and modified SARIMA with exogenous variables have worked better for day-ahead forecasting, while the univariate SARIMA model has outperformed for intra-day forecasting in the majority of months. Pasupuleti et al. [6] have created an IoT-based solution where the concentration of different pollutants is measured using sensors, and then models like linear regression, decision trees, and random forest are examined. Random forest has resulted in better prediction accuracy.

This paper examines machine learning-based regression models such as linear regression, extra trees, XGBoost, KNN, elastic regression, etc. for precisely forecasting AQI for the

city of Delhi. All models have achieved pretty decent accuracy, with Extra Tree being the best with 85% forecast accuracy [7]. Authors [8] have divided forecasts into clean air and unhealthy air forecasts, and they have investigated linear regression, neural networks, and genetic programming. All three models have worked well for clear air forecasts, but for unhealthy air, linear regression and genetic programming have outperformed neural networks.

Chattopadhyay and Chattopadhya [9] have performed a comparative analysis of a statistical method ARIMA and an auto-regressive neural network (ARNN) for predicting rainfall. ARNN has produced better results, and the model was evaluated using scatter plots and Willmott's index. Phan et al. [10] have made a comparative study of different models on five univariate time series and observed that a feed-forward neural network has provided better accuracy, whereas when shape and dynamics are considered, dynamic time wrapping has provided better results.Another application of univariate time series i.e. Long Term Wind Speed Forecasting [11] was studied and LSTM has produced better RMSE and MAPE results in comparison with ARIMA and ANN.

III. METHODOLOGY

The entire experimentation can be summarized in Figure 1, which shows the different pipelines followed for the SARIMAX method, ML-based methods, and DL techniques. For all three pipelines as shown in figure 1, data acquisition and preprocessing steps are same. The data collection process involves gathering data from multiple stations, namely, Colaba, Mazgaon, Kurla, Bandra, Malad, and Deonar, located in different parts of the city of Mumbai. Collected data is an univariate time series that contains temporal information and AQI levels at each instance. Since these datasets involve the capture of information through sensors installed at different locations by the government of India, there have been times when sensors have malfunctioned, resulting in missing values in the dataset across stations [13]. Analyzing, studying, and visualizing missing data is a laborious task. Hence, a machine-learning based random forest imputer is used to impute or fill in the missing data. After imputation, the data is fed to anomaly treatment [14], which is a two-stage process: (i) finding anomalies using cluster-based techniques, namely, Density-Based Spatial Clustering of Applications with Noise (DBSCAN), and (ii) imputing those anomaly points using a random forest imputer.A.SARIMAXSARIMA(p, d, q) x (P, D, q)s is a generalization of the SARIMA model, where p, d, q are non-negative integral values defining the polynomial orders of autoregressive (AR), integrated (I), and moving average (MA) for the time series' non-seasonal component, and P, D, Q represents the same quantity but for the seasonal component [5]. Along with the seasonal component, the SARIMAX model includes EXogenous variables. As shown in fig 1, Augmented Dickey Fuller (ADF) test was performed on data to check for stationarity, followed by finding best SARIMA orders using auto-arima package. Before applying SARIMAX method, data was divided into 70:30 train test sets respectively and eventually forecasted values where compared with actual values using performance metrics.

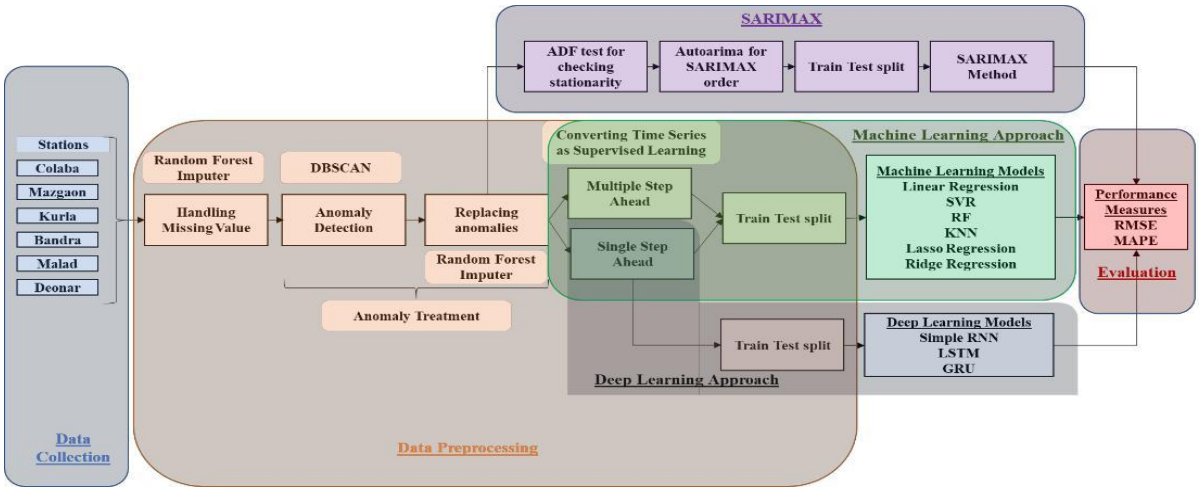


Fig. 1. Different pipelines followed for SARIMAX, ML and DL methods.

B. Machine Learning (ML) Models

There were several ML models studied to understand the competency of these models in analysing and forecasting AQI. For ML models, univariate time series data set was transformed to supervised learning datasets, where two variants were used for forecasting, they were single-step ahead (SSA) and multi-step ahead (MSA). As shown in Figure. 2, for a single-step forecast, one week of actual data, i.e., t = 24*7, is used to predict the next value, whereas for a multi-step forecast, the first value of one week of actual data

is rolled out and a newly predicted value is appended to predict the next value [15].

Similar to SARIMAX pipeline, same 70:30 ratio is used to create train test split. To perform a comparative experimentation, different ML models such as, linear regression (LR) [16] and its regularized variants such as lasso regression (LsR) and ridge regression (RiR) [17] which uses l1 and l2 regularization respectively. are implemented. Another algorithm implemented was support vector regression (SVR), which is one of the machine-learning-supervised regression models used for forecasting. Like linear regression, SVR seeks the best-fit line, which is a hyperplane with the greatest number of points [18].

One of the distance-based ML model implemented is K nearest neighbor (KNN). It is a supervised machine learning algorithm that uses a distance-based metric like Euclidean distance to calculate similarity between test samples and training samples. Based on this similarity score, the k closest training samples are considered for local interpolation of the test samples [19] Lastly, advanced ML concepts like ensemble learning was also explored where random forest algorithm was implemented which uses bagging technique. In this, various subsamples of the dataset are created by randomly bootstrapping and aggregating it. RF is a meta-model that combines the results of different decision trees created on these subsamples. This averaging of results helps improve forecast accuracy and also prevents the model from overfitting [20].

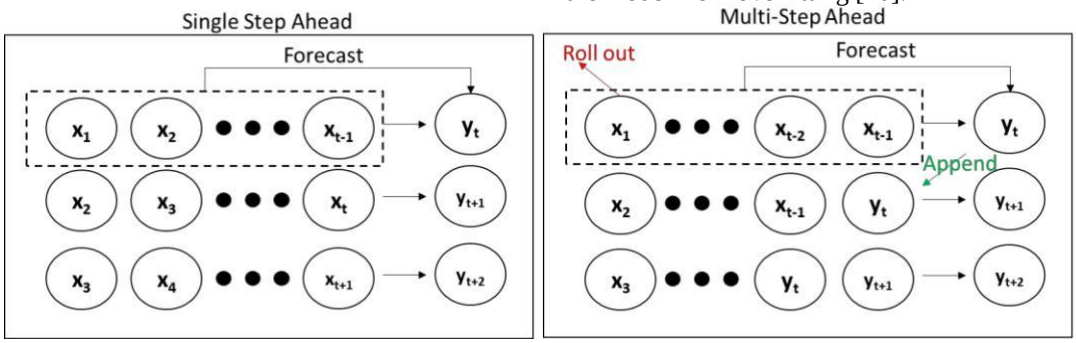


Fig 2. Single step ahead and multi-step ahead forecast

C. Deep Learning (DL) Models

To understand impact of deep learning, three variants of deep networks such as, recurrent neural network (RNN), long short-term memory (LSTM) and gated recurrent unit (GRU) were also implemented.

Figure 3 shows a cell of the RNN model. In this case, X, A, and Z represent the input, hidden layer, and output values, respectively. whereas U, W, and V are weights from the first layer i.e. input layer to the hidden layer, weights between different hidden layers, and weights from the hidden layer to the final layer i.e. output layer [23]. It is clear from the diagram, for instance, that the hidden value, At, is the function of input Xt and values from the previous instance, At-1. Hence, current output Yt depends on At, which in turn is determined by previous values such as At-1, At-2, At-3, and so on, which may result in a disappearing gradient problem because the sequence can be very large.

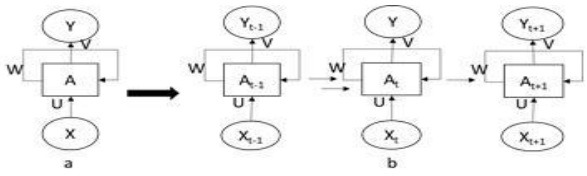


Fig.3. a. Structure of RNN cell b. Expanded diagram of RNN modelAnother architecture implemented was GRU were working is same as RNN; the difference is in internal structure. GRU has two gates: i) the update gate, which determines whether or not the cell state needs to be updated with the current state, and ii) the reset gate, which indicates how important previous state information is. Final cell status depends on the output gate, i.e., whether new content will be updated or old content is retained [22]. LSTM was created to solve the vanishing or exploding gradient descent problemUnlike GRU, LSTM has three gates: i) The input gate decides what information needs to be saved between the current input and the previous short-term memory; ii) The forget gate chooses whether to discard or keep information from long-term memory by multiplying this information with the current input and short-term memory; iii) The output gate produces new short-term memory that will be forwarded to the next cell in sequence using inputs as current input value, value form previous short-term memory, and value from newly calculated long-term memory

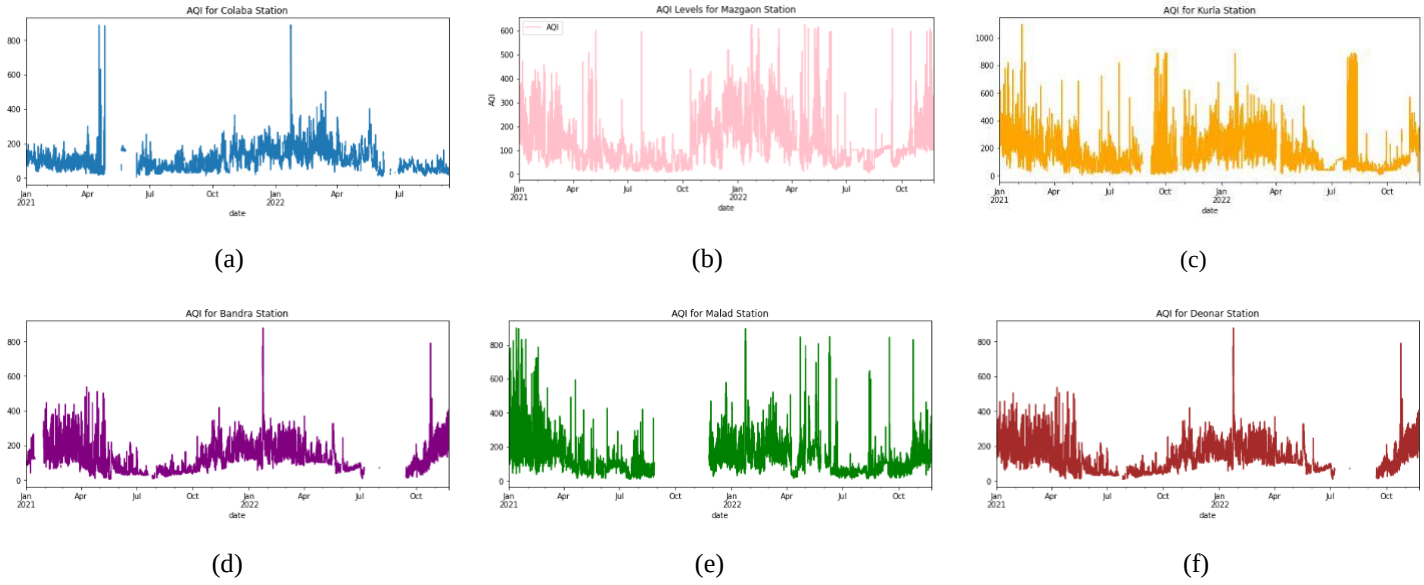
IV. Experimentation and Results

For this experiment, multiple datasets for all six stations, namely, Colaba, Mazgaon, Kurla, Bandra, Malad, and Deonar, are fetched from the Central Pollution Control Board (CPCB) [22], which contains hourly frequency data from January 1, 2021, to November 23, 2022. Figure 4 shows how AQI index varies with respect to time across different stations. The procedure followed for this study included data retrieval, filling in missing values, performing an anomaly treatment, splitting into train test sets, and finally applying multiple models. For handling the missing values, a random forest imputer is used because there is no assumption about the data being normal, and unlike parametric models, it does not require any specifications [21]. The algorithm of choice is a random forest with 20 trees in the forest and the Gini Index as an attribute selection measure, and an iterative imputer strategy that runs 10 rounds of the random forest algorithm is

used for final imputation. For anomaly detection, the DBSCAN algorithm is used, with eps set to mean values after imputation and min_samples set to the number of data points in a week.

For deep learning models, after anomaly treatment, data was passed to the min-max scaler for normalization and then split into train-test sets and fed to DL models. For all deep learning network, one dense layer with 7 hidden units with tanh activation was used. For optimization, Adam optimizer with learning rate 0.01 was used and all three models were trained for 500 epochs.

Figure 5 is a visual representation of the actual and forecasted values of the AQI for different models. It is observed that for all machine learning models, the multistep-



(a) (b) (c)

(d) (e) (f)

Fig. 4. a.- f, Data visualization of raw data for stations Colaba, Mazgaon, Kurla, Bandra, Malad, and Deonar respectively

ahead configuration has resulted in poor forecasts. From this figure 5, it is clear that SARIMAX, linear, lasso, and ridge regressions, as well as LSTM and GRU, have performed better in forecasting the AQI for Colaba station, similar results were achieved for other stations also.

For evaluating the performance, we have used two metrics: a) RMSE (Root Mean Squared Error) and b) MAPE (Mean Absolute Percentage Error). RMSE values are an indicator of how far data deviates from the actual value. As shown in Table 1, the best RMSE value achieved is 17.02 for the linear regression model for Bandra station. When comparing RMSE, SARIMAX, and deep learning methods, they have also resulted in better values. For almost all stations, SVR has performed poorly, with RMSE values reaching 128.64. From table 1, it is clear that the lowest MAPE value of 8.7% was obtained by the GRU model again for Bandra station. When looking at MAPE values for some stations, even random forest has given considerably good results.

Station		Sarimax	LR		SVR		RF		RR		LsR		KNN		RNN	LSTM	GRU
			SSA	MSA	SSA	MSA	SSA	MSA	SSA	MSA	SSA	MSA	SSA	MSA			
Colaba	**RMSE**	23.2	**18.6**	54.3	30.3	121.1	21.7	83.5	**18.6**	54.3	**18.5**	54.3	34.6	107.8	53.9	**18.4**	**18.4**
	MAPE (%)	42.25	**13.3**	80.5	21.9	226.3	19.8	153.7	**13.3**	80.5	**13.2**	80.5	33.1	163.4	75.01	13.6	**12.9**
Mazgaon	**RMSE**	**32.0**	40.45	75.36	49.72	102.26	42.07	74.01	40.45	75.36	40.35	75.36	57.95	80.77	41.82	39.53	39.43
	MAPE (%)	23.5	15.5	91.8	26.6	61.3	15.8	84.4	15.5	91.8	15.3	91.8	34	80	17	**13.5**	**13**
Kurla	**RMSE**	**19.47**	73.68	120.04	93.06	128.64	78.4	120.92	73.68	120	73.65	120	91.29	124.4	76.6	73.94	75.07
	MAPE (%)	17.4	30.5	146.6	40.7	41.9	41.4	54.2	30.5	146.6	30.5	146.6	51.1	69.9	32.8	30.7	27.6
Bandra	**RMSE**	19.3	**17.02**	64.12	28.42	88.54	18.34	64.88	**17.02**	64.12	**17**	64.12	31.81	68.99	18.95	**17.92**	**17.68**
	MAPE (%)	22.6	**9**	68.8	14.3	54.4	**8.9**	71.2	**9**	68.8	**8.9**	68.8	17.7	68.6	11.2	**9.8**	**8.7**
Malad	**RMSE**	**19.02**	41.25	75.19	53.86	92.05	41.98	105.2	41.25	75.19	41.19	75.18	55.53	82.75	39.9	39	38.83
	MAPE (%)	29.8	25.1	106.8	43.3	53.9	23.4	186.5	25.1	106.8	25	106.8	41.9	83.2	**21.8**	**21.7**	22.6
Deonar	**RMSE**	20.97	**17.3**	59.24	28	94.48	18.58	62.88	**17.3**	59.24	**17.28**	59.24	33.71	64.53	18.2	18	18.33
	MAPE (%)	23.2	**9.1**	52.2	15.3	58.1	**9.2**	65.7	**9.1**	52.2	**9.1**	52.2	22.8	54.4	10.5	9.8	**8.9**

Table 1. RMSE and MAPE values for forecasting models (Best results are in bold)

V. CONCLUSION AND FUTURE SCOPE

Forecasting the AQI is a challenging task because the data is highly unstable, has high variability, and is very dynamic in nature. The work demonstrated is an examination of various techniques for univariate time series analysis. The results show that, while deep learning techniques have gained popularity, SARIMAX produced better results in some

scenarios, indicating that adding exogenous variables, i.e. multivariate time series analysis, can improve forecasting accuracy.

It is evident from the results of linear regression, lasso regression, and ridge regression that adding regularization of different orders for these datasets has nearly no impact on forecasting. Considering RMSE and MAPE for all six stations, linear regression, LSTM, and GRU have performed significantly better, while models like support vector machines and K-nearest neighbors have failed miserably. It is also believed that single-step ahead variants of models have performed far better than their multi-step-ahead variants.

In the future, forecast accuracy can be enhanced by including other factors like pollutant levels, meteorological

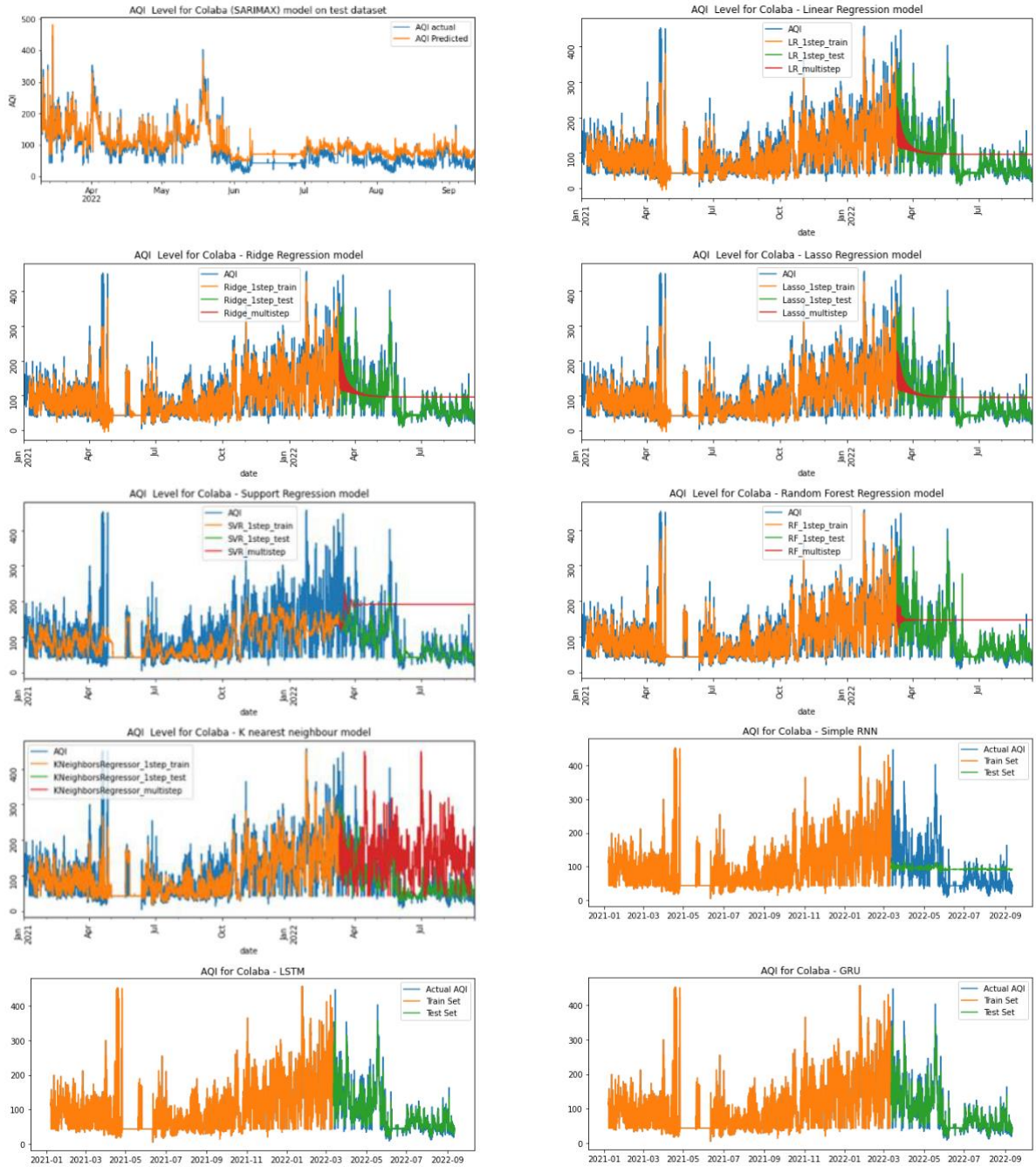


Fig. 5. Actual and forecasted value of AQI for Colaba station for all models

factors, population density, traffic density, distance from the seashore, etc. Along with this, advanced variants of RNN, such as transformers, auto encoders, and their variants, can be applied for more precise results.

17. ss

Predicting and Classifying Water Quality, Treatment, and Usage: A Comprehensive Review

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Abstract—**Water quality evaluation and efficient treatment methods play a vital role in the efficient and sustainable use of water resources. With increasing water demands and concerns about water scarcity and contamination, there is a growing need to predict water quality and identify appropriate treatment methods. In this review paper, we provide a comprehensive overview of the current state of water quality prediction, treatment method prediction, and use case classification. We examine the different methods used to predict water quality, including statistical models, and machine learning algorithms. We also provide an overview of the methods used to predict the most appropriate treatment methods. Additionally, we examine the various use cases for any type of water in general. The findings of this review highlight the importance of accurate water quality prediction and treatment method prediction in ensuring the efficient and sustainable use of water resources, and the need for further research in this field. In addition to examining the existing approaches, we also developed a theoretically ideal model to predict the use cases with or without treatment for any type of water. Our model is a hybrid approach of the previous studies done by researchers and their findings to enhance the results.**

Keywords– Water quality evaluation, water quality prediction, sustainable development goals, machine learning models, efficient water treatment, treatment method prediction, water use case prediction.

I. Introduction

One of the most important natural resources for the survival and existence of all species on this planet is water. Water is vital for healthy ecosystems, socio-economic development, energy, food production, and human existence. Water is a valuable natural resource that is getting increasingly scarce, even though it is still relatively inexpensive.

Water is an essential resource for all forms of life and its quality plays a crucial role in determining its usability. The increasing water demand, combined with concerns about water scarcity and contamination, has made it increasingly important to manage this limited resource efficiently and sustainably. Water quality prediction and the identification of appropriate treatment methods are key components of this management.

This review paper aims to provide a comprehensive overview of the current state of water quality prediction, treatment method prediction, and use case classification. We have examined various methods used for predicting water quality, including statistical models, machine learning algorithms, and remote sensing techniques. The review will also cover the methods used for treatment method prediction, such as decision tree models and artificial neural networks. Furthermore, the paper will examine the different use cases for industrial water, including process water, cooling water, and boiler feed water, and explore the impact of these classifications on water treatment and management.

The findings of this review will highlight the importance of accurate water quality prediction and treatment method prediction in ensuring efficient and sustainable use of water resources. This paper will make a valuable contribution to the ongoing efforts to manage water resources and address the challenges posed by water scarcity and contamination.

This paper also intends to address this issue by preparing our strategy to develop a model for predicting water quality using various machine learning algorithms, including decision trees, artificial neural networks, and improved decision trees. It also intends to forecast the most effective water treatment, which will be followed by the best use case classification or suitability prediction based on the quality of the data.

II. Problem Statement

Access to safe drinking water is essential to health, a basic human right, and a component of effective policy for health protection. This is important as a health and development issue at a national, regional, and local level. In some regions, it has been shown that investments in water supply and sanitation can yield a net economic benefit since the reductions in adverse health effects and healthcare costs outweigh the costs of undertaking the interventions.

The paper aims to prepare a Model to predict the quality of water using factors like hardness, pH value,

dissolved solids, chloramines, sulfate, carbon, etc, and tell us whether the water is safe to drink or not. If not, whether it is contaminated or not. If contaminated, provide the optimal treatment methods and further provide the best use case classification or suitability prediction.

III. LITERATURE REVIEW

A. AI IN WATER QUALITY PREDICTION

1) WATER QUALITY AND ITS REQUIREMENT:

Water Quality can be defined as the chemical, physical and biological characteristics of water, usually concerning its suitability for the designated use. Water can be used for drinking, cleaning, fish farming, agriculture, or industrial use. Each of these designated uses has different defined chemical, physical and biological standards necessary to fulfill the respective purpose. For example, there are stringent standards for water to be used for drinking or swimming compared to that used in agriculture or industry.

The use of Artificial Intelligence (AI) in water quality prediction can help in addressing the challenges faced in the water treatment industry. AI techniques can help in predicting water quality with a higher level of accuracy, which is essential for the efficient and sustainable use of water resources. AI models can be trained using historical water quality data and other relevant environmental factors, which can be used to predict water quality in real time.

2) PREVIOUS WORK

"Data-driven Water Quality Analysis and Prediction: A Survey" by G. Kang, J. Z. Gao, and G. Xie,[1] provide an overview of the various data-driven approaches used for water quality analysis and prediction. The paper reviews various statistical models, machine learning algorithms, and remote sensing techniques used for water quality prediction. The paper highlights the advantages and limitations of different techniques and the need for further research in the field.

Machine learning techniques:

- Artificial Neural Network (ANN) Model
- Radial Basis Function Network (RBFN) Model
- Deep Belief Network Model
- Decision Tree Model
- Improved Decision Tree Model
- Least squares Support Vector Machine Model

"A review of artificial intelligence-based methods for water quality monitoring and prediction" by Zhang et al.[2] provides a comprehensive overview of AI-based methods used for water quality monitoring and prediction. The paper focuses on the application of machine learning algorithms, such as decision trees, random forests, artificial neural networks, and support vector machines, for water quality prediction. The authors also discuss the challenges associated with water quality prediction, such as data availability and accuracy, and the need for further research.

Machine learning techniques:

- Artificial Neural Networks (ANNs)
- Support Vector Machine (SVM)
- Decision Tree (DT)
- Artificial Bee Colony Algorithm (ABC)

"Artificial intelligence-based water quality prediction using machine learning algorithms: a review" by Raza and Kim[3] focuses on the use of machine learning algorithms for water quality prediction. The paper reviews various algorithms, such as decision trees, random forests, artificial neural networks, and support vector machines, and their application in water quality prediction. The authors also discuss the challenges associated with water quality prediction and the need for further research.

Machine learning techniques:

- Artificial Neural Networks (ANNs)
- Support Vector Machine (SVM)
- Random Forest (RF)

In "Prediction of Water Quality Index by Support Vector Machine: a Case Study in the Sefidrud Basin, Northern Iran,"[4] the authors examine the use of Support Vector Machines in predicting the Water Quality Index (WQI) in the Sefidrud Basin in Iran. They show that this method can be effectively used to predict water quality in this region.

Machine learning techniques:

- Support Vector Machine (SVM)

"Artificial Intelligence-based Water Quality Prediction Models: A Review" by He et al.[5], provides a comprehensive review of AI-based water quality prediction models. The authors examine the different types of AI algorithms used for this purpose and provide a summary of their findings.

Machine learning techniques:

- Artificial Neural Networks (ANNs)
- Support Vector Machine (SVM)
- Decision Tree (DT)
- Random Forest (RF)

"Artificial Intelligence for Water Quality Monitoring and Prediction: a Review" by Liu and Li[6], similarly focuses on the use of AI in water quality monitoring and prediction. The authors provide a detailed overview of the different AI-based methods used for this purpose, including Machine Learning algorithms and other data-driven methods. Machine learning techniques:

- Artificial Neural Networks (ANNs)
- Support Vector Machine (SVM)
- Decision Tree (DT)
- Random Forest (RF)
- K-Nearest Neighbor (KNN)

In "Artificial Intelligence Techniques for Water Quality Prediction: A Review," Peiris and Xiong [7] provide a comprehensive overview of the use of AI techniques in water quality prediction. They examine the different methods used, including Machine Learning algorithms and other AI-based techniques, and summarize their findings.

Machine learning techniques:

- Artificial Neural Networks (ANNs)
- Support Vector Machine (SVM)
- Decision Tree (DT)
- Random Forest (RF)

The common theme in these papers is the use of AI and machine learning algorithms for water quality prediction and the need for further research in the field. The papers also highlight the importance of accurate water quality prediction in ensuring the efficient and sustainable use of water resources.

3) Uses and Requirements

a) Environmental management:

Predicting water quality helps to monitor and manage aquatic ecosystems, ensuring the preservation of aquatic biodiversity.

b) Agricultural planning:

Water quality predictions help farmers to determine the suitability of water for irrigation and to plan their crop production activities.

c) Drinking water management:

Water quality predictions are used to monitor and maintain drinking water sources' quality, ensuring communities' health and safety.

d) Industrial planning:

Water quality predictions help industries to identify potential sources of water for use in their operations and to plan for necessary treatment and discharge.

e) Recreational planning:

Water quality predictions help to monitor the suitability of water bodies for recreational activities such as swimming, fishing, and boating.

f) Climate change adaptation:

Predictive models can help to identify and assess the potential impacts of climate change on water quality and to plan for necessary adaptation measures.

g) Water resource management:

Predictive models can help to assess and manage the availability of water resources, ensuring equitable distribution and efficient use.

h) Pollution control:

Water quality predictions can help to identify and monitor sources of pollution, and plan for effective pollution control and remediation.

i) Public health:

Water quality predictions are used to monitor the presence of harmful contaminants in water, such as bacteria and chemicals, and to prevent outbreaks of waterborne diseases.

j) Environmental monitoring:

Water quality predictions can be used to monitor the effectiveness of conservation and management efforts and to identify areas in need of additional action.

k) Emergency response:

Predictive models can help to identify potential water quality issues in the event of natural disasters, allowing for rapid response and mitigation measures.

l) Policymaking:

Predictive models can inform policy-making at the local, national, and international levels, guiding decisions related to water management and conservation. and many more similar uses. What are the need of the hour

B. AI in Water Treatment

1) Use and Requirement of AI

The use of AI in water treatment is necessary due to the increasing demand for clean and safe water, and the need to efficiently use limited water resources. AI can be used to predict water quality and identify appropriate treatment methods, leading to improved water management and conservation.

AI algorithms can analyze vast amounts of data, including real-time water quality data, to make predictions and provide insights that would not be possible with manual methods. Additionally, AI can be used to optimize treatment processes, reducing waste and energy consumption.

By integrating AI into water treatment processes, it is possible to increase efficiency, reduce

costs, and ensure the safe and sustainable use of water resources.

2) INDUSTRIAL TECHNIQUES

a) Physical treatments: include sedimentation, flocculation, filtration, and distillation.
b) Chemical treatments: include coagulation, neutralization, oxidation, and reduction.
c) Biological treatments include activated sludge, bioremediation, and constructed wetlands.
d) Membrane filtration: includes reverse osmosis and ultrafiltration.
e) Adsorption: uses materials like activated carbon, zeolites, and clay minerals to remove contaminants.
f) Ion exchange: uses resins to exchange ions in the water to remove contaminants.
g) Thermal treatments: include thermal desalination and thermal oxidation.
h) Advanced oxidation processes (AOPs): include ozone treatment, hydrogen peroxide treatment, and UV light treatment.
i) Precipitation/Encapsulation: can be used to remove contaminants from both municipal and industrial wastewater.
j) Adsorption: widely used for the removal of heavy metals from wastewater because of its low cost, availability, and eco-friendly nature.
k) Membrane Technologies (Micro and ultrafiltration): Membrane technology used for removing solids in wastewater treatment is usually based on ultrafiltration or microfiltration.
l) Membrane bioreactor (MBR): Membrane bioreactors for wastewater treatment is a combination of a suspended growth biological treatment method, usually activated sludge, with membrane filtration equipment, typically low-pressure microfiltration (MF) or ultrafiltration (UF) membranes.
m) Reverse osmosis (RO): Reverse osmosis (RO) is a water treatment process that removes impurities using a semi-permeable membrane. Simple, safe, and cost-effective, it eradicates over 99% of contaminants from water such as dissolved solids, organics, bacteria, and pyrogens.
n) Electrolysis/Electrodialysis(ED): Electrodialysis (ED) is a process that removes ionic components under the driving force of an electric current from aqueous solutions through ion-exchange membranes.
o) Artificial Intelligence Models to Treat the Wastewater

The choice of treatment method depends on the type and concentration of contaminants in the water, as well as the desired outcome. The treatment processes may be used alone or in combination to achieve the desired water quality.

Heavy metals constitute one of the most common inorganic water pollutants. They can stay in the environment and food supply and are very toxic, inherently carcinogenic, and non-biodegradable. Heavy metal ion reduction from various wastewater sources has been handled utilizing multiple strategies.

Adsorption, membrane-, chemical-, electric-, and photocatalytic-based therapies are some possible divisions of these techniques [8].

Mercury, lead, cadmium, zinc, arsenic, and plutonium are a few of the heavy metals having a large atomic mass. Since lead is a harmful metal that comes from the exhaust of automobiles that utilize leaded gasoline, there is no safe level of exposure to it.

Typical heavy metals found in wastewater that is harmful to human health are shown in Table 1.

TABLE 1. Common heavy metals found in wastewater, their origins, and the health problems they cause.[8]

Heavy Metal	Main Sources	Main Organ and System Affected
Lead (Pb)	Lead-based batteries, leaded gasoline, alloys, cable sheathing pigments, rust inhibitors, ammunition, glazes, and plastic stabilizers.	Bones, liver, kidneys, brain, lungs, spleen. Immunological, hematological, cardiovascular, reproductive system.
Arsenic (As)	Electronics and glass production.	Skin, lungs, brain, kidneys. Metabolic, cardiovascular, immunological, and endocrine systems.
Copper (Cu)	Corroded plumbing systems, electronic and cables industry.	Liver, brain, kidneys, cornea. Gastrointestinal, lungs, immunological, hematological system.
Zinc (Zn)	Brass coating, rubber products, some cosmetics, and aerosol deodorants.	Stomach cramps, skin irritations, vomiting, nausea, anemia, and convulsions.
Chromium (Cr)	Steel and pulp mills and tanneries.	Skin, lungs, kidneys, liver, brain, pancreas. Tastes, gastrointestinal, reproductive system
Cadmium (Cd)	Batteries, paints, steel industry, plastic industries, metal refineries, and corroded galvanized pipes.	Bones, liver, kidneys, lungs, testes, brain. Immunological, cardiovascular system.
Mercury (Hg)	Electrolytic production of chlorine and caustic soda, runoff from landfills and agriculture, electrical appliances, Industrial and control instruments, laboratory apparatus, and refineries.	Brain, lungs, kidneys, liver. Immunological, cardiovascular, endocrine, and reproductive systems.
Nickel (Ni)	Manufacturing of nickel alloys and stainless steel.	Kidney, pulmonary fibrosis, gastrointestinal problems, lung, and skin.

3) Previous Work:

"Deep learning models for wastewater treatment" by Wei, H., Zhang, H., & Fang, J. [9] presents the application of deep learning models in predicting the operational process of wastewater treatment plants. The authors trained and evaluated several deep learning models such as multilayer perceptron (MLP), long short-term memory (LSTM), and gated recurrent unit (GRU) to predict the treatment performance of wastewater treatment plants. The results showed that the GRU model outperformed the MLP and LSTM models in terms of prediction accuracy. Techniques Implemented- Deep Learning Models

- Multilayer Perceptron (MLP)
- Long Short-Term Memory (LSTM)
- Gated Recurrent Unit (GRU)

"Real-time operational process prediction in wastewater treatment" by Yuan, Y., Wang, W., & Li, Y. [10] describes the implementation of machine learning algorithms for real-time operational process prediction in wastewater treatment plants. The authors used five algorithms, including decision trees, random forests, support vector machines, k-nearest neighbors, and artificial neural networks, to predict the treatment efficiency of wastewater treatment plants. The results showed that the artificial neural network had the best performance in terms of prediction accuracy.

Techniques Implemented- Machine learning algorithms

- Decision trees
- random forests
- Support vector machines
- k-nearest neighbors
- artificial neural networks

"Artificial intelligence-based wastewater treatment plant optimization" by Chang, X., & Dai, Y. [11] provides a comprehensive review of the application of artificial intelligence in optimizing the operational process of wastewater treatment plants. The authors discussed several AI techniques, including artificial neural networks, decision trees, genetic algorithms, and fuzzy logic, and their applications in wastewater treatment plant optimization.

Techniques Implemented- Artificial Intelligence-based optimization

- Artificial neural networks
- Decision tree
- Genetic algorithms
- Fuzzy logic

"Artificial intelligence-based wastewater treatment prediction model based on improved particle swarm optimization algorithm" by Liu, X., Guo, Y., & Li, S. [12] proposes a new wastewater treatment prediction model based on an improved particle swarm optimization

algorithm and artificial intelligence techniques. The authors applied the model to predict the treatment performance of a wastewater treatment plant and showed that the model achieved better performance compared to other traditional prediction models.

Techniques Implemented-

- Improved particle swarm optimization algorithm

"Deep learning-based prediction of the wastewater treatment process" by Jin, Y., Zeng, X., Wang, X., & Han, X. [13] presents the application of deep learning techniques in predicting the wastewater treatment process. The authors used a deep neural network (DNN) model to predict the treatment efficiency of a wastewater treatment plant. The results showed that the DNN model had a high prediction accuracy compared to traditional prediction models.

Techniques Implemented-

- Predictive control
- Convolutional neural network
- deep neural network (DNN) model

In "Deep learning-based prediction of the treatment effect of anaerobic sequencing batch reactor for municipal wastewater treatment" by Wang, X., Jiao, L., Zhang, X., & Li, B. [14], the authors used deep learning algorithms to predict the treatment effect of an anaerobic sequencing batch reactor for municipal wastewater treatment. They trained and tested the model on real-world data collected from a wastewater treatment plant in China. The results showed that the deep learning-based model was capable of accurately predicting the treatment effect, with high correlation coefficients and low mean absolute error values. The model was also able to capture the nonlinear and complex relationships between the input variables and the treatment effect.

In "Predictive control for wastewater treatment plants based on a deep neural network" by Lin, L., Fan, Y., & Li, X. [15], a deep neural network (DNN) was used for predictive control of a wastewater treatment plant. The authors collected data on influent flow rate, pH, and chemical oxygen demand from a real-world wastewater treatment plant and used it to train and test the DNN model. The results showed that the DNN model was capable of accurately predicting effluent water quality and optimizing the wastewater treatment process.

Techniques Implemented-

- Deep Neural Network

In the review paper "Artificial intelligence-based wastewater treatment optimization" by Wei, L., Liu, Y., & Zhang, Y. [16], the authors present an overview of the applications of artificial intelligence in wastewater treatment optimization. They discuss the various artificial intelligence techniques that have been used, including support vector machines, neural networks, genetic algorithms, and particle swarm optimization. The authors also provide a summary of the recent advances in this field and identify future research directions.

Techniques Implemented-

- Support vector machines
- Neural networks
- Genetic algorithms
- Particle swarm optimization

In "Artificial intelligence-based wastewater treatment plant operational process prediction using convolutional neural network" by Li, X., Li, Y., & Liu, J. [17], the authors have used a convolutional neural network (CNN) to predict the operational process in a wastewater treatment plant. They collected data on influent flow rate, pH, chemical oxygen demand, and temperature and used it to train and test the CNN model. The results showed that the CNN model was capable of accurately predicting the operational process, with high correlation coefficients and low mean absolute error values. The authors also demonstrated the effectiveness of the model in real-world applications by using it to control the wastewater treatment process in a pilot-scale wastewater treatment plant.

Techniques Implemented-

- Convolutional Neural Network
- Artificial Intelligence

C. AI in Use Case

1) Use and Requirement of AI

Artificial Intelligence (AI) can play a crucial role in improving the water treatment prediction process. AI algorithms can be used to analyze large amounts of data and find patterns, correlations, and relationships that might not be visible to the human eye. This can help predict the quality of water and the best treatment method based on its properties, costs, and available water supply.

Additionally, AI models can continuously learn and improve over time, which can help make water treatment prediction more accurate and efficient. AI can also help minimize the costs of water treatment by identifying the most optimal treatment method based on cost, performance, and environmental impact.

Overall, the use of AI in water treatment prediction can help improve water quality, reduce costs, and support sustainable water management.

The type of water used depends on the specific requirements of the industrial process and the quality of water that is required for that process. For example, some

industrial processes may require deionized water or distilled water, while others may require treated or untreated municipal water. In some cases, recycled or reused water may be used in industrial processes.

2) *Previous Works*

"Artificial intelligence-based water usage prediction in the chemical industry" by Zhang, H., Wu, J., & Fan, X. [18] presents a case study of using artificial intelligence (AI) for water usage prediction in the chemical industry. The authors use support vector regression (SVR) and artificial neural network (ANN) models to predict water usage and compare the results. The results show that the ANN model has a higher accuracy compared to the SVR model.

Techniques Implemented-

- Support Vector Regression (SVR)
- Artificial Neural Network

"Predictive control for industrial water usage based on machine learning algorithms" by Chen, S., Dong, X., & Jia, J. [19] presents a study on using machine learning algorithms for industrial water usage prediction. The authors use linear regression and support vector regression (SVR) models for prediction and compare the results. The results show that the SVR model has a better prediction performance compared to the linear regression model.

Techniques Implemented-

- Linear regression
- Support vector regression (SVR)

"An improved water usage prediction method for industrial production based on deep learning" by Xiong, H., He, H., & Lu, Y. [20] presents a study on using deep learning for industrial water usage prediction. The authors use a deep neural network (DNN) model and improve the prediction performance through feature selection and model fine-tuning. The results show that the improved DNN model has high accuracy and can effectively predict industrial water usage.

Techniques Implemented-

- Deep Neural Networks

"Water usage prediction in the chemical industry based on an improved particle swarm optimization algorithm" by Liu, X., Guo, Y., & Li, S. [21] presents a study using a particle swarm optimization (PSO) algorithm for industrial water usage prediction. The authors use the PSO algorithm to optimize the parameters of a support vector regression (SVR) model and improve the prediction performance. The results show that the optimized SVR model has high accuracy and can effectively predict industrial water usage.

Techniques Implemented-

- Particle swarm optimization algorithm
- Support vector regression

"Artificial intelligence-based water usage prediction in the chemical industry" by Wei, L., Liu, Y., & Zhang, Y. [22] presents a review of AI-based water usage prediction in the chemical industry. The authors discuss different AI techniques, such as artificial neural networks (ANNs), support vector regression (SVR), and decision trees, that have been used for water usage prediction. The authors also compare the performance of different AI techniques and suggest future research directions.

Techniques Implemented-

- Artificial Neural Network
- Support Vector Regression

"Water Usage Prediction by Using Machine Learning Algorithms" by Cetin, M. [23] presents a study on the use of machine learning algorithms for predicting water usage. The author compared the performance of decision trees, random forests, and artificial neural networks, and found that the random forest algorithm was the most accurate for water usage prediction.

Techniques Implemented-

- Decision tree
- Random forests
- Artificial Neural Network

"Water Usage Prediction Using Machine Learning Techniques" by Murugesan, K., Elumalai, E., & Palaniswamy, M. [24] presents a study on the use of machine learning algorithms to predict water usage. The authors compared the performance of support vector regression, decision trees, and artificial neural networks and found that the support vector regression algorithm was the most accurate for water usage prediction. Techniques Implemented-

- Support vector regression
- Decision trees
- Artificial Neural Network

"A novel water-use prediction method based on an extreme learning machine and multi-objective optimization algorithm" by Sun, S., Chen, W., & Lei, Y." [25] present a water-use prediction model using an extreme learning machine and a multi-objective optimization algorithm. The model is tested and applied on a real-world water use dataset, showing promising results.

Techniques Implemented-

- Extreme Learning Machines
- Multi-objective optimization algorithm

These studies show that machine learning techniques such as artificial neural networks, decision trees, random forests, support vector regression, and deep learning algorithms can be effectively used to predict water usage. However, the most accurate algorithm may vary based on the dataset and the specific application.

3) *Results*

The result of using AI in water usage prediction has shown promising results in the following manner:

a) Improved Accuracy: AI algorithms such as deep learning and machine learning can process vast amounts of data in real time and make predictions with high accuracy.

b) Efficient Water Management: AI can help optimize the use of water resources by predicting water usage patterns and identifying areas for improvement. This leads to better water management and reduces waste.

c) Cost-Effective Solutions: AI can help save costs by reducing the need for manual monitoring and data collection, and by providing more accurate predictions and insights into water usage patterns.

d) Better Decision Making: AI can provide real-time insights into water usage patterns, allowing organizations to make informed decisions about water usage, treatment, and allocation.

Overall, the use of AI in water industry usage prediction has the potential to revolutionize the way water is managed and utilized, leading to improved water resource management, reduced waste, and cost savings.

IV. Tabular representation of previously implemented work

TABLE 2. A Comparison of Research Papers with Big Data-Based Models [26]

PURPOSE AND AREA OF STUDY	BIG DATA MODEL	REAL-TIME MONITORING	WATER PARAMETERS	DATA-SOURCE	ACCURACY
Detection of Intentional Bacterial Spore Contamination of Potable Water	Real time water quality sensor model	Real-time sensing using BioSentry in-line sensor	turbidity, pH, temp., total organic carbon and conductivity	Deionized water as tap water using 1 µm pore size	detected *B. thuringiensis* spores with a detection limit of 102 spores/ml
Quantification of water parameters of inland and near shore waters by means of remote sensing	Remote sensing Model	Not real-time: Remotely sensed images	inorganic sediment particles, dissolved organic material, Secchi disk depth etc.	collected using Geographical Information System	Remotely sensed reflectance values have average *R*2 of 0.81 for Landsat data
detect and analysis of Trihalomethanes in drinking water in Scotland	Pearson's coefficient Analysis Model	Supports 24 hr. real time monitoring	Temp., dissolved organic carbon, chloride	93 water treatment plants assessed from 2011-'13	Temperature (r2 = 0.66, $p <$ 0.05)
To process big data for water monitoring of Three Gorges Reservoir area	Fast fuzzy C-mean clustering	Real-time wireless monitoring	DO, CO3, NH3-N	Data collected by ultra-large scale WSN	The water in which DO is higher than 11mg/L is best quality
Spatial quality evaluation of drinking water	GIS and Ant-colony algorithm	Supports 24 hr. real time monitoring	chloride or sulphate concentration, total hardness etc.	Data from 29 wells in Zhenping County, China	more than 95% area has the same water quality, which proves that the ACCA is feasible
To monitor water quality from a remote location with minimum supervision, initiating immediate corrective actions	Wireless System for water quality monitoring	Real-time data sent wirelessly	pH, conductivity, temperature	Water quality monitoring sensors	pH of water is almost constant at 8.8 till 11:45 a.m. The same rises to 10.00 at 12:15 p.m.
To construct a novel water quality index and quality indicator for reservoir water of Amazon region	Water Quality Indicator Model	Not real time	Physio-chemical parameters and metal concentration	11 water sample stations located upstream	determines seasonal differences in water quality with hydrological cycle
to evaluate the effect of water management of the environmental legislative Directives in Ria Formosa lagoon	EEA 2001 Guidelines	Not real-time	NH4+, NO2-, NO3-	Historical data for the lagoon	In the shallow west end of lagoon during summer, DO supersaturation reached 140% during day

TABLE 3. Comparison of features of various ML-based models[26]

MODEL /ALGORITHM	ARTIFICIAL NEURAL NETWORK	RADIAL BASIS FUNCTION	DEEP BELIEF NETWORK	DECISION TREE	IMPROVED DECISION TREE	SUPPORT VECTOR MACHINE	IMPROVED SUPPORT VECTOR MACHINE
Big-data based	Y	Y	Y	N	Y	N	Y
Water quality factors	Physical, Bio, Chemical	Physical Chemical	Biological Chemical	Physical, Bio, Chemical	Biological Chemical	Chemical	Chemical
Structured data-sets	Y	Y	Y	N	Y	Y	Y
Training data	60%	82%	76%	55%	70%	60%	78%
Testing data	20%	54%	54%	30%	30%	40%	45%
Real-Time Prediction	Y	N	Y	N	Y	Y	Y
Simplicity	Y	Y	N	Y	N	Y	Y
Accuracy	Err: 3.7x10-4	R^2 =0.6020	Err: -1.6 (O2)	70%	85%	RMSE: 40.7%	Err.0.089
Upstream flow	Y	N	Y	N	Y	Y	Y
Downstream flow	Y	N	Y	Y	N	Y	Y
Regression based	Y	Y	Y	Y	N	N	N
Supervised Learning	Y	N	N	Y	Y	Y	Y
Sensors used	N	Y	N	Y	N	Y	Y
Robustness	Y	Y	Y	N	N	Y	Y
Flexibility	Y	N	Y	N	Y	N	N
Data clustering	Possible	Impossible	Possible	Possible	Impossible	Possible	Possible

TABLE 4. A comparison table of research papers with Machine learning-based models to predict water quality [26]

PURPOSE AND AREA OF STUDY	ML MODEL	REGION	PARAMETERS	DATA-SOURCE
To develop a water quality prediction model with the help of water quality factors using Artificial Neural Network (ANN) and time-series analysis	Artificial neural network (ANN)	New York	Chlorophyll, Dissolved Oxygen, Specific conductance, turbidity	USGS online resource: National Water Information System
To develop a new hybrid methodology for predicting the biochemical oxygen demand which is the main indicator of water quality	Artificial neural network- Markov Chain	Tolo Harbor, Hong Kong	Chlorophyll, Dissolved Oxygen, Salinity etc.	27-year water quality data set
To use a new method combing both macro and detailed model to optimize the water quality parameters. It is optimized for the purpose of decreasing the times of time consuming water quality simulation	Radial Basis Network Function	South China, water utility	residual chlorine, turbidity, pH and temperature	network has 6909 nodes, no tank, and 7452 links. It is supplied from the four treatment plants
To provide fairly accurate predictions for variable data to evaluate water quality	Deep belief network	Chaskaman River, India	Dissolved oxygen, pH, turbidity	secondary data collected from a third part
To present a Classification data model using decision tree for the purpose of analyzing water quality data	Decision tree model	Narmada river, India	(NH3_N, NO3_N), pH, Temp _C, BOD, COD	Data collected from 1990 to 2010.
To present an improved decision tree learning method making water quality prediction easier and forecast more accurate	Improved Decision tree model	Chao Lake, China	O, O2, O3	Environment Protection Bureau of Anhui Province and Evaluation standard reference, Hong Kong
To address water quality predicting based on spectrometry	Least square support vector machine model	100 water samples from different places	Total Organic Carbon (TOC) criterion	Fluorescence data obtained by Zhejiang Univ.

V. Our Proposed Solution

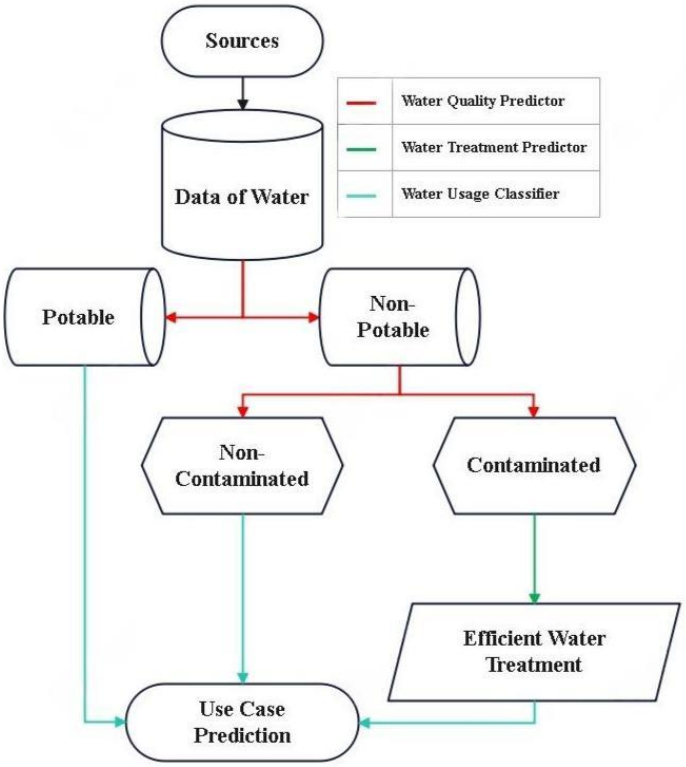

Fig. 1. System Architecture of the proposed solution

The goal of our model is to find the most efficient way to use any type of water source such as rivers, ponds, wells, reservoirs, dams, etc.

The water will be tested and its data will be fed into the model, which has three phases:

1. The Water Quality Predictor
2. The Water Treatment Predictor
3. The Water Use Case Predictor.

The flow of the solution i.e the system architecture is graphically depicted in Figure 1.

The data of the water would first go through the Water Quality Predictor to provide us the insights/results on the quality of the water on which we would decide whether the water is Potable or Not, if it is potable then we would run it through our Use Case Prediction model to suggest the best use cases like household work, cleaning, drinking, etc.

If Not, it would further check whether it's contaminated or not concerning its quality derived earlier. If not it can be used for industrial uses like Cooling: Water is used for cooling in industrial processes, such as Industrial Processing, Cleaning, Boiler Feed, Fire Suppression, Agriculture, etc.

If the water is contaminated, the data will be run through our 'Water Treatment Predictor' which will take into account the costs of water treatment facilities, and the amount of water available and also predict the output of all the treatment methods on the specific data. Then it would provide us with the most optimal treatment method economically as well as in terms of performance.

Lastly, the output of the treatment predictor will go through the Use case predictor to also predict the use cases of that water.

The aim is to determine the best use for any form of water, even if it's contaminated so that smart and optimal industrial or large-scale decisions can be made.

VI. Results and Discussion

The usage of AI in water quality and treatment prediction & usage classification can result in several significant benefits in the water industry.

1. Improved Accuracy: AI models can process large amounts of data from various sources and provide more accurate predictions compared to traditional methods.
2. Real-Time Monitoring: AI models can monitor water quality and treatment processes in real-time, alerting operators to potential problems before they become serious.
3. Cost-Effective: AI models can reduce the cost of water treatment and quality prediction by optimizing processes and reducing the need for manual labor.
4. Enhanced Decision-Making: AI models can provide water treatment and quality predictions that can be used to make informed decisions, reducing the risk of costly mistakes.
5. Automation: AI models can automate many water treatment and quality prediction processes, reducing the need for human intervention and increasing efficiency.
6. Increased Awareness: AI models can provide data-driven insights into the water treatment and quality prediction process, increasing public awareness and promoting sustainability.

Despite these benefits, there are still some challenges associated with using AI in the water industry, such as ensuring the accuracy of the data used as input, developing robust models, and ensuring that the models are accessible and understandable to stakeholders. However, with continued advances in AI technology, these challenges are likely to be overcome, leading to even greater benefits in the future.

SVM/SVR, Improved Decision Tree, Random Forest, and Artificial Neural Networks were found to be the most effective and best-providing algorithms for implementing water quality predictions. Similarly, CNN, DNN, Fuzzy algorithms, and Genetic Algorithms are used in the Water Treatment Predictor. Whilst SVR, ANN, DNN, and extreme learning algorithms are used in the water use case predictor/suggestion. Therefore, it is advised that any model relevant to this area be implemented using the aforementioned techniques.

If properly implemented, our suggested method, which is theoretically viable, would reinvent the water sector.

Finding the best datasets for industries that are often privatized and processing all the different types of information from various sources are the hard components of putting our approach into practice.

Despite the enormous quantity of data that is accessible from the government sectors, it appears that only a significant industrial entity with the data and resources could genuinely work on adopting the suggested solution.

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Scheduling the Tasks and balancing the loads in Cloud Computing using African Vultures-Aquila Optimization Model

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Abstract

Load balancing among VMs is crucial for optimising the delivery of cloud services, both in terms of the money spent and the time spent. Transferring a running virtual machine from one physical host to another is known as "live VM migration," and it is used in the cloud to balance system load. While this method has been offered to lessen downtime while moving overburdened VMs, it is still expensive and requires a sizable amount of memory to implement. To address these limitations, we provide a Task-based-System Load Balancing approach based on the African Vultures-Aquila Optimization Model (AVAO), which attains system load balancing by moving only the surplus of tasks from an overcrowded VM. In addition, we develop an optimization model for applying AVAO to the transfer of these supplementary activities to the new host VMs. We employ an augmented version of the cloud simulator (Cloudsim) package with AVAO as its task scheduling typical to test the suggested strategy. Based on the simulation findings, it is clear that the proposed method considerably shortens the time required for the load balancing practice when compared to the conventional methods. In terms of both make span time and throughput, the system's performance is significantly enhanced if the proposed method is proven to be valid.

Keywords: Load Balancing; African Vultures-Aquila Optimization Model; Virtual Machines; Makespan; Throughput.

Introduction

It is generally accepted that load balancing in CC is complex research for the purpose of segmenting the activities of virtual machines in data centres. In this context, the use of CC as a technique for delivering services via internet is very necessary [1]. The cloud is an expansive and linked system that makes use of all

files and arenas in number of different ways. However, resources are not distributed in an equitable manner, and only a small number of VMs are able to successfully complete the tasks. If a job is to be completed using virtual machines (VMs), then all VMs must work in parallel with a minimum amount of complexity and also the process to be finished swiftly

[2]. Identifies the necessity of task planning and then the execution of plan into action using the resources that are at their disposal. When many jobs are delegated to enormous VMs, those jobs are carried out concurrently in order to ensure that
the jobs are finished on time

[3]. When a trade is assigned to one or more virtual machines (VMs), the scheduler is responsible for ensuring all the transactions that are not executed in the same VM and when there is an availability of alternative VMs. As a consequence of this, the scheduler role is required to take care of all user tasks on all VMs within CC

[4]. As shown in Figure 1, in order to tackle the problem of LB across all VMs, required. This model must enhance the response time of operations that have been allocated by enlarging the resources that are available.

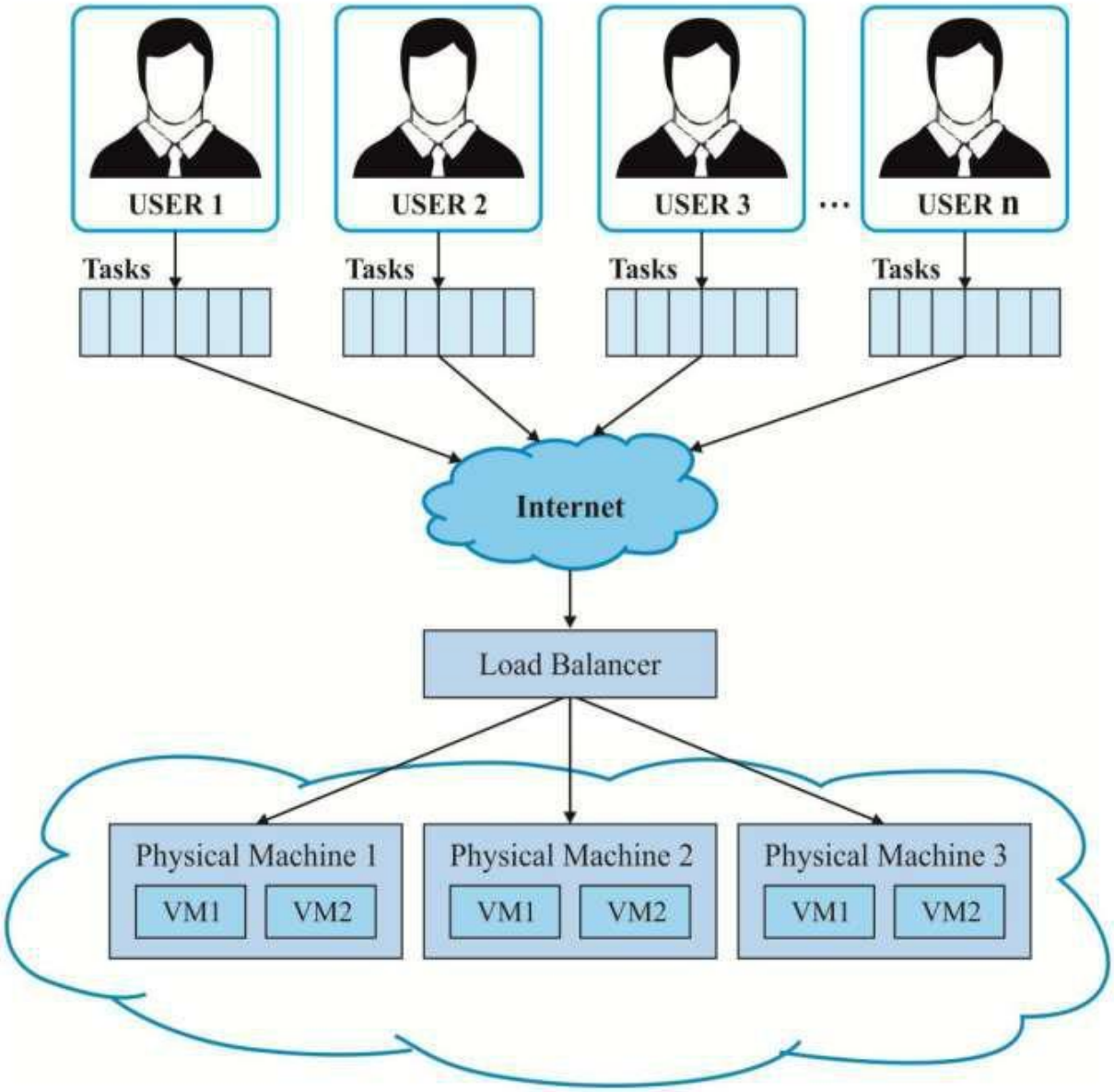

Fig 1. LB in CC platform.

During the process of LB, the input job is distributed evenly among all VMs. The primary objective of LB is to alleviate the strain that is being placed on all VCs by reporting it to other weighted minimum VMs [5]. The presentation and throughput of a system are highlighted by it. The problem of load balancing was also addressed by the developers by using both heuristic templates. Where Protected load balancing is recorded on a distributed network

[6]. In addition, in order to solve the difficulties of load balancing and network security in a dispersed network, three different models have been adopted. For example, it offers a mobile agent in a dispersed network to broadcast all the nodes in that network. After that, it offers an outline in order to give optimal efficiency, which offers a solution to the problem of network

insecurity [7]. A hierarchical load balancing approach is offered as a solution to the problem of uneven load distribution on the computer platform known as Grid. The characteristics of the real node are considered while dynamically distributing the input job from the VMs benchmarks.

The process of load balancing is carried out by a number of different LB modules, and the outcomes are connected to throughput and speed [8]. There are a variety of scheduling strategies that have been implemented for the MapReduce environment, and one of these strategies is load balancing for the CC network [9]. It is anticipated that an task allocation scheduler would be necessary for optimising the performance of Map Reduce in a heterogeneous cloud [10]. In order to shorten the amount of time needed to complete a job in which it is condensed when processing enormous amounts of data such as video and images using Map Reduce outlines [11], a deadline reduction scheduler has been designed. An independent agent that is reliant on the load balancing strategy is offered for the purpose of balancing a load by VMs with the assistance of three agents, namely a Channel agent, a load agent [12].

1.1. Problem statement

This part focuses on the problem statement that was derived from the review conducted by this study. The new algorithm is suggested as a solution to these difficulties once those problems have been solved.Incorrect allocation of resources to virtual machines (VMs) can make it difficult to deal with incoming tasks and also maintaining a balanced workload in cloud-based systems. One of the reasons for this is that only a limited number of task factors are taken into consideration. For instance, which does not work in a dynamic environment like cloud systems because the requests are not prioritised. If virtual machine (VM), or if the CPU is not fully utilised or is insufficient to handle the requests, then performance issues may arise as a result of an unbalanced load. The number of requests increases, simultaneously problems increases. It is vital to take into consideration QoS considerations and give an effective algorithm in order to increase the performance of the cloud while using IaaS in order to overcome these challenges. This can be accomplished by optimising the utilisation of the system's resources, which in turn decreases the amount of time taken by user tasks to both prepare and execute.

The vast majority of researchers didn’t consider the priority, despite the fact which is essential component in task scheduling. This can result in problems such as increase in the Makespan period, which is the amount of time it takes to schedule a task or request, as well as an upsurge in the sum of rejected tasks and latency [8-12].

While Task Scheduling is the primary aims of delivering an effective Load Balancing and boosting performance, the majority of researches concentrate only on one or two parts of the problem. As an illustration, in order to improve Load Balancing and by taking few Task Scheduling factors into consideration. Therefore, in order to increase the overall performance, by considering selected few indicators. This is a problem in poor Task Scheduling that creates an uneven burden on the hosts [10], [11]. For instance, if many tasks arrive at the same time in accordance with the protocol of the FCFS algorithm, which significantly increase Makespan since the task will have to wait for a longer period of time to execute completely. So that it is important to specify each client will send a unique request by assigning random values to the Task Length parameter in order to provide a dynamic workload.

Load balancing has been improved by the implementation of a number of novel strategies, however the difficulty of workload transfer has not been resolved yet to its fullness. Despite the fact VM is in a state of SLA violation, which means it does not adhere to the stipulated Deadline and requirements outlined in the agreement document [10], but tasks are continued to be assigned to it. As a result, the

assignment of random values. This is due to the fact each client receives a unique SLA agreement depending on the demands they have from CSPs.

1.2. Contribution of the Study

The significance of this paper's contribution is discussed here. The primary objective of this study is to improve use of cloud resource by developing more Task Scheduling methods. The following is a brief contribution to the research:

LB workloads is provided by a suggested Load Balancing algorithm, which also solves the problem of virtual machine (VM) violations in the cloud. Even though this problem has been studied before, most solutions ignore critical QoS criteria like Deadline and Completion Time. The suggested approach also accounts for a key issue that has not been completely addressed up to date and the movement of load to balancing VMs.

The algorithm improves Resource consumption when the two primary Load are decreased.

In prospect researchers would find this work useful in the field of CC in their efforts to optimise the performance of cloud-based applications through Load Balancing

Allocation of tasks are carried out by AVAO algorithm, which results in reducing two main parameters such as Makespan and Execution time in the cloud applications.

2. Related Works

Khaleel, M.I., [13] devised a dual-phase metaheuristic method called Clustering Sparrow Search Method-Differential Evolution. (CSSA-DE). To get started, we employ a clustering approach to group computing nodes into productive node aggregations. Training is performed on each node at different levels of utilisation, and the one that achieves the highest Performance-to-Power Ratio (PPR) is selected to serve as the mega cluster's master node (MCH). We then fused the DE algorithm with the SSA to further improve the already

impressive search efficiency we had while trying to find the best possible pairing of tasks for a given VM. In addition, the number of resource fragments can be reduced thanks to the integration phase's capacity to make use of the number of VMs that are either overloaded or underloaded. CSSA-performance DE's is not only very close to, but often significantly better than, that of state-of-the-art procedures.

Mangalampalli et al. [14] have suggested a useful approach for scheduling tasks. This algorithm considers both the relative importance of jobs and virtual machines when allocating work. This scheduler is modelled after the firefly algorithm. The burden associated with this method was assessed using both synthetic datasets with different in the context of the Cloudsim simulation environment. We next compared our proposed approach to the ACO, PSO, and GA techniques that served as benchmarks. The simulation findings validated our hypothesis that our proposed solution will have a significant impact over. To do this, we were able to decrease the amount of iterations needed to solve the problem.

Data from Prabhakara et al [15] study's that needs to be analysed to fix the load balancing mechanism in cloud settings To achieve this optimal utilisation of similarly distributed virtual computers, this study develops a strategy-oriented mixed support and load balancing structure. The proposed approach combines heuristic and metaheuristic techniques to get the best makespan and pricing efficiency achievable. To improve job management and cut down on costs and time, the HPOFT-MACO framework combined two methods known as Heuristics Predict Origin

A new hybrid approach, combining the Arithmetic Optimization Algorithm (AOA) with the Swarm Intelligence Search Algorithm (SISA), was proposed by Mohamed and co-workers [16]. (SSA). To kick things off, we present a novel hybrid metaheuristic approach to the issue of selecting and deploying data replicas in fog computing. Both the Arithmetic Optimization Algorithm (AOA) and the Salp Swarm Algorithm (SSA) are utilised in this answer (SSA). As a second step, we use the Floyd technique to plot the cheapest routes for sending data across multiple sites and minimising travel time. The AOASSA method was developed to eliminate the issue of data duplication, and its efficacy is evaluated using a number of datasets of varied sizes. Multiple experiments were performed to prove the efficacy of the AOASSA

method. These results prove the efficacy of the AOASSA approach. The experimental findings show that AOASSA outperforms its competitors on key performance indicators like lowest cost, longest range, and best throughput. Kruekaew et al. [17] proposed a multi-objective work scheduling optimization for cloud computing that is based on the artificial bee colony algorithm method. We call this approach the MOABCQ methodology. The suggested method seeks to balance the load across different virtual machines in terms of makespan, cost, and resource use in order to maximise throughput for all virtual machines. Concurrent concerns place limitations on these goals. CloudSim was used to analyse the suggested method's performance in relation to that of many pre-existing load balancing and scheduling techniques. Some examples of these algorithms are the Max-Min, FCFS, HABC LJF, Q-learning, datasets were used for the study. Experimental results showed that MOABCQ-based algorithms outperformed their counterparts in terms of makespan reduction, cost reduction, degree of imbalance reduction, throughput improvement, and average resource utilisation. The primar aims of the tests were to accomplish these things.

Malathi et al. [18] investigate the advantages of heuristic approaches in order to develop the cloud computing load balancer algorithm. We make two major improvements to previous methods of load balancing in our work. The hybrid method has proven to be the most applicable, and the results have shown exceptional performance in terms of the fastest turnaround time and the most efficient use of virtual machine resources. The lion optimizer was created as a first step toward better load balancing on virtual machines by identifying optimal parameter settings. Two selection probabilities are developed to better the selection process: the scheduling likelihood of tasks and the virtual machine selection probability. The lion optimizer uses fitness criteria that are specific to both the task at hand and the underlying virtual machine. Our second contribution is a genetic algorithm we created by tailoring the global search criteria to the lion optimizer's needs. Results from trials prove that the lion-based genetic hybrid technique is effective.

3. Proposed Methodology

Using virtualization technology, a hypervisor (a software layer) is created on top of a physical hardware platform. A hypervisor is an OS that controls the requests made by VMs and the replies are driven from VMHs, by ensuring the security of VMH resources. Different types of hypervisors are described for different use cases: type-1 hypervisors run directly on the VMH hardware, whereas type-2 hypervisors use the VMH operating system. A VM is a software abstraction that runs on a virtual machine host (VMH) and makes use of its underlying virtual hardware (vCPUs, vRAM, and vHDs). While operating on a virtual machine, a user programme has no access to the underlying hardware. Instead, the hypervisor of the VMH acts as a wrapper around all resources. A VMH is a specialised server that can host and manage several virtual machines. A group of virtual machine hosts (VMH farm), which provides computing resources for a single virtual machine (VM) or a group of VMs. Hypervisors like VMware vSphere, Hyper-V are widely used.A virtual machine (VM) consists of two files: a "configuration file" that specifies the VM's virtual CPU, memory, and hard drive (vHD), and a "disc image file" that stores the user's data (vHD). When a virtual machine is active, it creates a "memory page" in the main memory of the VMH, which is temporary in nature. When a VM is formed, all aforementioned data files are written to the VMH's storage. Consequently, when you delete, copy, or relocate a virtual machine, it indicates the file deletion, copy, or relocation. One of the benefits of virtualization is a single virtual machine (VM) can migrate from one virtual machine host (VMH) to another. In order to run on several VMH platforms, virtual machines (VMs) can migrate between them. If the virtual machine is currently running when the migration begins, it must be stopped. By coping the virtual machine's settings and disc ima

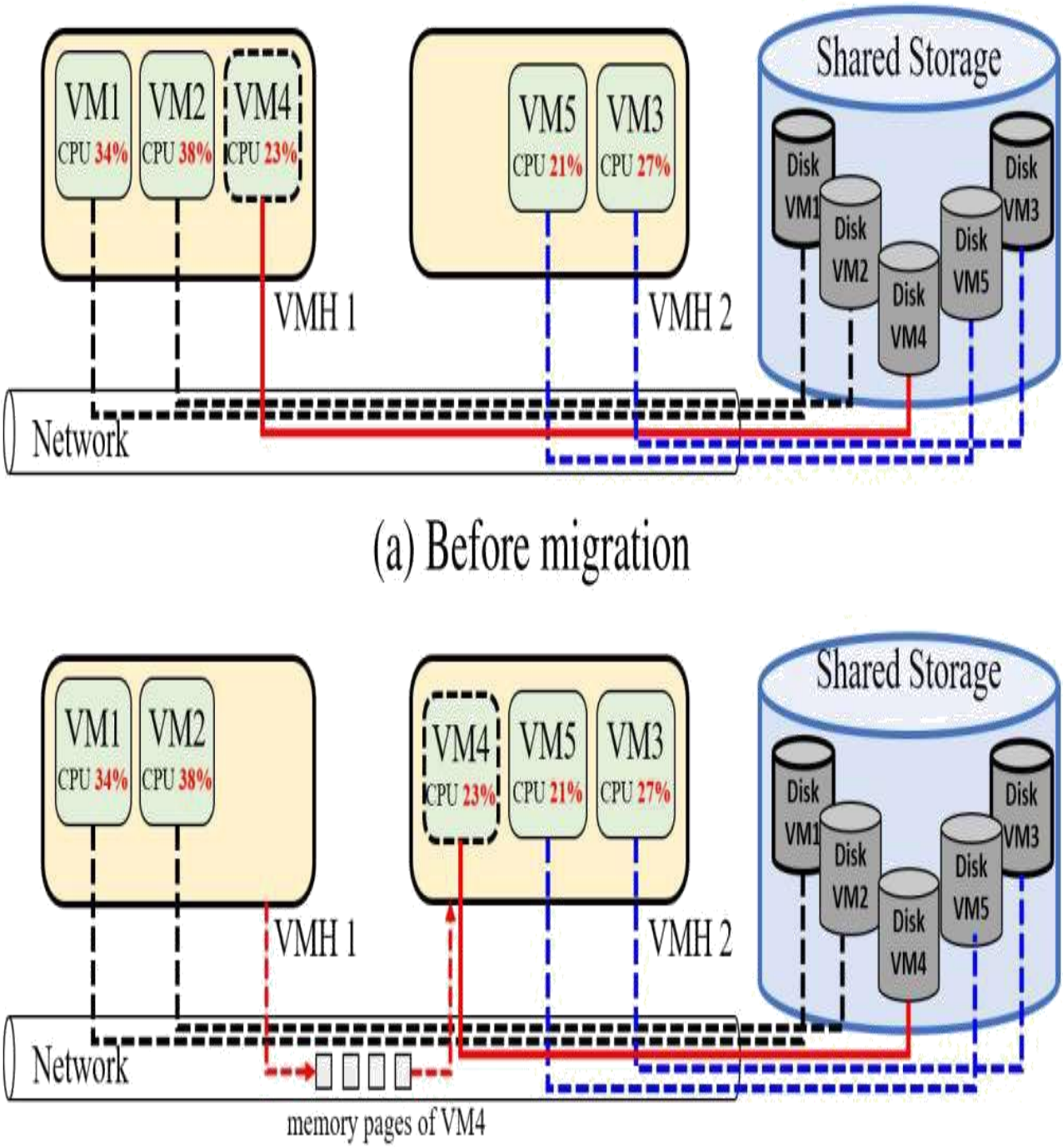

Fig 2. Live relocation with shared storage.

Depending on the size and storage type of vHD and VM can take anywhere changes a few seconds to several minutes. When a virtual machine (VM) is moved, data stored in its vRAM must be sent over the network. The larger the vRAM, the more data must be sent, which places a higher strain on the system. To minimise disruption to virtual machine (VM) users, so-called "live migration" involves a fast re-configuration of vHD and vRAM for migration during which the VMs are powered down for an exceptionally little period of time. Live migration is most frequently used with a shared storage system. Instead of physically moving vHDs, virtual machine migrations can be performed fast and easily by just changing ownerships and disc mapping files (huge sizes). As shown in Fig. 2, this live migration between two VMHs using shared storage is a realistic situation. Let's pretend the admin decides to move VM4. Memory pages are copied from VMH1 to VMH2, and the corresponding disc mapping files for VM4 are moved around in the storage. Load balancing

boosts efficiency and has less effect on running VMs with live migration.

3.1. Problem Formulation

The bulk of a virtual machine's load is determined by the use of its central processing unit (CPU), the quantity of memory that is accessible, the speed of the network, and other variables. Assume that v represents a virtual machine (VM), and the value of ( ) indicates the amount of work being done by that VM. That is shown in the equation (1), the ( ) might be seen as a function.

where (*h*) represents the load on the system and ( ),1– – , represents the load on the virtual machine (VM) v i. In most cases, the SLA will safeguard the load on each VM, and this load should be above a fair threshold in order to keep the service quality high. In addition, the load VM is bounded by quota liability. The upper and lower boundaries of ( ) are both described by Equat

Constants $_*$( ) and *( ) are often established by the superintendent of VMHs in accordance with the terms of the SLA and the necessities of the contract. If ( ) > *( ), the load on the v i is too large, so it results the user's responsibilities are not maintained in a smooth manner. If ( ) is less than *( ), this indicates the load is low, which results in a waste of the resources provided by the VMH.

Let's states there are p virtual machine hosts (VMHs), labelled h 1,...,h p, running in a data centre. The total load carried by each VMH must fall within a tolerable range as well, and this load distribution can be expresswhere $1 \leq \leq$. Also, $_*(h)$ and $^*(h)$ are parameters of control that were established by the administrator. If (h) is more than $^*(h)$, which will not acquire adequate resources until that are operating on h , that will result in a decrease in performance and also decrease in service quality... If (h) $\leq _*(h)$,The computer resources are unused still and being thrown away and in order to maintain the coherence of equation (4) across all VMHs. As a result of the overloading of certain VMHs the event that equation (5) becomes damaged, it is possible that some VMs associated with these VMHs is necessary to be powered down or relocated to other VMHs to achieve LB. After the transfer of VMs, it is anticipated that the load on each and every VMH would be balanced. Suppose h is a VMH that is on the verge of being overloaded, and where h is a VMH that is operating within its safe load, (h) > $^*(h)$, while (h) $\ll ^*(h)$. If migration of q virtual machines, , … , , from h to h is undertaken, the load on and h will alter in the following manner:

Therefore, LB by the migration of virtual machines (VMs) can be viewed as a combinatorial problem. In this scenario, the optimal set of VMs is chosen from the VMHs and then migrated to the appropriate hosts, and equations (4) and (5) are always observed either before or after the VM migration. The following concerns are looked at in detail in this investigation.

After the transfer of VMs, it is anticipated that the load of VMHs would continue to be balanced. In order to avert the target hosts from getting overloaded after the migration, it is required to make a prediction regarding the load of the VMHs. In order to derive the descriptive formulation of ( ) in Equation (2), is the one of the techniques to gather a significant quantity of data and then identify a model that corresponds with the data. Black-box and white-

box are both categories of educational approaches that might be taken. The explainability and was developed which is the primary factor of differentiates the two of them. In system administration point of view, an explainable virtual machine load model can be linked

readability of the regression model and altered with the management system in a more straightforward manner.

A job-assignment optimization problem, which is typically a time-consuming combinatorial explosion problem, it must be solved in order to choose the optimal collection of virtual machines and destination hosts for migration. For load balancing and smooth migration, it is required the selection method that is both efficient and effective. The process of doing research is outlined in Figure 3 below .

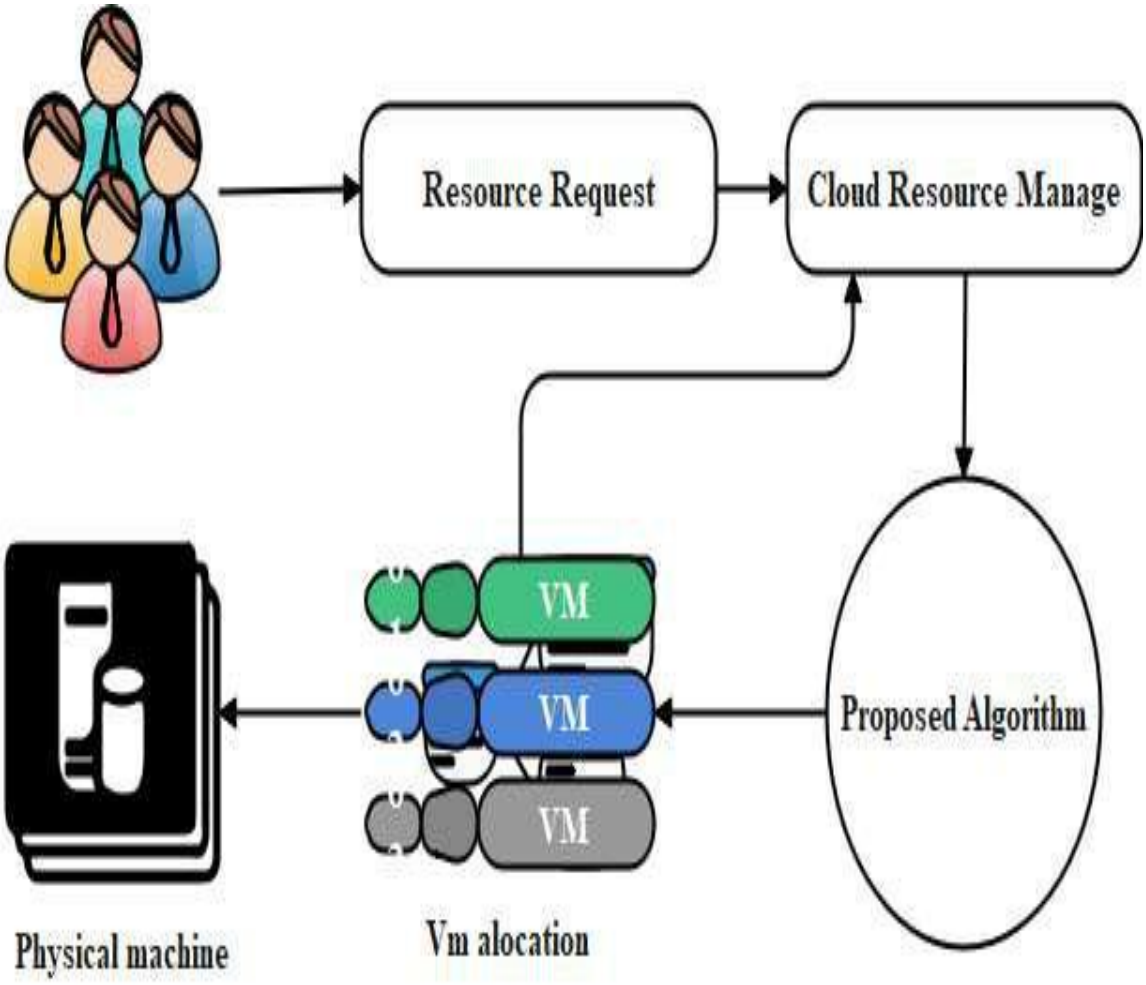

Fig 3: The proposed load-balancing system.

3.2. Proposed AVAO algorithm

This work introduces a novel AVAO method used to optimize the load balancing in VMs. The newly developed AVAO algorithm was developed by changing the AVOA's [19] methods in light of the AO's increased exploration capacity [20]. The population-based AVOA algorithm draws its inspiration from the foraging, navigation, and way of life of African vultures. Selection of the best vulture, estimation of starvation rate, exploration, and exploitation are the four steps of AVOA implementation which include best and second-best solutions to any difficult situations sought after by AVOA. The algorithm has a relatively simple computational structure and highly adaptable. In addition, between resonance and unpredictability strikes a balance are programme successfully. On the other hand, including expanded exploration, narrowed exploration, expanded exploitation, and narrowed exploitation, taking into account the predatory behaviour of Aquila are the four steps applied in AO method. Real-time applications and has a quick convergence rate can be handled by the AO method successfully. Thus, excellent efficiency and quick convergence by merging both the algorithms are achieved by the AVAO algorithm. Following are the steps in the proposed AVAO algorithm.

i) Initialization

Let us assume there are number of vultures. The first step is to initialize the population of vultures in the problem space and can be represented by,

$$= \{ \quad , \qquad\qquad ,\ldots, \quad ,\ldots, \qquad \} \quad (8)$$

where, represents the ith vulture in the population.

ii) Determine the best vulture

Once the population is initialized, the best vulture is determined by considering the fitness of all the vultures. The value of fitness is calculated by using mean square error given by the following equation.

Here, represents the target output, * defines the output of the DMN and n designates the overall sample count.

After the fitness is computed, the best vulture of the first group is selected from the group with the best solution and the one with the second-best value of fitness is considered the second group's best vulture. The best vultures are determined by various iterations.

Here, and are factors have to be calculated ahead of the search operation and has a value in the range [0,1] and the factors to be computed before the search mechanism with the measures between 0 and 1. The term represents the probability of selecting the best vulture and is calculated using the roulette wheel.

iii) Determination of starvation rate of vultures

Usually in search of food the vultures fly to long distances when they are full and this produce high energy. But in case if they are hungry, they feel shortage of energy of exploring long distances and they become aggressive and seek the food near the powerful vulture. Thus, the rate at which the vulture is starving determines the exploration and exploitation phases and it can be mathematically modelled by using the following equations. The satiated vulture is given by,

=		(2 ×	+1)× ×	1 −	+ (11)
= ×		×	+	×	− 1 (12)

where, and denote the present iteration count and the overall count of iterations. , and are arbitrary numbers in the range [0,1], [−1,1] and [−2,2] respectively. Further, is a parameter, whose value is fixed before the searching process, and the probability of exploration enhances with the value of . The vultures hunt for food in varied spaces and the algorithm is in exploration phase, if the value of | | > 1, otherwise the exploitation phase is supported.

iv)Exploration phase

Vultures have good quality of eyesight and retain high capability in identifying weak animals, while hunting for food. But, searching food is highly challenging and the vultures have to perform careful scrutiny of their surroundings for a long period over vast distances. Random areas are examined by the usage of two approaches. An arbitrary parameter , which has a value in the range [0,1] is utilized to select the approaches. Based on the subsequent equations the strategies are selected.

(+ 1) = ( ) − ( ) × if ≥ (13)

(+ 1) = ( ) − + × (−) × +if < (14)

( ) = | × ( ) − ( )| (15)

Here, (+ 1) denotes the vulture position vector, represents the coefficient vector. , and are random variable in the range [0,1]. The terms and denotes the lower as well as the upper limits of the variable.

Relieving equation (13) in equation (15),

(+ 1) = ( ) − | × ( ) − ( )| × (16)

Here, ( ) > ( ) and hence the above equation can be rewritten as,

(+ 1) = ( ) + (× ( ) − ( )) × (17)

(+ 1) = ( )[1 + ×] − ( ) × (18)

In the AO algorithm, Aquila identifies the position of the prey by exploring climbing up and then determining the search area. The expanded exploration ability of the Aquila can be given by,

(+ 1) =( ) × 1 −+ (( ) − ( ) ∗) (19)

Where,

( ) = ∑ ( ) (20)

Assume, = 1

(+1)= ( ) × 1 − − + ( ) (21)

Consider, (+ 1) = (+ 1) (22)

( ) = ( ) (23)

( ) = ( ) (24)

(+ 1) = ( ) × 1 − − + ( ) (25)

( ) = (+ 1) − ( ) × 1 − − (26)

Substituting equation (26) in equation (18),

(+ 1) = ( )[1 + ×] − (+ 1) × + ( ) × 1 − −× (27)

(+ 1) + (+ 1) × = ( ) 1 + × + 1 − − × (28)

(+ 1)[1 +] = ( ) 1 + + 1 − − × (29)

(+ 1) = ( ) [] × (30)

Here, denotes the number of samples and is a arbitrary number.

v) Exploitation: phase 1

Depending on the value of where exploitation is performed in two phases. If the value of |SR| lies between 0.5 and 1, then phase 1 is executed. Rotating flight and siege-fight are the of two techniques comprises by first phase. A parameter is utilised in selecting the strategies, which has to be computed ahead of searching. The parameter is compared to a random variable to select the strategies. If < , then rotating flight approach is implemented, else siege fight approach is performed.

a) Contest for food

The vultures are full and have high energy, if | | ≥ 0.5. Brutal disputes might occur When vultures accumulate on a single food source. The highly powerful vultures wouldn’t share the food with the weak vultures, whereas the weak vultures attempt to

exhaust the strong vultures by assembling around them and snatching the food leading to conflicts.

(+ 1) = ( ) × (+) − ( ) (31)
( ) = ( ) − ( ) (32)

Here, is an arbitrary number in the range [0,1].

b) Rotating flight of Vultures

A rotational flight is made by the vultures for modelling the spiral movement, and a spiral motion is formed among the best two vultures and the other vultures and this can be modelled as,

(+ 1) = ( ) − (+) (33)

= ( ) ×

= ( ) ×

where, and are arbitrary numbers in the range [0,1

× (( )) (34)

× (( )) (35)

vi) Exploitation: phase 2

In the second phase, by using the siege and aggressive strife strategy the food source is determined, where the other vultures aggregate over the food source following the motion of the best vultures. This phase is executed when | | < 0.5. A parameter is utilized in selecting the strategies, which has to be computed ahead of searching. The parameter is compared to a random variable to select the strategies. If < , then the cultures are accumulated over the food source, otherwise aggressive siege-flight strategy is performed.

(a) Accumulation of vultures over food source

Here, all vulture's close examines the motion of the source of food is carried out. When the vultures are hungry, they compete with each other over the food source. This can be represented as,

= ( ) = ( ) −

× (36)

× (37)

Here, ( ) and ( ) denote the best vultures The position of the vulture in the next iteration is given by.

(+ 1) = (38)

(b) Aggressive conflicting for food

The chief vulture becomes too weak to compete with other vultures when it is starved, when | | < 0.5, which turn aggressive and move in multiple directions and leading to the group head in their search for food. This is modelled as,

(+ 1) = ( ) − | ( )| × × ( ) (39) Here, ( ) specifies the distance between a vulture and anyone of the best vultures. vii) Feasibility evaluation

By finding the value of fitness the optimal solution is calculated. If the current solution found has the least fitness, then the existing solution is substituted by the current one.

viii) Termination

The above steps are kept reiterated till a best solution is achieved.

4. Result Analysis

4.1. Simulation Setup

Currently, the CloudSim imitation tool is the most often utilised by academics and developers for

studying cloud-related topics. It has the potential to reduce or even finish with the requirement and associated costs, computational facilities for performance assessment and modelling the research solution. Downloading and integrating this simulation tool's external framework is possible with popular IDEs like Eclipse, NetBeans, Maven, and others. NetBeans IDE 8.2 with Windows 10 run the CloudSim toolkit to mimic the Cloud Computing environment.

To measure the quality of suggested method in a real-world cloud setting, here it is virtualized a number of entities and computing resources to simulate a scheduling and load-balancing situation. Two data centres, six virtual machines, and forty jobs, or cloudlets, were used in the studies, all running on a simulation platform. The number of instructions in the task is created at random up to a maximum of 1,000,000,000,000. (MI). The amount of work that can be assigned to a VM is based on its processing power, memory capacity, and network throughput. Table 1 below summarises the CloudSim configuration settings.

TABLE 1. Hardware necessities.

Component	Specification
Operating Structure	Windows 64-bit OS
Processor	Intel CoreTM CPU @ 1.19 GHz
RAM	16.0 GB

4.2. Performance Metrics

In the context of the cloud, based on the interaction of three parameters the effectiveness of the suggested LB algorithm was evaluated. The following performance matrix is utilised in the process of measuring and analysing the presentation.

1) Makespan (MT): It refers to the amount of time that must elapse before a cloudlet can be planned. To evaluate the effectiveness of scheduling algorithms with regard to the passage of time is the primary purpose of this makespan. It has to be chopped down in order to make room for the efficient execution of other activities and to free up resources for other jobs. In the following equations, CT stands for cloudlet completion time, and n represents the total sum of VM in use. This is how it is measured.

= ( ) (40)

= ∑ ( ) (41)

2) Execution Time (ExT): It is the precise amount of time needed to complete the tasks (cloudlets) have been assigned to a virtual machine. It is recommended that this statistic

be lowered in order to progress the algorithm's overall performance. In the following equations, is measured using AcT, which which stands for the total sum of cloudlets.

= (42)

= ∑ (43)

3) Resource Utilization (RU): This is another measurable statistic, and it is dependent on the metrics discussed above. It is measured to enhance the effectiveness of utilising the resources in a situation where hosted in the cloud. The following equations are used to compute it, where "ExT" stands for "total execution time" and "MT" stands for "total Makespan." The degree to which the suggested algorithm makes effective use of the computer's central processing unit can be evaluated that is based on the average resource usage. This measure has a range of 0 to 1, with a maximum value of 1 representing the best-case scenario, which shows all available resources are utilised, and a minimum value of 0 on behalf of the worst case scenario, which indicates that all available resources are in perfect condition.

= (44)

= × 100 (45)

The objective of performing this experiment is to provide evidence of a dynamic cloud environment

can result in a shorter Makespan and execution time while simultaneously improving the amount of resource consumption. During the process of validating the algorithm, some thought has given to the possibility of preemptively scheduling jobs. This indicates that the task may be stopped in the middle of its execution until workload exceeds the SLA, and it can be transferred to another resource in order to finish its execution. During the process of scheduling, a number of quality of service performance criteria of cloudlets, including as:

Arrival Time: identifies the time at which cloudlets arrive or the moment at which the algorithm gets the user request. Within the CloudSim environment, this point in time is referred to as the cloudlet start time. When using CloudSim, the default setting ensures that all cloudlets reach the broker at the same exact moment. This is known as a random Arrival Time parameter, and it has been changed in order to make adjustments in this experiment so that modifications can be made to postpone the submission of cloudlets. The logic that is implemented in this function will cause the broker to allocate the cloudlets to the VMs in a manner that is completely arbitrary. By making use of this parameter, it is able to construct an algorithm that is capable of operating in a dynamic situation in which the arrival time for each request may be varied...

Task Length: determines the size of tasks in bytes; tasks with a lower size have a greater impact on resource consumption. In CloudSim, every Cloudlet must have a length value which identifies the cloudlet type. This number might indicate whether the cloudlet is a heavy request, a light request, or a medium request. During this experiment, the length of each Cloudlet was measured and given a value determined by chance. It is important for all cloudlets to have random values so that client
each Virtual Machine, the length parameter is a crucial input in the experiment. On the basis of this parameter, it is possible to identify the Time taken to Complete requests present in each VM. On the basis of this, It's able to establish whether or not there is a breach of the SLA...

Deadline: CSPs one of the important tasks by SLA is to establish maximum time taken to complete the task. In the context of this experiment, each Cloudlet has a unique deadline value; thus, each customer will receive a unique SLA contract that is tailored to their specific requirements and the level of service they anticipate by receiving from cloud providers. As a result, it is recommended to utilize the random deadline value rather than a static one. Here, it is determined whether a breach of the (SLA) or not by looking whether the Time taken to Complete the requests before the Deadline.

Table 2 provides an illustration of some of the variables that comprise the workload and are determined by the two factors discussed above (Task Length and Deadline).

TABLE 2. CloudSim simulator requirements.

Type	Parameter	Value
Cloudlet (Task)	Length of task (in bytes)	Random<upper threshold (1000000)
	Total number of task	1-40
Virtual machine (VM)	Count of Virtual Machines	2-6
	(VMs)	9980-15000-MIPS
	CPU frequency and amount of	512-Mb
	RAM in a single VM	1000-Mb
	Cloudlet Scheduler	Time Shared
	The minimum sum of processor elements (PEs) that must be provided	1
	VMM	Xen
Data Center	Sum of Data Centres	2

Here, the effectiveness of the suggested method is measured across three distinct scenarios: There are three options here: (1) two VMs housing 10–40 cloudlets, (2) four VMs housing 10–40 cloudlets, and (3) six VMs housing 10–40 cloudlets. These simulation-based variables can be increased to

better simulate scheduling and workload migration between virtual machines.

As various values are evaluated for work criteria like Deadline, arrival time, and task length, the typical Makespan, Execution time, and resource consumption were recorded. All virtual machines (VMs) in the cloud used for the experiment are identical in terms of their processing power and storage space for each scenario. The allocation of resources is then

modified based on the violation of a VM. Tables 3 to 5 detail the changes in the proposed model's metrics as a result of varying virtual machine types.

TABLE 3. Results were gotten for 2 VMs with 10 To 40 tasks.

Number of cloudlets	Average Execution Time (ms)	Resource Utilization (%)	Average Makespan (ms)
10	195.93672 04	75	261.44009 38
15	289.10250 95	74	388.82919 83
20	366.77082 64	72	512.09732 45
25	418.78468 01	68	616.20598 95
30	527.36662 82	70	753.46398 50
35	618.46387 92	71	870.42580 42
40	607.12133 88	68	892.74444 28

TABLE 4. Consequences were gotten for 4 VMs with 10 To 40 tasks.

Number of cloudlets	Average Execution Time (ms)	Resource Utilization (%)	Average Makespan (ms)
10	205.583434	76	270.8765645
15	289.853678	74	390.8272922
20	368.874635	72	514.3474892
25	427.046281	69	618.8271912
30	534.267521	71	753.5425567
35	630.6788556	72	870.2578313
40	614.9916124	69	894.7453515

TABLE 5. Consequences were gotten for 6 VMs with 10 To 40 tasks.

Number of cloudlets	Average Execution Time (ms)	Resource Utilization (%)	Average Makespan (ms)
10	251.8378228	83	303.5410115
15	361.2242912	84	430.8096146
20	407.6729213	79	512.9966944
25	423.6572891	73	577.6690028
30	559.9376242	74	754.0924138
35	650.2356788	75	869.5038272
40	638.7329182	71	896.2638292

In the course of this investigation, Makespan Time has served as the primary comparative variable of interest. The primary purpose of the Load Balancing algorithm has been presented to improve the use and allocation of cloud resources while simultaneously reducing the amount of time needed to plan a job in order to boost the overall performance of

cloud-based applications. This technique was designed in order to optimise the Makespan and allot cloudlets to Virtual Machines in the most possible effective manner. It makes effective by the use of the resources that are available in the cloud environment. This algorithm was chosen to serve as a point of comparison, that is related closely to the main aim of this research and the framework for its execution. This method included in QoS parameters and priority as part

of the future work that was planned for the Dynamic LB algorithm. The purpose of our algorithm was to highlight how the results might be modified by depending on whether these factors were employed or not. Both of these methods make use of factors like the cloudlet length and the completion time. The LB method has been developed are taken into account various arrival times and deadlines in order to follow up with the SLA document in a manner which is in line with QoS criteria. This result gives improved service for cloud applications. Makespan is used to make comparisons between the outcomes, as illustrated in figure 4, where the y-axis shows the value of Makespan. By conclusion, the results have been achieved for a total of forty different assignments.

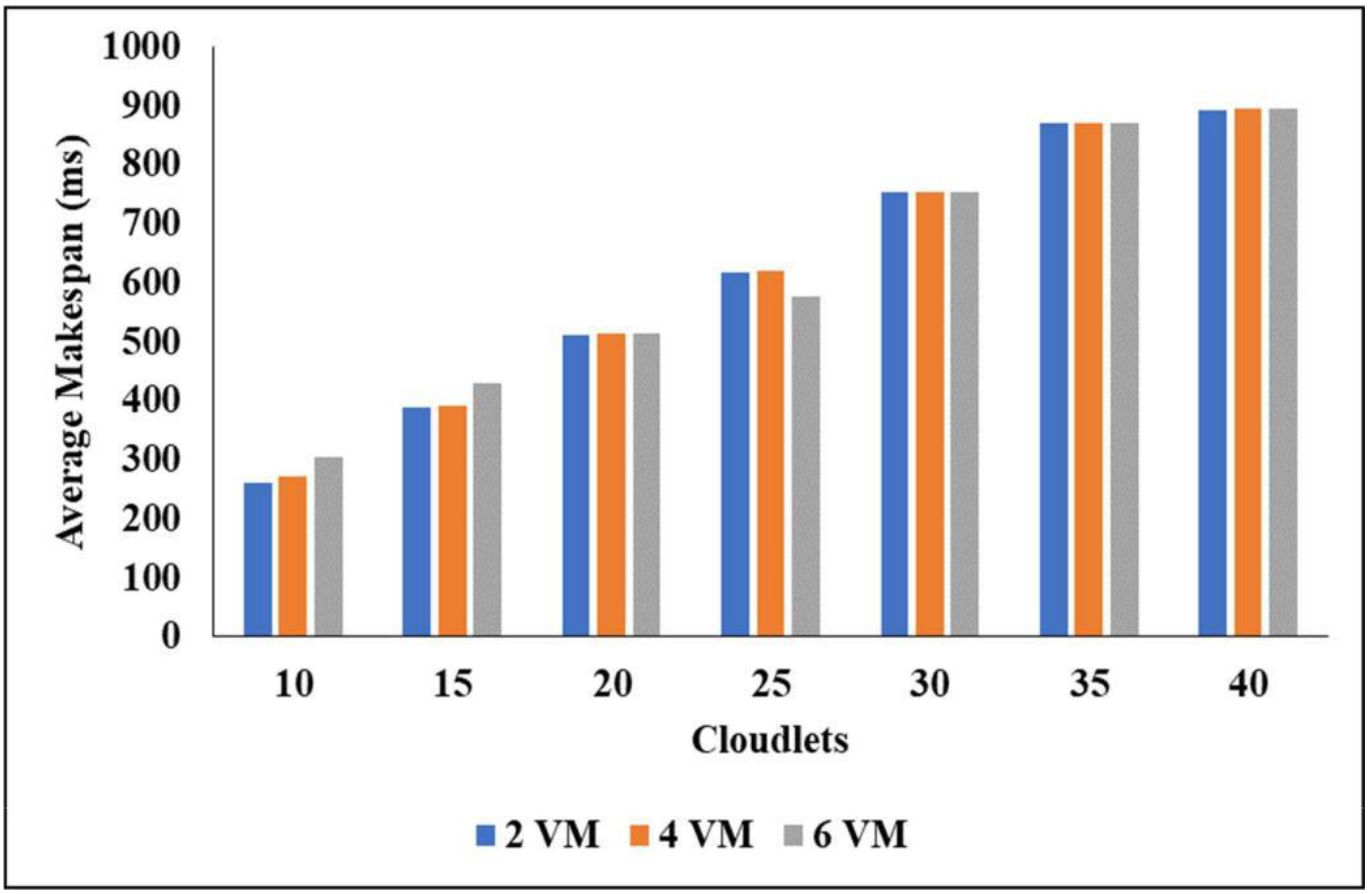

Fig 4: Graphical Representation of proposed model in Makespa

The experiment took into consideration of very broad spectrum of task lengths, which is shown in the graph as a rise in Makespan for the proposed method as the number of tasks grows from 25 to 40. The LB method presented can handle requests for bigger jobs up to 1,000,000 MI in length. Because Makespan is dependent on the load that is placed on the VMs, increasing the task length will also result in an increase in Makespan. Makespan will be indicates the total number of cloudlets (tasks).

reduced for cases involving 25-40 jobs since suggested approach is modified to handle a lesser size.

In addition, comparisons are made between the results based on resource usage, as shown in figure 5, where the y-axis represents the Resource utilisation expressed as a % value and the x-axis

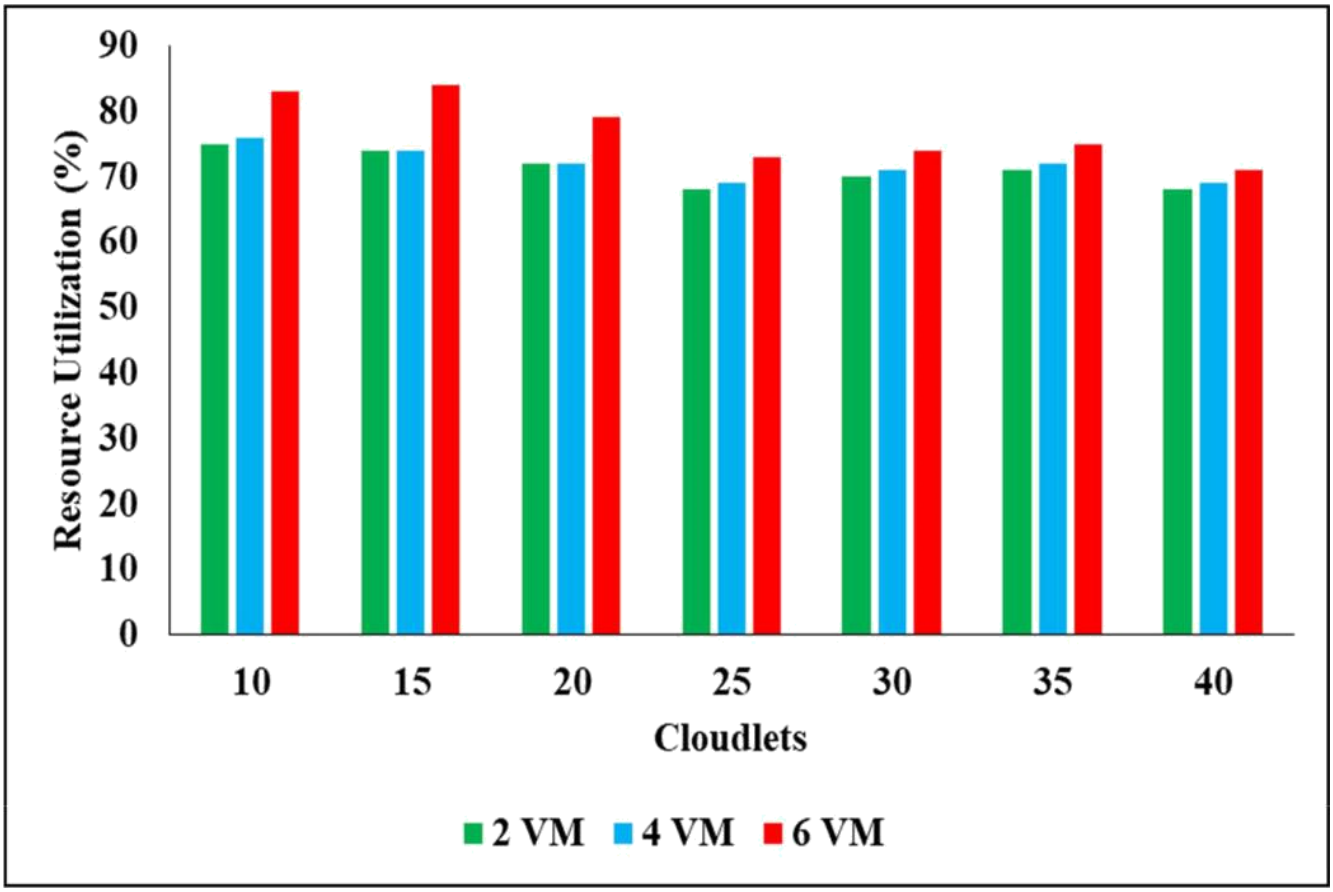

Fig 5: Graphical Representation of proposed model in Resource utilization

The new method achieves a slightly higher level of resource utilisation in 6 virtual machines, by reaching 78% of their total capacity. In the final analysis of the data, it was demonstrated that by considering QoS criteria like the Deadline can be considerably enhance the consumption of resources, hence shortening the Makespan and offering an effective allocation strategy in VMs. In addition, the Workload Balancing Algorithm for Data Centers to Optimize Cloud Computing Applications which are developed might be the assistance to a variety of applications, such as location-, and so on.

5. Summary

This part serves as the paper's conclusion and summarises the findings as well as the outcomes achieved from the suggested LB algorithm. A technique for load balancing that is based on evolutionary computing is presented in this study. When building symbolic regression models of VMs using AVAO, loads on VMs as well as the resource metrics associated with those VMs are monitored and utilised as inputs. The ideal combination of virtual machine and virtual machine host (VM-VMH) assignment is determined by AVAO, which also anticipates VMH loads based on AVAO models and advises the VMs to be transferred for load-balancing purposes. Hence this research gives knowledge about, task scheduling plays a significant role in ensuring that a cloud environment's workload is distributed evenly. The process of load balancing can be improved by utilising task scheduling, which can lead to more effective use of cloud resources. A more efficient algorithm for load balancing was the focus of this particular piece of research. The findings demonstrated that suggested approach shortens the Makespan and maximises the consumption of resources by 78%. It also demonstrates that the suggested algorithm is capable of functioning in a dynamic cloud environment, which is characterised by a large number of variations in the duration of user requests and the arrival of requests from users in an arbitrary sequence. In comparison to the current method, the algorithm is also able to manage requests of a significant scale. By redistributing resources, the programme corrects SLA violations of VMs and the tasks are carried out effectively.

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Acne detection using convolutional neural networks and image processing techniques.

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Abstract - **This paper describes a proposed model for identifying and assessing acne and other facial skin problems using a large number of selfies. The model uses convolutional neural networks and various image processing techniques to extract and analyse specific features of the skin. The model has been evaluated on a sample of 230 test images and has been found to perform better than human assessment in over 50% of cases, with an accuracy of 97% and a F1 score of 98%.**

Keywords— ***skin disorders, acne and pimples, dermal issues, haar cascade , convolutional neural network, object detection***

I. INTRODUCTION

Medical vulgaris which is also known as acne is a type of skin disorder which occurs when the pores of skin get blocked and get filled with dead skin cells and oil. It is most commonly seen in the teen agers and also seen in some aged people also Acne get produced when An oily substance which is also known as sebum that lubricated human skin and hairs and dead skin cells plug hair follicles. Increase of bacteria can multiply the number of pimples and acne on the face and it might also increase the inflammation and infections. Acne results in the inflammation and producing larger and dark red pimples. Medically and technically the check up and the assessment of acne is done by the respective dermatologist and it requires a clinical environment. The given prescriptions of doctor are then followed by the patient over a long period of time to heal the spots and it requires a good capital. The medical field is growing tremendously as this problem is very common in most of the people. From the acne patients who need a day to day treatment or a long-time treatment has to follow the dermatologist and have to visit the clinics frequently just for their basic check-up and doctor's further prescription. According to a survey the average time worldwide for a patient to wait for getting an appointment with dermatologist is 32 days [1]. This leads to big frustration to the acne patients as it affects their day to day life cycle, their food intake, their schedule etc.... To fill this gap model
is been created which will detect the acne by their images. The basic aim of this model is to 1) detect the acne through Images and then also tell, amount of acne through the world-wide data. 2) Accurately assess the acne of face and other dermal issues. 3) Give the predicted and possible image if plastic surgery or medical treatment is to be done in future. 4) To give a possible range of amount required for the treatment. 5) To classify between the acne and non-acne images. 6) To suggest the required medical treatments according to the type of dermal issue.

II. LITERATURE REVIEW

Acne is a common skin condition that occurs when dry hair follicles become blocked under the skin. Acne is an inflammatory blockage of the skin that has sebaceous glands (oil painting) connected to hair follicles containing fine hairs. is. In healthy skin, sebaceous glands produce sebum, which separates hair follicles to reach the surface of the skin[1].

A dermatologist may recommend treatment that mixes one or more of the following: oral antibiotics, topical antibiotics, topical retinoids, peroxide etc: being hooked in to whether the medical substance sometimes used for amusement is general or trade-mark name, amount, and the way many small vessels you get, the worth for antibiotics ranges between $10 and $73. prices are supported means discovered on place in the net and will different by stores for medical substances placing. A time of 5-7 days of antibiotics 1 is suggested in men or women. this is often supported by an ordered paper making clear no important point or amount different in outcomes between 3-7 days of antibiotics made a comparison of to 7 days or longer. benzoyl peroxide: it works as a keeping clean to urge changed to other form the number of germs on the top of your skin. it's usually one of the first ways of doing recommended for warm to middle diseased red marks on face. It comes as a soft paste or face wash having in it 5% benzoyl 3 peroxide 4. Benzac Ac 2.5% Gel 20 gm, 20 at Rs.83 in India topical antibiotics: Triple Antibiotic (bacitracin/neomycin/polymyxin b topical 2) may be a part of a group of the topical antibiotics give substance having effect upon the senses part and is commonly used for bacterial Skin infection[2].opical retinoids: retinoids act to figure back to normal desquamation by making price lower keratinocyte increasing greatly and giving a higher position to making clear as being different . of current interest retinoids also solid mass several important inflammatory footways that are activated in diseased red marks on face. The mean do trade with general public price of tretinoin is $105.60 for 1, 20gm of 0.025% thick a part of milk. you'll may be able to use tretinoin tickets from SingleCare to but for on the money price of tretinoin and money given for work $11.64 for 1, 20gm of 0.025% pipe Of thick a part of milk. Single Care free medical substance sometimes used for amusement tickets are often got back at taking part store for medical substances deep Learning has established itself as a really potent tool over the previous few decades because of its capability for handling huge amounts of information. Hidden layer technology is way a lot of standard than standard ways, significantly for pattern recognition. Convolutional Neural Networks square measure

among the foremost wide used deep neural networks. Now while thinking about a neural community matrix multiplications is been considered however that isn't always the case with ConvNet. It makes use of a unique approach known as Convolution[3].

Before visiting the running of CNN's let's cowl the fundamentals consisting of what's an picture and the way is it represented. An RGB picture is not anything however a matrix of pixel values having 3 planes while a grayscale picture is the equal however it has a unmarried plane. Take a examine this picture to recognize more. Lets take a filter/kernel(3x3 matrix) and use it on the enter photo to get the convolved function. This convolved function is exceeded directly to the subsequent layer[4].

Haar cascade is an set of rules which can stumble on items in images, regardless of their scale in picture and location. This set of rules isn't always so complicated and may run in real-time. Haar-cascade detector is trained to stumble on diverse items like cars, bikes, buildings, fruits, etc.Haar cascade makes use of the cascading window, and it attempts to compute capabilities in each window and classify whether or not it can be an object. Haar cascade works as a classifier. It classifies nice statistics points → which are a part of a model which detects item and bad statistics points → that don't comprise model item. The set of rules may be defined in 4 steps : Haar features calculation followed by integral images creation then implementing adaboost algorithm and then It's importanat to don't forget that this set of rules calls for numerous high quality photographs of facial and bad photographs of non-facial things to train classifier, much like different gadget getting to know models[5].

For a model first goal is to get the hair feature landmarks. The Haar function is actually a calculation performed on a contiguous rectangular region of selected neighbours within the detection. The mathematical operations involves adding of the intensities of pixel from each region and then deviation calculation between the sums. Here are some examples of hair features. Without going too deep into the background calculations (see docs if interested), keyshots significantly speed up the calculation of these hair features. Instead of doing math for each pixel, create sub-rectangles as proxies and create array references to each sub-rectangle. Used to calculate hair properties. Adaboost selects important features by default and trains a classifier to use them. a set of "vulnerable classifiers" is used to create a "strong classifier" that a set of guidelines can use to hit upon elements. A vulnerable newbie is created by means of passing a window over the enter picture and computing the Haar function for each subregion of the photograph. This distinction is as compared to a certain threshold that separates non-articles from articles [6].

From decided on friends in the detection window. The calculation entails summing the pixel intensities of each vicinity and calculating the deviation among the sums. right here are a few examples of hair features.. Because they are "weak classifiers", they require a large set of Haar functions to ensure accuracy in order to form reliable classifiers. A cascade classifier consists of several layers, each of which is a group of weak novices. Weak novices have been trained to use boosting, so implicitly predicting each weak novice produces a very accurate classifier. Based on this prediction, the classifier decides whether it should look for an element (positive) or go directly to the next area (poor). [7].

In this Paper Mr. Tingting Zhao, Hang Zhang And Jacob Spoelstra have dealed with Nestle Skin Health SHIELD. Their main aim was to develop a model using deep learning so that it will help to detect the acne from the selfie images. To deal with the spatial sensitivity of images they used CNN model on the training and the testing images. They had used ResNet 152 pre-trained Model. And they had outperformed a human dermatologist on test images[8].

In the paper Open Face: A general purpose face Recognition library with mobile applications. Mr. Brandon Amos and their team has done the research in the combined field of IOT and deep learning. They have introduced the OpenFace library which fill the gap between the public face recognition system and the private face recognition system. This paper is meant to be for the non-experts in the field of face and pattern recognition. And it helps to get familiar with the various deep learning techniques that that have used[9].

In this paper Mr. Joon Yul Choi and teams worked on the analysis of retinal diseases. They had used the convolutional neural networks and MatConvNet for automated detection of various retinal diseases with fundus photographs. They had built the dataset on 10 different categories, it had been included with normal retian and 9 different diseases regarding retina. Ther outcomes were based on VGG-19 Architecture They got an overall accuracy of 52% and on the multi categorical classifier they got an accuracy of 72.8%. further it can be improved with the help of better algorithms[10].

In this paper Mr. Yi Xiao, Liping Chen and team have given an idea of cost of surgery for removing acne from face. In China market a treatment called as Chemical Peel [CP] is widely accepted as it is used to remove the hyperpigmentation and scarring. The factors which were affecting the willingness to pay were identified using the general linear models and hence an approximate value had been provided with that. They got a response rate of almost 96% among the 476 patients. And as an conclusion they got a result for three time Chemical Peel treatments as 383.4 US dollars[11].

In this paper, they focused and studied to develop a system which detect acne on the face. This system generally detects various types, shapes, or amounts of acne on face. They have used MATLAB program, image processing module. Firstly the system converts RGB colour image to Gray scale image, then absolute maximum value is calculated, then another step is to normalize Gray scale image by reducing of data into it's simplest form, Brightness extraction is done after that image subtraction is done for region of Interest then unwanted features is eliminated, like spots and noise. This system calculates sensitivity, precision and accuracy generally all values are high except for accuracy which they need to be improved[12].

In this paper they gives a brief about acne vulgaris. Acne vulgaris (AV) is that condition of the pilosebaceous unit that results in noninflammatory lesions, such as open and closed comedones, inflammatory lesions, such as papules, pustules,

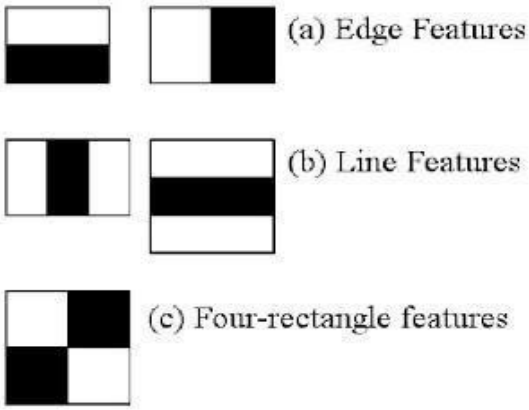
and nodules, as well as scarring of varied degrees. With a lifetime frequency of about 85%, AV is a very prevalent illness that predominantly affects adolescents. AV can linger into adulthood; among women aged 20 to 29, the prevalence of acne was 50.9%, compared to 26.3% among those aged 40 to 49. 2/3rd of all dermatology office visits for acne are from female patients, and one third of these visits are from women older than 25 years[13].

III.APPROACH

Here in this model a practical way of acne detection through images by using CNN- based transfer learning regression model is being discussed. Here the performance of this model is not less than a special trained dermatologist and then it will help to get a better prediction of the total revenue required for the treatment of such acne and also for plastic surgery if done [8]. Here proposed model is a combination method of facial landmark model and OneEye OpenCV model to extract skin regions from different regions of the face for background noise removal. Addressing the limited availability of labeled training data requires image scrolling as an innovative approach to data enhancement. The result is that the transformational regression model with corresponding data augmentation is one of the most effective methods to train a model, regardless of the size of the training set.

HAAR CASCADE

Haar cascade was used in the pre-processing of the image data to crop out faces from the images. It was observed that some of the image failed to detect the faces, hence the model was training with both the faces and background as the noise. It was recommended to use other deep learning model for face detection in the pre-processing stage to improve the quality of model. As for the dataset, there is an imbalance data on the skin tones in the dataset as there is lesser dark skin tone in the dataset [9].



The study from University of California San Francisco suggests that dark skin have a stronger skin barrier, hence this may suggest why there are lesser acne dark skin photo found. This is the limitation of the model. Alternatively, a proposed model is to increase synthetic data for dark skin in order to make up for the imbalance dataset. The model helps the company to identify acne skin consumer. This can be deployed on the website to classify the consumer skin to better recommend a more appropriate skincare product online without the salesperson. Moving forward, the shopping experience can be improved to have live predictions via video instead of images. The electronic device can be placed in stores and can be helpful to the consumers especially when the salesperson was away during the store operations.

Fig. 1. Pre-processing on image

IV.WORKFLOW

Here dataset is filled with total 2156 images, In this the 1010 images are acne while 1150 images are non-acne. The datasets are then divided into 60-20-20 for train, validation and test respectively.

Table 1. Distribution of images in Dataset

Folder	Variable type	No. of images
Train	Non-Acne	690
Train	Acne	610
Validation	Non-Acne	230
Validation	Acne	200
Test	Non-Acne	230

The general flow of the project is:

1. Data Collection and Pre - Processing.
2. Exploratory data analysis (EDA)
3. Modelling and evaluation
4. Conclusion and recommendation
5. Limitation and future development

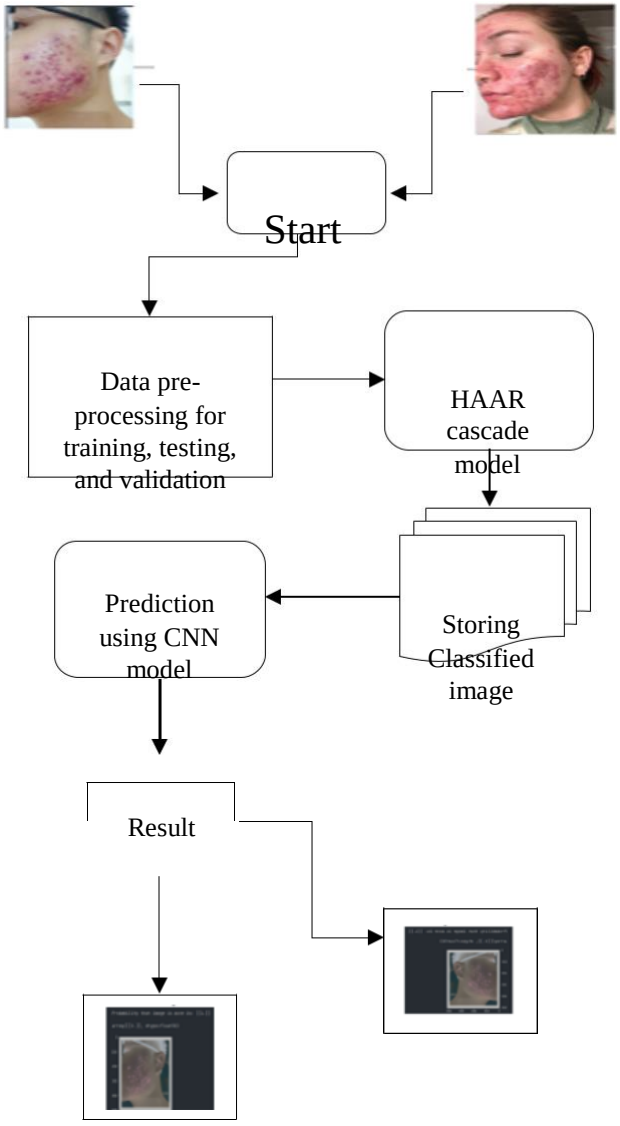


Fig. 2. Proposed flow diagram of acne detection and bill prediction.

As the flowchart shows raw images will be taken as a input which will be pre-processed and after that a series of deep learning algorithms will come into action like CNN and HAAR Cascade through which the unnecessary parts of the images will be removed and the images can directly go for training and testing and the end the final evaluation will be done.

V. Results

In a model the Haar Cascade Classifier is being used. It's an algorithm used in the field of object detection no matter what size and the object has.

Table 2. Accuracy table

	Precision	Recall	f-1 score	Support
Non-Acne	0.97	0.99	0.98	230
Acne	0.99	0.96	0.97	200
Accuracy	-	-	0.98	430
Nacro avg	0.98	0.98	0.98	430
Weighted avg	0.98	0.98	0.98	430

Less complexity of the algorithm makes it more friendly to use in real time. The algorithm can be trained to detect a variety of objects like vehicles, animals, humans, face, cars etc. Here in a model it is used for the removal of unnecessary part of the face that is basically the face cropping is done here.

Fig. 3. Input dataset Images

Fig. 4. Output Results (I)

Fig. 5. Output Results (II)

Basically here once the training and testing of the data set of 2156 images is done model first get the classification of acne and non acne images. and then model pre-process the data and then for removing the unnecessary background, it crop the images by using haar cascade algorithm.

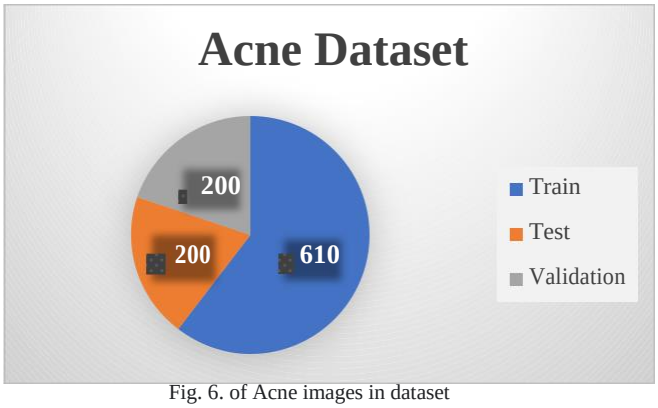


Fig. 6. of Acne images in dataset

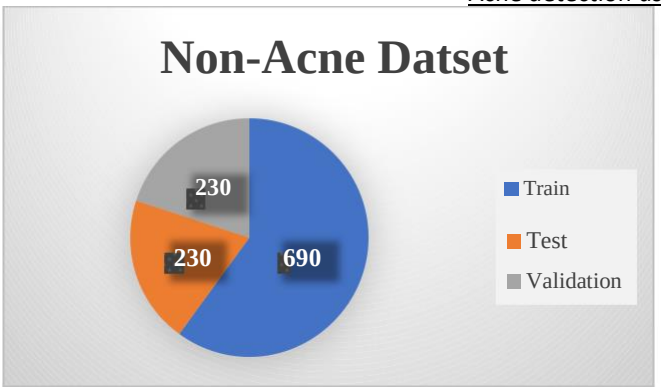


Fig. 7. of Non-Acne images in dataset

VI. Conclusion

The model has an accuracy of 97% on validation data and 98% on test data while the f1 score for validation data and test data are 98%. Compared to the previous models this is the highest precise results acquired. The model has a train score of 99% for both accuracy and f1 score. In order to prevent overfitting, dropout ratio of 50% was introduced in the CNN model.

Table 3. Accuracy per dataset

Dataset	True positive	False positive	True negative	False negative
Train	686	4	606	4
Test	225	5	195	6
Validation	228	2	192	8

In conclusion, the model has high accuracy and f1 score however, it is not able to work well with darker skin tone which can be further improve.

VII. Future Scope

For the further extension of this project we are aiming to develop a bill prediction system which will estimate the total amount to remove the acne by means of plastic surgery. This will require some changes in the previous dataset so that the model will be able to distinguish the difference between natural non acne face and after plastic surgery non acne face.

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Block chain Bidding System Using Smart Contract

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Abstract—

The main goal of this project is to develop and implement a secure online bidding system using blockchain technology. For this we will use a smart contract.The purpose of this project is to create a system that allows bidders to connect to a validator network and place an item or product of their choice up for auction. Other customers can view various items for sale, connect to the validator network, and bid on each of those items. For each item, after a specified period of time, the highest bidder wins the item and gets the item at the bid price.Therefore, the system provides an online platform with an easy-to-use user interface for users to buy and sell various commodities. All information about an item is stored on the blockchain, including bids and related information for each item. As a result, this information is securely stored and tamper-proof. Therefore, a detailed record of all bids on an item is maintained and cannot be changed once the sale is confirmed. This ensures that the highest bidder always wins and purchases for the amount specified in the bid.Additionally, information about the item is also stored on the blockchain. The person listing the item cannot mislead bidders about the item, as it must match the description provided when the item was put up for sale. This requires both sellers and bidders to meet their buying goals and ensures that both parties have access to the sale. All information about an item is stored on the blockchain, including bids and related information for each item. As a result, this information is securely stored and tamper-proof. Therefore, a detailed record of all bids on an item is maintained and cannot be changed once the sale is confirmed. This ensures that the highest bidder always wins and purchases for the amount specified in the bid. Additionally, information about the item is also stored on the blockchain. The person listing the item cannot mislead bidders about the item, as it must match the description provided when the item was put up for sale. This requires both sellers and bidders to meet their buying goals and ensures that both parties have access to the sale.

Keywords— Smart contract, blockchain

I. INTRODUCTION

Auctioneers deploy smart contracts that allow users to bid on items within a specified auction time. After the auction time ends, the highest bidder's bid is sent to the auctioneer.

The purpose of this project is to create a system that allows customers to connect to a validator network and offer selected items or products for auction. Other customers can view the various items for sale and connect to her network of validators to bid on each of those items. For each item, after a specified period of time, the highest bidder wins the item and gets the item at the bid price. Therefore, the system provides an online platform with an easy-to-use user interface for users to buy and sell various commodities.

II. PROBLEM STATEMENT

To create and implement a trustworthy bidding system using blockchain technology. Users can list items or bid on existing items, and the results of their bids can be trusted and unmanipulated by anyone. item information is stored on the blockchain along with the description. All valid bids are also stored on the blockchain, so you can always trust the results of your bids.

III. METHODOLOGY AND

TOOLS Hardware Specification

System:

Processor	2.20 GHz
RAM	2GB
Hard Disk	10GB

Software Specification

Operating System	Any OS
Remix IDE	Smart Contract
Language	Solidity
Blockchain Network	Ganache Client
Ethereum wallet	Metamask

IV. RESEARCH WORK

Problem Analysis:
There are various bidding systems available, but this system is unreliable and focuses only on centralized systems, so bidders cannot trust the system and set up a transparent decentralized set of smart contracts on the local Ethereum network. need to do it. A Smart contract code is also available to bidders.

Requirement Analysis:
In this system, the basic requirement is to have an Ethereum wallet so that transactions are automatically possible. After that, you need to connect to the decentralized blockchain network to realize the final goal of the system: a decentralized system.

Technical Research:
The technologies used to develop this system are blockchain and smart contracts, or dapps (decentralized applications).
To study blockchain and solidity programming language I used several websites like –

1. https://www.youtube.com/channel/UCY0xL8V6NzzFcwzHCgB8orQ (YouTube)
2. https://solidity.readthedocs.io/en/v0.5.12/

For understanding the system in well manner I also used different research papers which mentioned in the references.

V. USE CASE

There are two main players in the system, sellers and bidders.
Sellers can log into the system and sell items. When he does this, the item information (description, price, etc.) is written to the blockchain. This information is visible to all other users of the system. Bidders can log into the system and view information
about the various items listed. You can then bid on any item. User information is placed on the blockchain along with the
bid. User must bid higher than the previous bid. When the bidding period ends, the highest bidder wins the item and the item is considered sold. Bidding information is stored on the blockchain, so bidding results are reliable. Therefore, only the highest bidder wins.

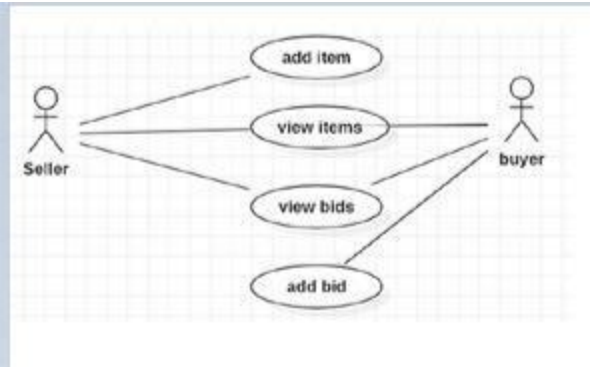

Fig1. Use Case

VI. ROLE OF CLIENT AND TYPES OF TRANSACTIONS

A user can either post an item for sale, or make a bid on existing items. Therefore, there are four defined transactions that the client can perform:

1. Post an Item for Bidding – The client will post an item along with relevant information on the blockchain
2. View items – The list of items that can be bid on

3. Place bid – Making a bid on the listed items
4. View bids – View the existing bids on the items

VII. TABLES STORED IN BLOCKCHAIN

There are two implemented tables:

1. Items table – This table consists of all available items for bidding, and all associated information
2. Bids table – This table contains the list of all bids made.

VIII. FIELDS FOR ITEM

There are five fields for each item:

1. Item ID
2. Item Name
3. Item Description
4. Post time
5. Bidding Expiry Time

IX. FIELDS FOR BID

There are five fields for each bid:

1. Bidder ID
2. Bidder Name
3. Item ID
4. Amount
5. Timestamp

X.SYSTEM ARCHITECTURE

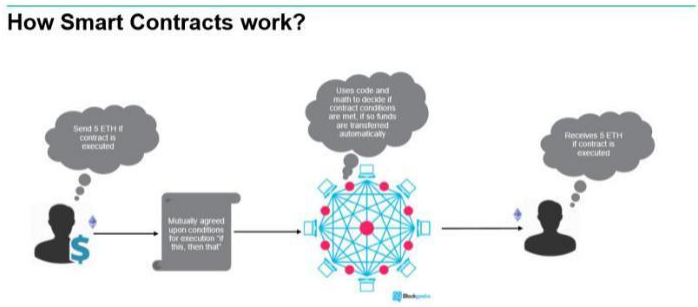

Fig2. Architecture

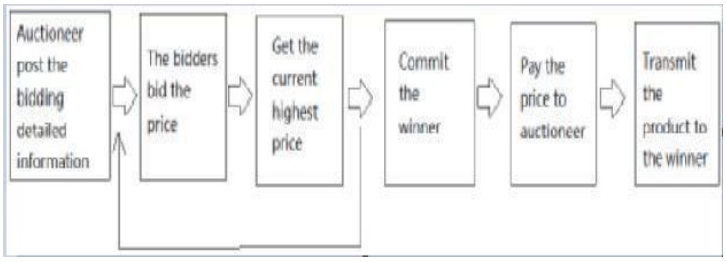

Fig3. The flowchart of E-auction

XI. CONCLUSION:

In this paper we proposed using smart contract for bidding system with the help of bloackchain. Auctioneers deploy smart contracts that allow users to bid on items within a specified auction time. After the auction time ends, the highest bidder's bid is sent to the auctioneer

ACKNOWLEDGMENT

This paper on 'Blockchain Bidding System Using Smart Contract' is a result of the motivation and co-operation by my guide Dr R.R.Sedamkar and teacher Dr. Sheetal Rathi.

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Malicious QR Code Detection and Prevention

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Abstract. Many developers were inspired to create the new mobile applications that are utilized as barcode scanners by the widespread use of smartphones with superior capabilities. In essence, QR codes are just a type of 2D barcode that makes it simple to interact with websites, printed materials, and mobile devices by eliminating the need to manually type in contact information or URLs. Most people use QR codes, and some virus writers and cybercriminals also use them. This proposed paper gives detailed information about the design and its uses, and data that may be encoded in QR codes, as well as the clear danger posed by malicious QR codes. The paper will also illustrate a few attack scenarios that make use of QR codes.

Keywords: QR, quick response, scanner, scan, transaction.

INTRODUCTION

Nowadays, everyone has a smartphone, and UPI has just changed the banking system. Every single link is in the form of QR. After 2020, Due to pandemic demand for a standard that could carry large amounts of information without humans touching physical items has been increased. And such a solution is provided by Quick Response(QR code).

Quick Response code includes black and white color modules which are structured in a square shape on a plain color background. The information which can be ciphered should be in one of the 4 standard modes.

By the way, people are committing fraud by using malicious QR codes. And one can't predict the QR code which one is malicious and which one is not by just looking at QR code.

Problem Statement

Quick response code is everywhere now a days whenever customer visit any shop or he needs menu cardin some hotels they directly share QR code with us for payment and information but every QR code [1] that is scanned , customer doesn't know whether it's safe or not doesn't know where it will take us if that website is malicious. So to tackle this problem and aware the normal users for preventing their data from malicious sites and QR.

Literature Survey

In this paper [1], authors have analyzed fishing in this technological world, especially on the internet in which QR codes were used , authors have experimented by visualizing and studying QR codes throughout fourteen million web pages over a 1 year span. The study's findings indicate that attackers frequently employ QR code technology to disseminate malware or point people toward bogus websites. Additionally,

the relatively high number of malicious QR codes discovered during trials indicates that, on a large scale, While exploring the internet, consumers are infrequently exposed to the threats carried by QR codes, and the frequency of these assaults isn't very significant.

In this proposed paper [2] authors have given a solution for determining the JPEG image and QR code which are malicious and benign. They have proposed a system in which they have given a machine learning-based solution in which they have used convolution Neural Network (CNN) by which In order to distinguish between good and bad QR code / JPEG images, they have extracted 10 discriminative characteristics using a machine learning classifier.

In this paper authors [3] have designed new 2 level QR code inorder to increase security of QR codes .They developed two types of QR codes: the public level, which can be read by any QR code reader, and the private level, which employs textured patterns as black modules and is encoded for private message transfer. Also private methods do not affect or interfere in the process of public level thus smooth functioning of this 2-level QR code takes place.

This study [4] demonstrates how to identify perspective distortion in QR codes using edge direction and edge projection analysis.

The authors [5] of this work used a watermark technique for threat detection to develop a blind digital image based on a QR code. The suggested method provides a framework through which modified binary form of data can be embedded into the cover image's DWT domain and used to identify images or QR codes.

This paper [6] shows how QR codes can be used to attack systems . Also authors have discussed different phishing techniques from the point of view of attackers and suggested possible solutions to it .

The authors [7] of this study have suggested a method for reading QR codes based on the correlation of histograms between the reference image for the QR code and the input picture. Paper also proposes new algorithm which provides good accuracy for the trained model

This paper [8] describes the different worm attacks on the QR code and also provides the countermeasures for the same.

This paper [9] discusses the study of different malicious QR codes and also demonstrates how to identify perspective distortion in QR codes using edge direction.

The authors [10] of this study have suggested that specification of the data matrix of the barcode symbol.

This study [11] demonstrates the QR code libraries and provides a case study on their application in the NITK central library.

In this paper [12] authors have designed QR code perspective distortion based on edge

projections and edge directions and their analysis.

In this proposed paper [13] different QR patterns are given and their invariant moments and localisation.

In this proposed paper [14] authors have analyzed the BRISK algorithm (Binary Invariant Scalable Keypoints).

This paper [15] presents Quick QR code detection and recognition in high resolution photos.

4 Structure of QR Code

The QR code contains different areas that contain different patterns. They are as follows:

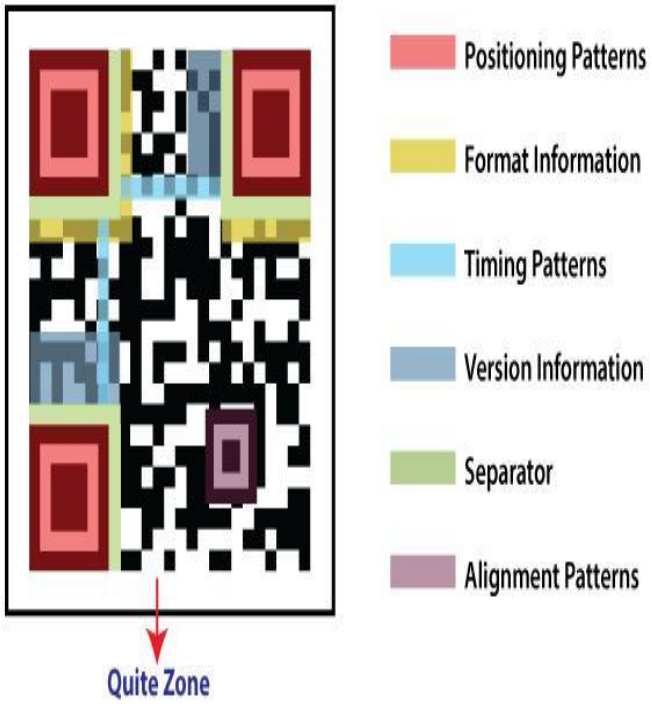


Fig 1 : QR Code Structure

4.1 FINDING PATTERN: This pattern can detect or identify the QR code and it can be read at any angle.

4.2 TIMING PATTERN: This pattern differentiates black and white modules or squares alternatively.

4.3 ALIGNMENT PATTERN: This pattern aligns the data points which are encoded in the data region.

4.4 SEPARATORS: Separators are used to separate the finding patterns.

5 QR Code Attacks

5 . [18]QR COver the past few years, QR codes have become more famous and it is the target

for hackers to spread malwares and steal some information. Hackers can use QR codes for different malicious purposes. Basically there are two main types of QR code attacks or exploits. They are as follows:

5.1 QUISHING

[26]The first type of attack is Quishing and it is somehow similar to phishing attacks. In this

4attack, a phishing page which hackers have designed to steal information like user credentials, personal data or some sensitive information is sent to a victim.[16] This attack can be avoided by making the QR code dynamic because it has more security than static one. Also aging time can be added that means if the user does not use or activate the QR code in specified time then it will become invalid. It can be prevented by encrypting the data as well.[27]

5.2 QRL JACKING

[28]The second type of attack is QRLjacking. In this attack, hackers spread malware to the user's or victim's device. QRLjacking is short for Quick Response Code Login Jacking.[19] Here the user or victim scans the QR code on a fake website which is provided by hackers and then the hackers have all access to the user's account. This attack can be avoided by sending Email/SMS to the users from service providers.[17] Additional authentication methods can be added to user login. For example, sound based authentication.

6 Algorithms Used

6.1 RANDOM FOREST

Random forest and other algorithms for supervised machine learning are frequently used to solve classification and regression issues.[20] It develops decision trees from various data samples, using their average for categorization and majority vote for regression. Random forest perform following procedures[29]:

Step 1: Scan QR code

Step 2: Preprocessing of QR code

Step 3: load the training and testing dataset

Step 4 : Feature Extraction with help of BRISK algorithm

Step 5:In Random Forest, a number of records exist randomly selected derived from dataset

Step 6: An exclusive decision tree is constructed for every sample.

Step 7: An output executes it. produced by each decision tree.

Step 8: For classification and regression, the final result is evaluated using a majority vote or an average as malicious /benign QR code

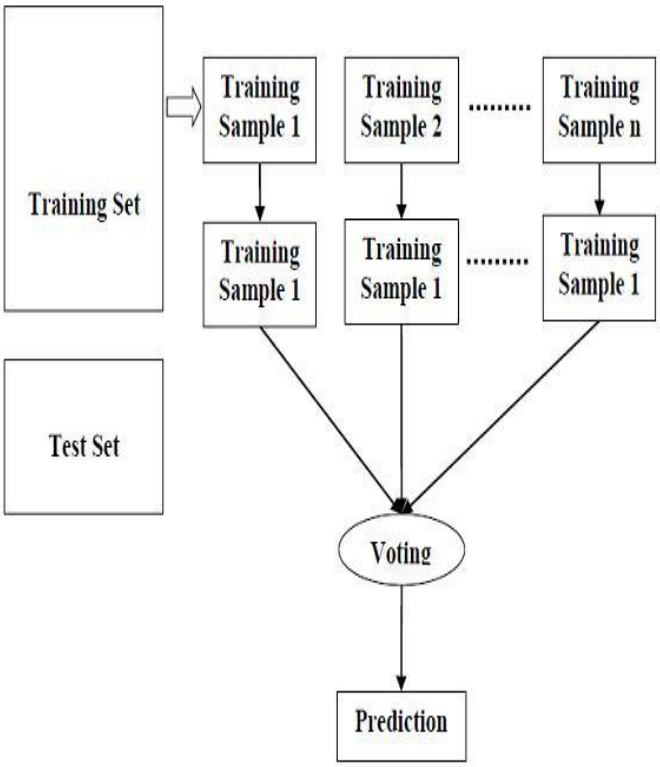


Fig 2 : Random Forest implementation

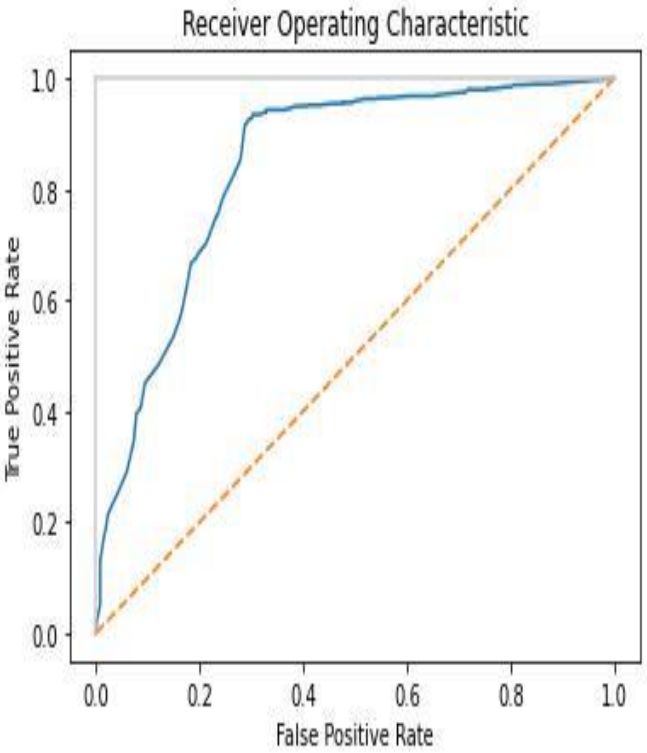


Fig 3: Random forest ROC curve

6.2 DECISION TREE

Decision tree algorithm is used for classification and regression problem analysis based on the nodes of the tree.

Step 1 : Scan QR code

Step 2 : Preprocessing of QR code

Step 3 : load the training and testing dataset

Step 4 : Feature Extraction with help of BRISK algorithm

Step 5 : Applying Decision Tree

Step 6 : Train the model

Step 7 : Detecting type of QR code [malicious/benign]

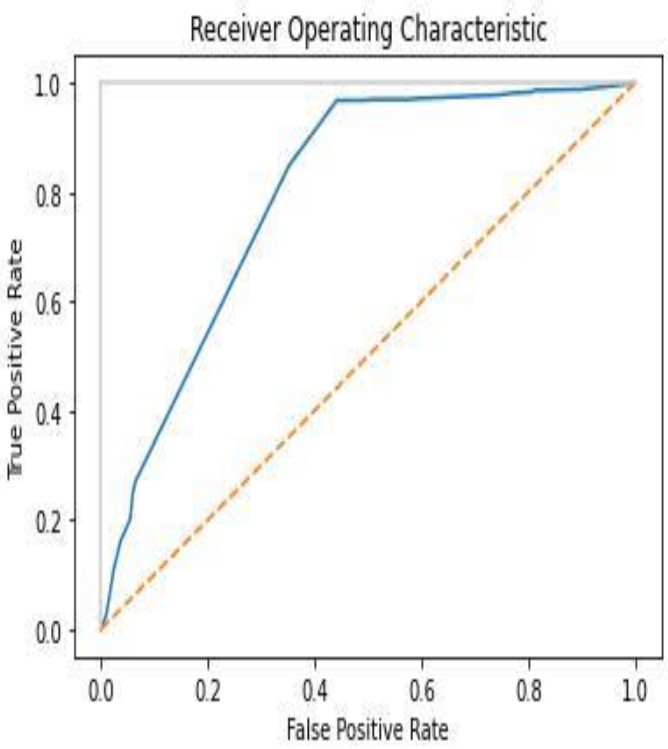


Fig 4 : Decision tree ROC curve

6.3 KNN ALGORITHM:

KNN is a supervised machine learning algorithm in which classification of data points is done on the basis of the closest neighbor class.

Step 1 : Scan QR code

Step 2 : Preprocessing of QR code

Step 3 : load the training and testing dataset

Step 4 : Feature Extraction with help of BRISK algorithm

Step 5 : choose the value of 'K' i.e nearest datapoint

Step 6: based on the value of k and distance of datapoint . KNN will assign it separate classes

Step 7 : Train the model

Step 8 : On the basis of classes it will classify QR code as malicious/benign.

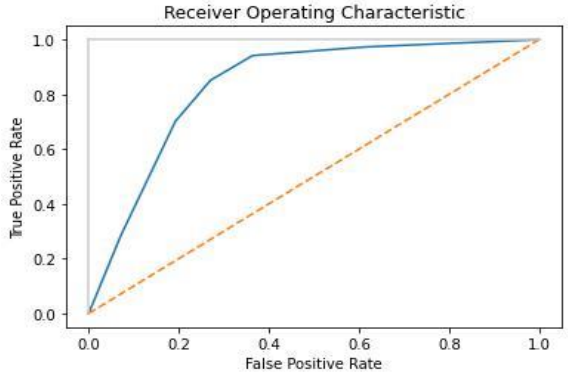


Fig 5 : KNN ROC curve

7 Diagrams

[22]In the proposed system , by using the camera of the system, first of all, scan image QR code. For data preprocessing, the model used various data pre-processing techniques such as scaling, translation etc.

Training-Testing-Model: [21] For training and testing of proposed model, dataset has splitted as 70% training dataset and 30% testing dataset into 2 classes .

After preprocessing QR code images then for training and testing of proposed model extract features from the QR code image .[23] So for extracting features of QR code, selected patterns used in it as features for the purpose of feature extraction. In this there are 3 main features: Finder pattern , Alignment pattern and Timing pattern. And for the purpose of feature extraction here BRISK algorithm is implemented[28] which selects these patterns and find relation between them and select best features from them by using scale invariance and rotational invariance .[30]Once features are selected then creation of separate files of extracted

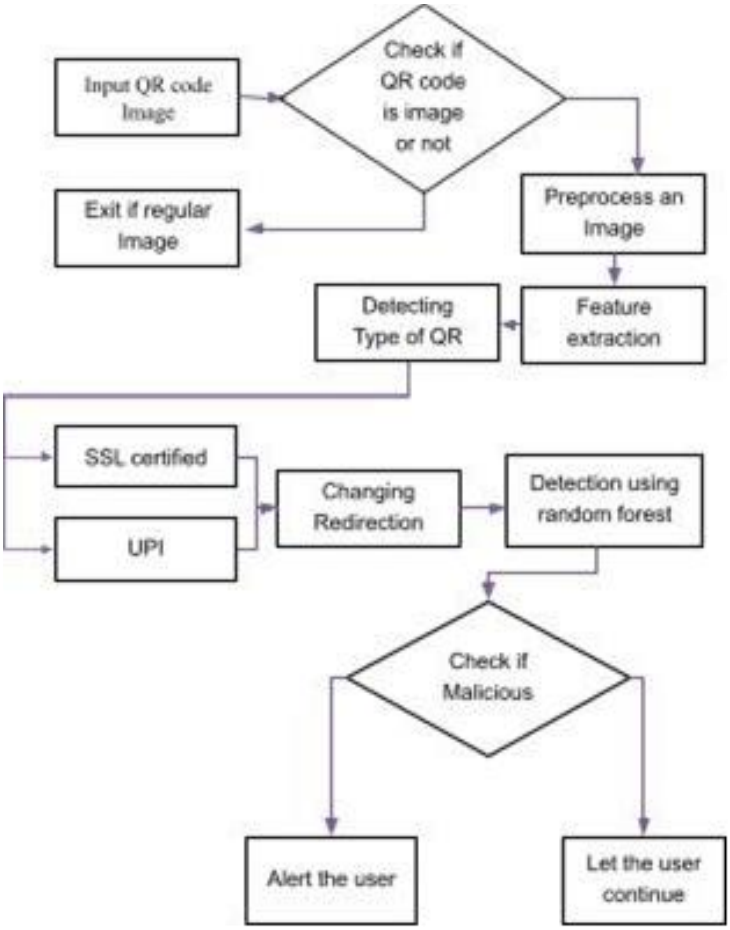


Fig 6 : Flow diagram for proposed System

Once the feature extraction is over , [24] then on the basis of QR code type our system check whether it is SSL (Secure Sockets Layer) or if it is redirecting the user to malicious website or it uses UPI protocol and based on that classification is done in respective types.

After detecting the QR code type, Then by using a random forest algorithm, classify them into two classes: malicious and normal(benign) QR codes which was our main objective. [26] While using the random forest algorithm, features extracted from BRISK algorithm as an input parameter. and with the help of different decision tree [25]classifiers of random forest algorithm based on BRISK features, classify QRs into malicious and normal on the basis of the majority of votes of decision tree classifiers. and hence proposed model have selected random forest as classifying algorithm as its accuracy was the highest. And at the end, print the result as a malicious QR code or normal QR code.

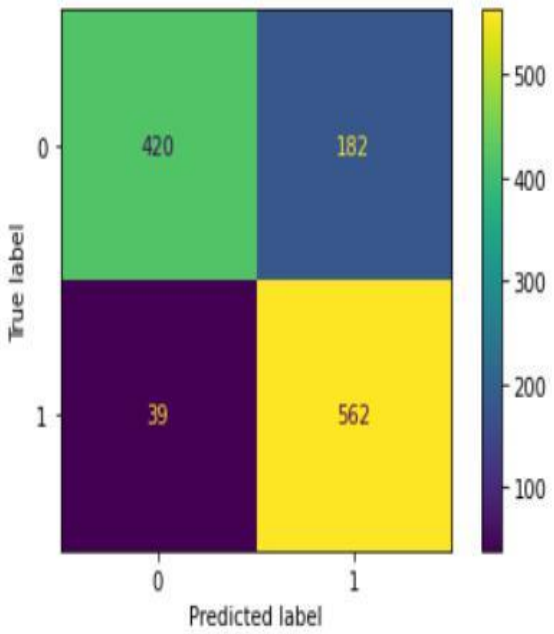
8 Implementation

Our solution is mainly based on two problems: the first is the efficiency of existing Quick response code scanners that is not on that level as of now so the proposed model uses an improved random forest algorithm to increase accuracy and efficiency and the second is to detect the problematic one or malicious QR codes, [6] because QR code fishing is a big issue nowadays so proposed model secures the user perspective for security on QR scanning by showing them proper security warning so user can make better decisions.

9 Comparative Analysis

In the proposed system , the accuracy of the random forest algorithm is 81.46% which is greater than other algorithms like Decision tree classifier (76.76%) and SVM (72%) . so one can interpret that random forest classifier performs better for our proposed system as it uses ensemble learning techniques

10 Confusion Matrix of Algorithms




```
Accuracy on Train data :  0.82174688057041
Presion : 0.9201710620099787
Recall : 0.7689100655151876
F1 score :  0.8377676833225179
Accuracy on Test data :  0.8162926018287614
Presion : 0.9351081530782029
Recall : 0.7553763440860215
F1 score :  0.8356877323420073
```

Fig 7 : Accuracy Of Random Forest Algorithm

Table 1: Experimental Results

Sr. No	Algorithm	Exiting accuracy	Proposed system Accuracy
1	KNN	69.61 %	71.61 %
2	Decision Tree	65.83 %	76.76 %
3	Random Forest	70.45 %	81.46 %

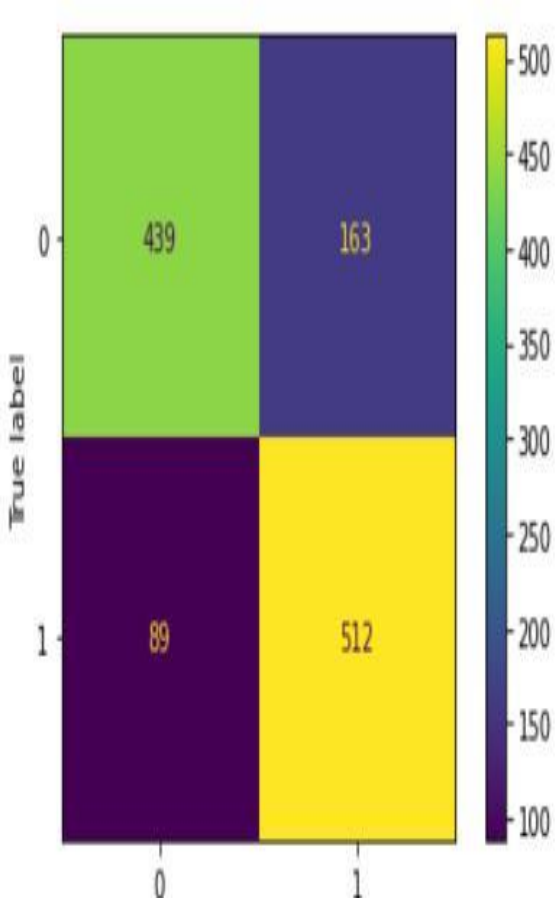


Fig 9 : Accuracy Of KNN Algorithm

11 Future Scope

In the future, there is scope to improve the proposed system model for more accurate detection and classification of malicious QR codes by implementing improved machine learning algorithms.Overall, the emphasis will be on making the scanning and detection process more efficient, as well as providing the user with more detailed and accurate information regarding malicious QR codes.

12 Conclusion

With the help of a model, the detection of malicious QR is easy. A number of suspicious Quick responses will be detected so it will be helpful in the case of authentication, digital information, and especially in payment transactions. It will provide great security and most importantly people will also adapt to it. Every time while scanning QR code they will check it through the model. And the number of frauds in digitalization and transactions will be very low.

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Hyperparameter Study: An Analysis of Hyperparameters and Their Search Methodology

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Abstract— **Deep neural networks have significantly improved people's daily lives since they were created. Deep learning provides more rational direction than humans can in almost every aspect of daily life. Though it has been likened to alchemy, developing and training neural networks continues to be a challenging and unpredictable process. Automated hy- perparameter tuning has gained popularity in both academic and com- mercial circles to minimize consumer technical barriers. The most im- portant areas of hyperparameter tuning are reviewed in this work. The primary neural network model hyperparameters are introduced in the initial section, along with their significance and methods for defining the value range. The discussion continues with the most popular optimiza- tion approaches and their efficiency. Finally, the second-order optimiza- tion and its usefulness**

Keyword- Hyperparameter tuning Deep neural network Classical searching technique Second-order optimization.

I. INTRODUCTION

Neural network (NN) approaches have expanded and gained influence over the last few years in academic and industrial sectors. NNs have recently shown im- pressive results in the areas of image classification, objective detection, indus- trial control systems, and natural language understanding [1]. The most popular strategy for hyperparameter (HP) tuning is usually based on experience, which implies that to develop a workable set of HPs, researchers must have previous knowledge of NN training. According to the no-free-lunch theorem, all opti- mization problems have a fixed computing cost, and there is no shortcut to solve them [2]. Specialists' prior knowledge, which helps select crucial parameters and narrows the search space, can be used in place of computational resources.

HPs are variables that are fixed throughout the training process of a NN system. Several factors, including the learning rate (LR), loss function, and op- timizer, can influence how well and precisely a model is taught. The activation function and the number of hidden layers are other factors. HP tuning may be

viewed as the first stage of NN training and the final stage of model development [3]. To cut humans out of the machine-learning system's feedback loop, HP tun- ing automatically improves a model's HPs. Before the training process begins, HPs must be properly adjusted with expertise because to their impact on train- ing accuracy and speed [4]. When several HPs are tuned concurrently, adjusting HPs involves a trade-off between computing resources and human effort. HP tuning has become more crucial in recent years due to two new advancements in the development of deep learning models. Upscaling NNs for greater accuracy is the first requirement. Empirical research has shown that more complex NNs with wider and deeper layers often outperform those with simple architecture [5]. The development of a demanding lightweight model with fewer weights and characteristics to provide satisfying accuracy is the second requirement. HP tun- ing is essential in both scenarios: a model with a complicated structure indicates that there are extra HPs to tune, and a well-planned structure entails that each HP must always be set to a certain range in order to repeat the accuracy. The ability to modify manually depends on experience, and researchers may always learn from previous work; thus, adjusting the HPs of a widely used model is con- ceivable. This is equivalent to small models. But, especially for bigger models or freshly published models, the vast array of HP possibilities demands a lot of researchers' painstaking work, as well as a lot of time and computer resources for trial and error. Fig. 1 depicts the block diagram for the HP tuning process.

The major contribution of the study is as follows:

– The discussion of the crucial deep neural network (DNN) model HPs, along with their significance and default settings.

– The major HP tuning strategies are examined in depth to demonstrate their

applicability to the given problem.

- comparison of the second-order optimization technique to first-order

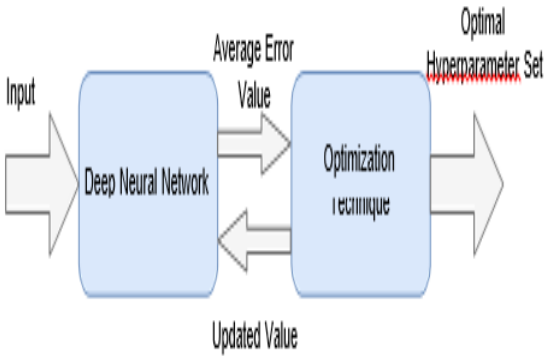

Fig. 1. Block diagram of the HP tuning process.

The rest of the paper is structured as follows. The required HPs and their default values are clearly outlined in section 2. The standard algorithms for HP tuning is discussed in section 3. The second-order optimization applied to NN models is described in section 4. Section 5 summarizes the significant ideas, while section 6 concludes the study.

II. KEY HYPERPARAMETERS AND ITS USEFULNESS

HPs have a significant impact on the effectiveness of NNs. HPs with a higher impact on weights during training are more important for NN training. Hence, it is given preferential attention. There are two types of HPs: those used to build models and those used to train models. NNs may learn more rapidly and perform better when the right HPs are chosen for the model training process.

Performance of the model is more influenced by several HPs such as opti- mizer, LR, loss function, activation function, and network depth. The previously mentioned HPs—aside from batch size and LR—are supplied throughout the model-designing process. When training, the LR, and batch size are considered [5]. This section further explains the HPs that are crucial for model building, training and their impact on models and suggested values.

2.1 Optimizer

Unaware of the optimizer's benefits, many people may be utilizing it to train their NNs. Optimizers, or optimization algorithms, are essential for increasing training efficiency and accuracy. The optimizer's selection, the mini-batch size, and the momentum are all HPs connected to optimizers. Making the right optimization choice is challenging. Optimizers are the algorithms used to modify the weights and LR of the NN to decrease losses and improve network performance. Gradient descent (GD), stochastic gradient descent (SGD), mini-batch gradient descent (MBGD), adaptive moment estimation (Adam), and root mean square propagation (RMS-prop) are some of the popular optimizers [6].

GD is the easiest and most often used optimization technique. It is heavily utilized in classification and linear regression algorithms. Backpropagation technique in NNs also uses the GD technique. A loss function's first-order derivative is necessary for the GD method of first-order optimization. It chooses how to adjust the weights so that the function can attain a minimum. Backpropagation is used to pass the loss from one layer to the next, and the weights of the model are changed to reflect the losses in order to lessen the loss. In GD, weights are adjusted after the gradient on the full dataset has been computed. The weight is updated using Eqn. 1.

$$Wnew = Wold - \alpha * [\partial(Loss)/\partial(Wold)] \quad (1)$$

Where Wnew and Wold are the updated weight and old weight respectively.

SGD is a variation of GD. It seeks to update the model's parameters more often. The model's parameters change when the loss upon every training instance is determined. As a consequence, if the data contains x number of rows, SGD will update the model parameters x times during the dataset cycle as opposed to GD's single update. Since they are updated often, model parameters exhibit large variances and vary in loss functions at different intensities. In order to reduce the significant volatility in SGD and smooth out the convergence, momentum was developed.

The momentum term is often set to 0.9 or, as needed, 0.99 or 0.999. Oscil- lation is minimized by increasing the update's strength in the same direction and reducing its movement in other directions [7]. The impact of momentum on SGD is shown in Fig. 2.

The updated value can be calculated using Eqn. 2.

$$Vnew = \eta * Vold - \alpha * [\partial(Loss)/\partial(Wold)]$$

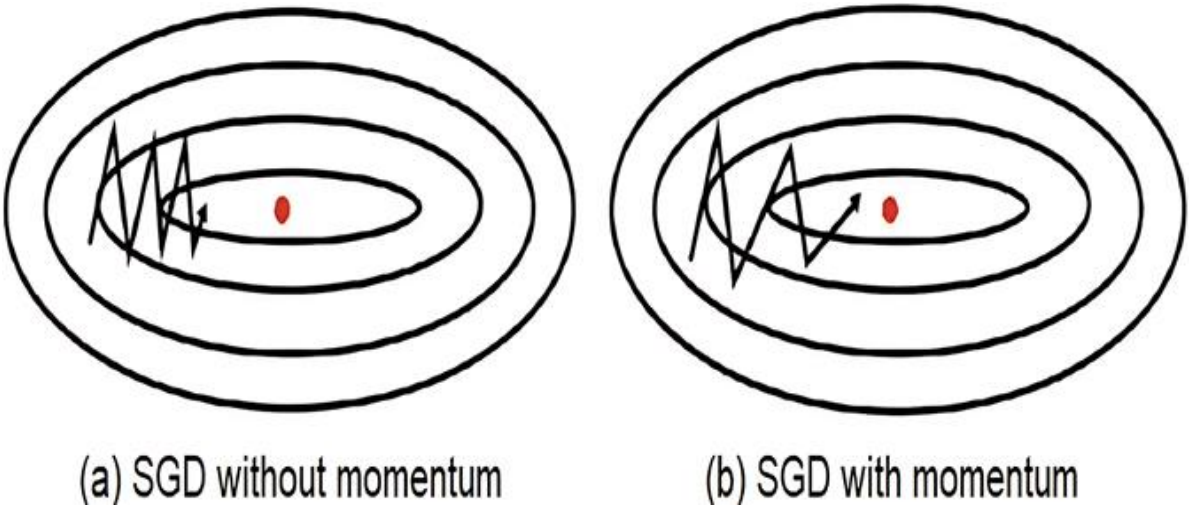

Fig. 2. Effect of momentum over SGD (Source: https://medium.com/mlearning- ai/optimizers-in-deep-learning-7bf81fed78a0).

Where α is a constant and η is the LR.
One of the best GD algorithm variants is called MBGD. In MBGD approach, the dataset is split up into different batches and the parameters are changed in different batches. The HP called mini-batch size has a value that is highly connected with the memory of the processing unit. Because of the GPU/CPU memory access, its value is assumed to be a power of 2. The model will run rapidly if the mini-batch size is a power of two as it accesses GPU/CPU memory with an acceptable default value of 32 [6].
One of the most popular optimizers for DNN training is RMS-prop. The GD is accelerated by RMS-prop, but it performs better as the steps get smaller. The LR is modified in RMSprop by dividing the square root of the gradient. RMSprop speeds the horizontal movement from a considerably greater LR while slowing the vertical oscillation compared to the initial GD [8]. Eqn. 3 is used to

implement RMS-prop. $w = w - lr * (dw/\sqrt{S})$

Adam deals with momentums of the first and second order. The concept be- hind the Adam is that instead of rolling so rapidly just because it can jump over the minimum, it should slow down a little for a deliberate search. Additionally, Adam keeps the average of earlier squared gradients and saves the exponentially decaying average of earlier gradients [8]. The weight and bias is calculated using Eqn. 4 and 5.

$wt = wt{-}1 - [(\eta/\quad Sdwt\ - \varepsilon) * Vdwt\ ]$
$bt = bt{-}1 - [(\eta/\sqrt{S}dbt - \varepsilon) * Vdbt\ ]$

2.2 Learning Rate

The LR is the HP in optimization algorithms that controls how much the model must change each time its weights are changed in response to the projected error. It determines how often model parameters are cross-checked and is one of the most crucial factors while building a NN. Selecting the ideal LR can be challenging because if it is excessively low, the training process may be slowed down. Nevertheless, if the LR is excessively high, the model cannot be well-tuned. Finding an ideal value for LR is difficult yet essential [9]. A small enhancement based on the constant value is setting an initial rate of 0.1 and modifying it to0.01 when the accuracy is saturated and subsequently to 0.001 if required. Fig. 3 illustrates how the LR (from low to high) affects finding minima. Divergent behavior occurs when the LR value becomes too high. When the LR value becomes too small, it takes several updates to achieve a minimal point, the ideal LR value quickly achieves the minimal point, and severe changes occur.

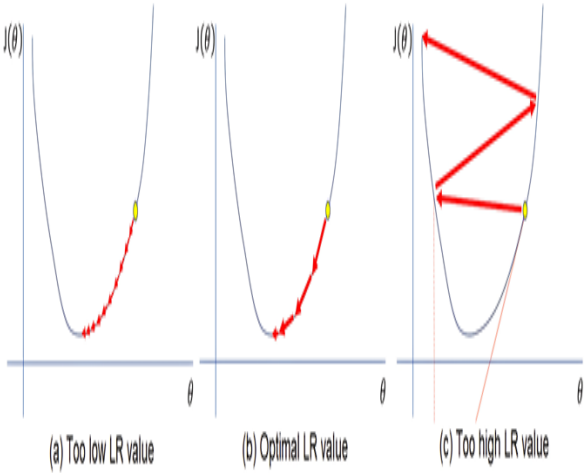

Fig. 3. Effect of LR to find minima (Source: https://www.jeremyjordan.me/nn- learning-rate/).

Different methods are adopted to find out the value of LR. Two common methods are linear decay and exponential decay, which can be implemented using the Eqn. 6 and 7, respectively.

$lr = lr0/(1 + kt)$ (6)

$lr = lr0.exp(-kt)$ (7)

Where lr0 is the previous LR, k is the decay rate, and t is the training time.

2.3 Network Depth

A crucial factor in deciding the entire design of NNs, which directly affects the output, is the number of hidden units. Deep learning networks with even more layers are more likely to produce features with increased complexity and relative accuracy. It's common to practice scaling up the NN by including more layers; however, this raises the model's complexity and can occasionally result in overfitting. Overfitting happens as a result of there being more layers and neurons in each layer. Therefore, it is important to carefully calculate the model's depth [10]. Once more, regularization can be used to handle overfitting. Lasso (L1) and Ridge (L2) regularization, which may be implemented using Eqn. 8 and 9, are the two regularization norms employed to address the overfitting problem. L1 and L2 regression have their benefits and drawbacks.

$$w(L1) = \sum_{i=0}^{N} \left(y_i - \sum_{j=0}^{M} x_{ij} w_j\right)^2 + \lambda \sum_{j=0}^{M} |w_j|$$

$$w(L2) = \sum_{i=0}^{N} \left(y_i - \sum_{j=0}^{M} x_{ij} w_j\right)^2 + \lambda \sum_{j=0}^{M} w_j^2$$

Where the regularization parameter is defined as λ.

2.4 Activation Function

A neuron's activation status is determined by an activation function. According to this, it will perform some straightforward mathematical operations to decide whether the input from the neuron to the network is important or not for the prediction process. The activation function's function is to enable nonlinearity in a NN and produce output from a set of input values provided to a layer. Deep learning relies on activation functions to provide nonlinear characteristics to the output of neurons. A NN without an activation function will just be a linear regression model, unable to reflect intricate characteristics of data. The activa- tion functions must be differentiable for backpropagation and computing weight gradients. The most well-known and often employed activation functions are sigmoid, softmax, hyperbolic tangent (tanh), and rectified linear units (ReLU) [10].

When given a number, sigmoid outputs a number between 0 and 1. It has a fixed output range, monotonicity, continuous differentiation, nonlinearity, and all the other desirable characteristics of activation functions. It is also easy to use. Typically, binary classification issues make use of this. The likelihood that a particular class will exist is provided by this sigmoid function [11]. It can be modeled mathematically using Eqn. 10.

$$f(x) = 1/(1 + e^{-x})$$

The activation function tanh can condense a real-valued number to a range between [-1, 1]. It varies from a sigmoid and generates zero-centered output while being nonlinear. The main advantage of the approach is that negative inputs will be actively mapped to the negative, and zero inputs will be mapped almost perfectly to zero [11]. Eqn. 11 is a mathematical representation of the tanh function.

$$f(x) = (e^{x} - e^{-x})/(e^{x} + e^{-x})$$

ReLU is one of the activation functions that is used in applications the most. The ReLU function's gradient has the highest value of 1, which solves the van- ishing gradient problem. It also solves the problem of saturating neurons because the slope of the ReLU function is never 0. The range of ReLU is 0 to infinity [10]. Eqn. 12 provides a mathematical illustration of the ReLU function.

$$f(x) = x, \text{ if } x > 0, \text{ else } 0$$

Several sigmoids are combined to form the Softmax function. There is a proven relative likelihood. The probability of each class or label is returned by the Softmax function, just as the sigmoid activation function. The last layer of the NN in multi-class classification is most frequently used with the softmax activation function. The softmax function provides the likelihood of the present class to other classes. This indicates that it also takes other classes into account [12]. The softmax function is represented mathematically in Eqn. 13

$$f(x) = \exp(xi)/\Sigma \exp(xj)$$

2.5 Loss Function

A loss function compares the target and anticipated output values to determine how well the NN reflects the training data. During training, we make an effort to minimize this output discrepancy between the expected and the goal. The basic goal of the loss functions is to reduce the average loss by adjusting the weight and bias value. Regression loss function, which includes mean absolute error (MAE), and mean squared error (MSE), and classification loss function, which includes binary cross entropy (bc) and categorical cross entropy (cc), are the two main types of loss functions that are used [13]. The mathematical representations of the loss functions are shown in Eqn. 14–17.

$$MSE = 1/n \sum_{i=1} (y^i - \hat{y}^i)^2$$

$$MAE = 1/n \sum_{i=1} |y^i - \hat{y}^i|$$

$$Loss_{bc} = 1/n \sum_{i=1}^{N} -(y_i \log(p_i)) + (i - y_i).\log(1 - p_i)$$

$$Loss_{cc} = -1/n \sum_{i=1}^{N} \sum_{j=1}^{M} y_{ij} \log(p_{ij})$$

III. SEARCHING TECHNIQUE

In this section, all the classical HP searching techniques are discussed.

3.1 Grid Search Technique

If enough resources are available, grid search is the simplest search algorithm that produces the most accurate predictions, and the user can always identify the ideal combination. Grid search is simple to conduct in parallel since each trial runs independently without regard to time order. Results from one experiment do not affect those from further tests. The distribution of computational resources is incredibly flexible. grid search, however, is cursed by dimensionality since more HPs that need to be tuned consume exponentially more computational resources. When more HPs are utilized in the model, the grid search technique's major downside is the computing time [14].

3.2 Randomized Search Technique

Random search is a fundamentally improved form of grid search [15]. It denotes a randomized search over possible parameter values for HPs from certain distri- butions. The search procedure is carried out indefinitely or until the necessary accuracy is attained, whichever comes first. Grid search is comparable to ran- dom search; however, random search has been shown to produce superior results. When some HPs are not distributed equally, the random search may perform better. In contrast, a longer search period cannot provide better results for a grid search. Another key benefit of random search is its parallelization simplicity and resource allocation adaptability [14]. While random search often outperforms grid search, it still requires a lot of processing.

3.3 Bayesian Search Technique

It is a sequential model-based approach that aims to identify the global optimum with the fewest trials possible. It strikes a balance between exploration and exploitation to avoid becoming trapped in the local optimum. In two ways, Bayesian search is superior to random search and grid search: first, users are not needed to have existing experience of the distribution of HPs; and second, the central concept of Bayesian search, posterior probability, beats both of these methods. The Bayesian search seems to be more computationally effective than random search and grid search, requiring fewer attempts to discover the ideal HP set, especially when highly expensive objective functions are observed [16]. Another outstanding benefit of Bayesian search over grid search and random search is that it may be used whether the goal function is stochastic or discrete, convex or nonconvex.

3.4 Population based Search Technique

Population-based methods, such as evolutionary algorithms [17], swarm-based optimization [18], and covariance matrix adaptation evolutionary strategies, are essentially a series of random search methods based on genetic algorithms [19]. Initialization (random population), Selection (assessment of the existing popu- lation and parent selection), and Reproduction are the three key components of genetic algorithms (creation of the next generation). The population-based approach effectively uses less computing time to identify the ideal HPs.

IV. SECOND-ORDER OPTIMIZATION

Backpropagation is a stage in optimization approaches when an error from the calculated and intended output is monitored. The objective function is mini- mized during optimization in the context of NNs. The GD approach is one of the most widely utilized optimization strategies in NN training. It is a first-order derivatives approach, as seen in Eqn. 18. However, the selection of LR signifi- cantly impacts how well GD performs. An excessively large LR causes significant changes with each iteration and frequently fails to find the minimum point. Bet- ter trajectories through the mountainous error surface that is frequently seen in NNs can be provided by the second-order technique using local curvature information [20].

$$wk+1 = wk - \eta(\partial e/\partial w)$$

With the use of extra Hessian data, the second-order derivatives approach offers a superior training trajectory

over the local curvature of the error surface. By adaptively changing the step size following the various learning phases, the usage of Hessian matrices simplifies the fine-tuning of HPs. The second-order derivative is represented mathematically by Eqn. 19. Inverse Hessian matrices are used in the computation of the next update step.

$$wk+1 = wk - \eta(\partial 2e/\partial w2)-1(\partial e/\partial w)$$

V. DISCUSSIONS

The idea of HP search has been around for a while and is a commonly utilized technique. The DNN has captured the majority of academics' interest in recent years. To adapt the model for various datasets, the HP autotuning approach is absolutely essential. Due to a large number of HPs, many classical methods are becoming impractical. In complicated scenarios, choosing HPs is highly costly. Table 1 briefly compares the main algorithms

Table 1. Comparison of different hyperparameter searching algorithms.

Searching Technique	Advantages	Disadvantages
Grid Search	- Simple and Parallel execution - Almost find the optimal way	- Time consuming - Issue of overfitting
Random Search	- Reduction of overfitting - Faster than grid search	- Potential for variance - Cannot guarantee for optimal
Bayesian search	- Not stock at local minima - Can handle complex problems	- Complex algorithm - Parallelism is difficult
Population based search	- Can achieve parallelism - Not stock at local minima - Almost find the optimal way - Faster than grid search.	- A bit complex to code - Extra parameters to set.

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VI. CONCLUSION

DNNs are being used more often in various sectors, which inspired this study. The essential HPs and the approaches for finding them are systematically reviewed in this study, with an emphasis on how to autotune HPs for NNs. Discussing various HPs and their needs served as the study's initial point. Further a brief discussion of HPs with a discussion of various autotuning searching algorithms and their application, and it concludes with a discussion of the second-order optimization methodology. This study is devoted to providing researchers and industry users with a reference summary of information on HP tuning.

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A pragmatic review of learning models used for unsupervised analysis of existing cyber physical deployments from an empirical perspective

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Abstract— **Cyber physical deployments include game engines, multimedia systems, internet of things (IoT) systems, etc. Each of these models have certain inputs, several processing layers, and certain outputs. Monitoring & control of such deployments can be automated via their unsupervised analysis, which requires deep learning & pattern analysis methods. A wide variety of such models are proposed by researchers and system designers, but each of them have their own nuances, advantages, limitations, & future research scopes. Moreover, these models have different performance characteristics, that vary in terms of analysis accuracy, precision, recall, fMeasure, delay of analysis, response time, computational complexity, etc. Thus, while deploying such learning models, researchers & system designers are required to perform manual analysis, validation, and testing for automation & control. Due to this cumbersome process, cost & time to market for these unsupervised control models is very high, which limits their scalability, and deployment capabilities. To overcome this issue, a detailed characteristic discussion of these models is done in this text. Based on this discussion, researchers will be able to identify existing unsupervised & semi-supervised learning models, which closely match their deployments. These models are further analyzed in terms of their performance metrics, that includes, accuracy of analysis, response time needed for control, delay needed for analysis, precision of analysis, computational complexity, and cost of deployment. Using these metrics, researchers can evaluate best performing models for their deployments, which will assist them in reducing cost, and time needed for automating their cyber physical systems. This text also discusses certain future prospects that can be explored by researchers in order to further enhance quality of their deployments.**

Keyword- Neural, Network, Cyber, Physical, Unsupervised, Scalability, Empirical, Complexity, Automation, Control.

I. INTRODUCTION

Design of automation controllers for cyber physical systems is a multidomain task, which involves design of methods for input pattern analysis, response analysis, control signal analysis, etc. A typical automation controller [1] for such systems can be observed in figure 1, wherein different inputs are controlled via an input analysis engine, which assists in analysis of different input signals. Signals are generated based on this analysis, and are given to the plant model, which uses design requirements & automatic control engine design tools in order to produce a control design for the model. This design is used to develop a control model, that is capable of automatically controlling the entire plant (or control system) deployment In some models, feedback is also taken from the cyber physical system, which assists in estimating its performance variation due to the deployed control system for different input combinations. Based on this feedback, the model is tuned, and continuous performance enhancement is achieved, which assists in improving underlying model performance under different input & output conditions. Similar models [2, 3, 4], along with their nuances, advantages, limitations, and future research scopes are discussed in the next section of this text. Based on this discussion, readers will be able to identify close similarities with their own deployment models, which will assist them in short listing models that suit their interface requirements. After this discussion, section 3 further analyzes these models in terms of statistical performance metrics that include, accuracy of analysis, response time needed for control, delay needed for analysis, precision of analysis, computational complexity, and cost of deployment under different scenarios. Upon referring to this performance evaluation, researchers will be able to select the best performing model for their deployment, and use it for high-efficiency automation purposes. Finally, this text concludes with some interesting observations about the reviewed models, and recommends methods to further improve their performance.

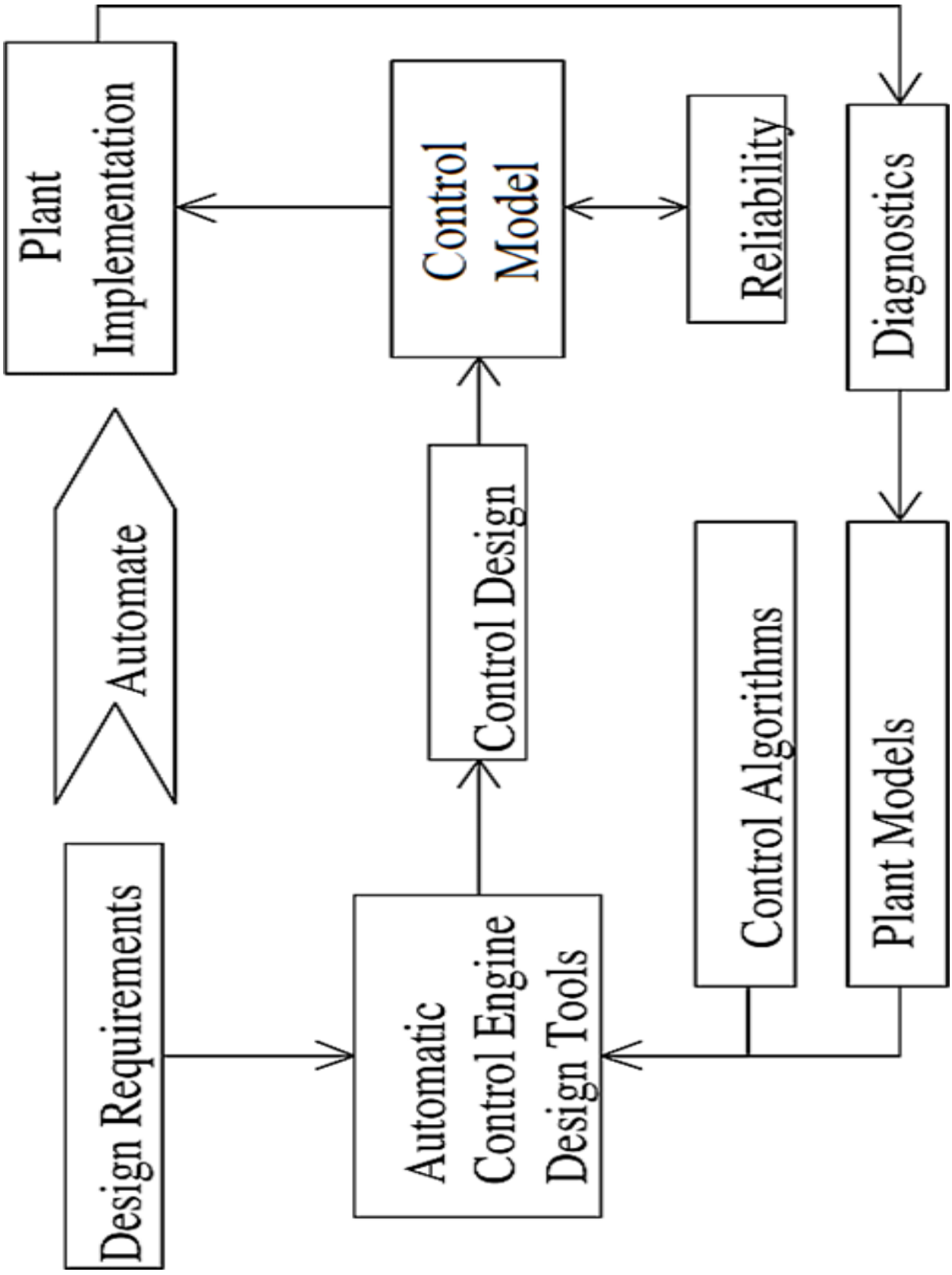

Figure 1. Design of a typical model for automation of control systems

II. PRAGMATIC REVIEW OF UNSUPERVISED LEARNING MODELS

Researchers have proposed a wide variety of unsupervised learning methods, which can be used for solving multidomain tasks including classification, clustering, prediction, etc. Each of these models have their own characteristics, and are deployed for context-specific applications. For instance, work in [1] proposes use of Incremental & Unsupervised Domain-Adversarial Neural Networks (IUDANN), which are highly flexible and can be used for prediction of output combinations via pattern analysis of different input types. The model uses a combination of feature extraction layer with label classifier to obtain classification outputs. These outputs are further tuned via use of domain classifiers which assists in estimation of error functions. IUDANN Models use gradient reversal layer (GRL) to tune their internal training constants to reduce these error functions Working of this model is depicted in figure 2, wherein inputs, their intermediate processing layers, and output classes are visualized, and can be applied to multiple scenarios.

This model is applied for Optical Character Recognition (OCR), Number Plate Recognition, and other applications that involve 2D input datasets. But it can be extended for other applications via internal parameter tuning and cross validations. The model showcases an accuracy of 96.95% for multiple applications, which is higher than Convolutional Neural Network (CNN) (57.53%), DANN (68.23%),

improved CNN (iCNN) (72.62%), and iDANN(85.91%), thus recommending use of IUDANN for large-scale deployments. But efficiency of this model is limited when applied to 1D or 3D datasets, which makes it useful for image processing applications. To overcome this limitation, work in [2] proposes use of two-stage unsupervised multiple kernel extreme learning machine (TUMK-ELM) which assists in data extraction from multiple sources to perform closed-loop learning under heterogeneous datasets. To perform this task, multiple types of kernels are deployed, such that each kernel is capable of solving single task with high efficiency, which improves overall performance via k Space data construction, and kernel combination coefficients (kCCs). These values are processed via use of an ELM based engine as depicted in figure 3, which assists in continuous tuning of kCCs via an incremental learning process.

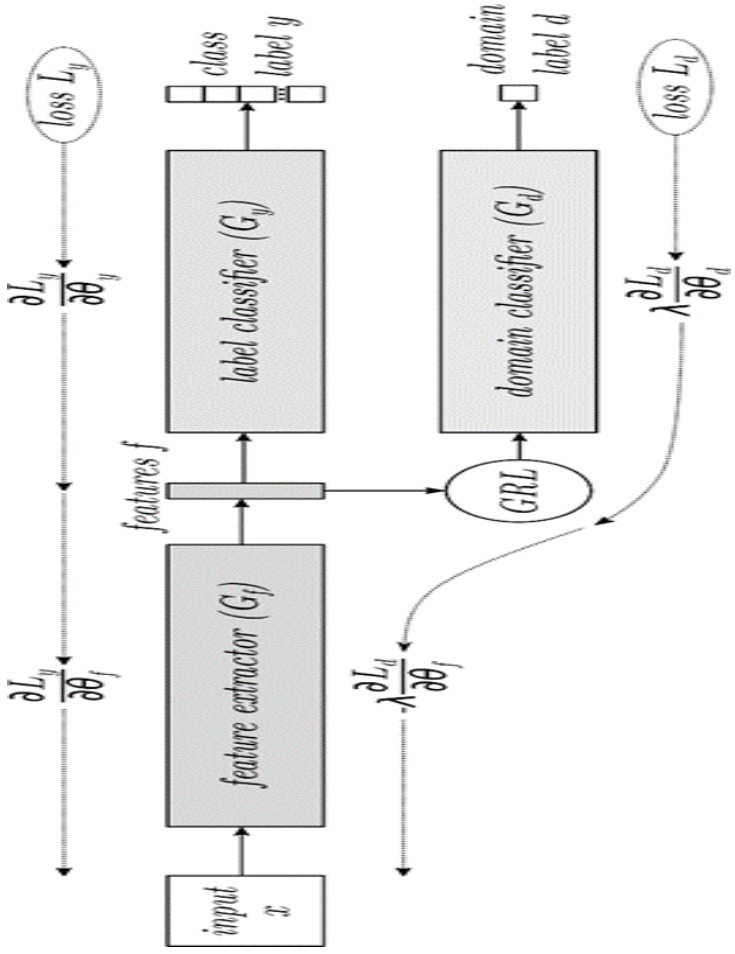

Figure 2. Design of IUDANN for continuous performance optimizations [1]

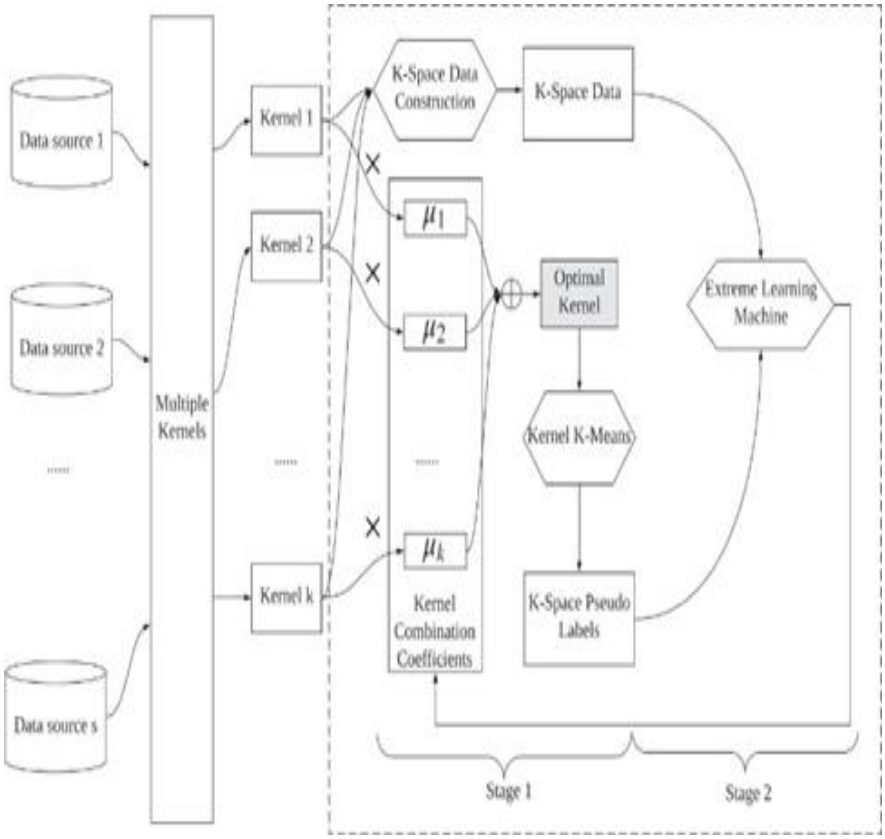

Figure 3. Design of TUMK-ELM for heterogeneous data processing [2]

Due to continuous learning, the proposed model is capable showcases an accuracy of 93.5%, which is higher than Robust Multiple Kernel K Means (RMKKM) (85.5%), and Linear MKKM (LMKKM) (86.4%) models, which makes the underlying model useful for large-scale deployments. But the model requires implementation of multiple kernel types, which increases its computational complexity. To reduce this complexity, work in [3] proposes useof Unsupervised Cross View Metric Learning (UCVML), which can be used for 2D & 3D datasets. The model uses shared mapping for exploration of shared features via estimation of Nonparametric Maximum Mean Discrepancy (NMMD) metrics, that is used for domain adaptation & transfer learning operations. The model showcases an accuracy of 96.2% on different datasets, which is higher than Cros View Quadratic Discriminant Analysis (XQDA) (75.4%), Cross View Discriminant Component Analysis (CVDCA) (83.5%), and Clustering- based Asymmetric Metric Learning (CAMEL) (85.5%) under different datasets. This model requires larger training data, thus is only applicable for big data applications, thus it needs to integrate data augmentation to improve its scalability performance. Augmentation models are capable of deployment for small scale to large scale applications, which increases their deployment capabilities. Such models are discussed in [4], wherein researchers have proposed use of Artificial Neural Network (ANN), Hierarchical Cluttering, Bayesian Clustering, Partitional Clustering, Mixture Distribution, Blind Signal Separation, Hidden Markov Model (HMM), Probabilistic Graph Models (PGMs), Generative Topographic Model (GTM), Nonlinear Clustering with Multidimensional Data (NCDM), Auto Encoders (AE), Self-Organizing Kohonen Maps (SOKM) and Stochastic Neighbour Estimation (SNE). These models are applied to network applications, but can be extended for other classification & post-processing tasks. It was observed that ANN achieved an accuracy of 83.5%, HMM showcased an accuracy of 79.8%, PGMs had an accuracy of 75.4%, NCDM achieved an accuracy of 64.5%, SOKM showcased an accuracy of 85.5%, while SNE had an accuracy of 74.9% on different datasets. These models must be validated on multiple datasets, and their performance can be improved via application of sparse coding & other deep learning techniques. Such a technique is discussed in [5], which proposes use of Unsupervised Transfer Learning using Multiple Scaled Convolutional Sparse Coding (UTL MSCSC) for medical applications. The model uses different filter sets to extract features, which assist in continuously improving its training & validation performance. Flow of the model is depicted in figure 4, wherein Colour Decomposition (CoD), Multiple Scale Convolution, Absolute Value Rectification at element level (Abs), Local contrast normalization (LCN) and Max Pooling (MP) operations are used to design a UTL Network, that is capable of classifying multiple data types.

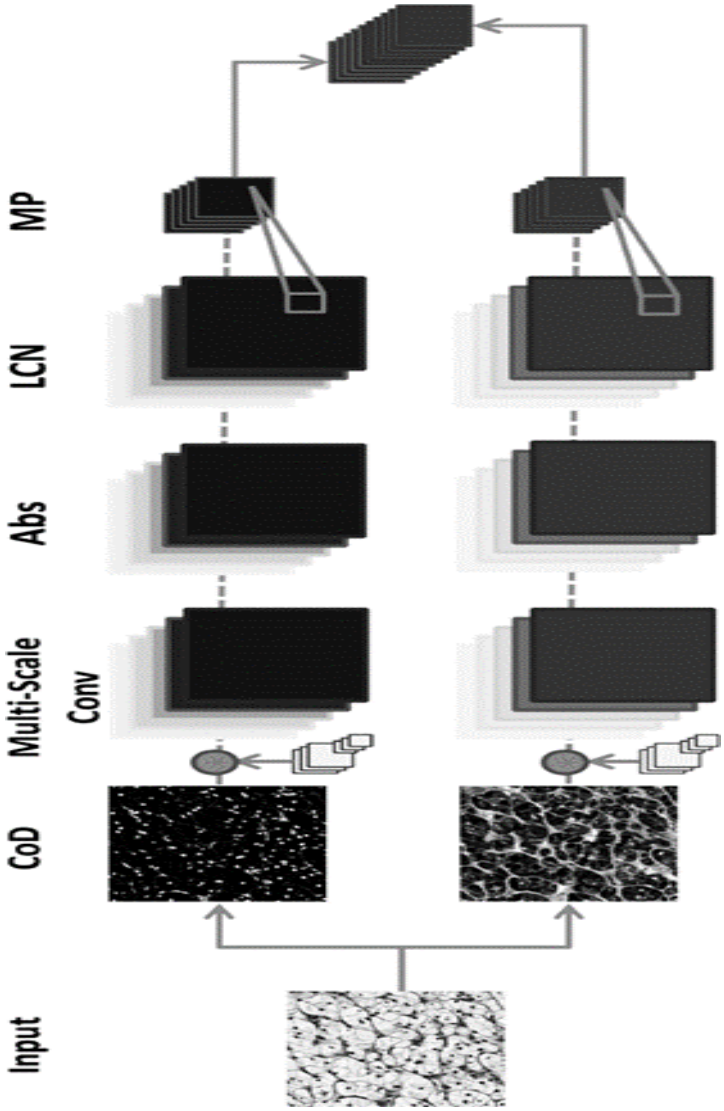

Figure 4. Design of the UTL MSCSC Model for efficient feature representations [5]

Due to use of these filters, the model showcases an accuracy of 93.42%, which is higher than Pseudo Multiple Scaled CSCSPM (PMS CSCSPM) (92.86%), Power Spectral Density with Stacked Predictive Sparse Coding (PSD2SPM) (91.85%), Sparse Morphometric Linear Spatial Pyramid Matching (SMLSPM) (92.35%), Sparse Coding (ScSPM) (79.58%),
and Kernel SPM (KSPM) (85%) for the same dataset applications. But the model is highly complex, cannot detect irregularities in input datasets and requires large training & validation delays. To overcome these limitations, work in
[6] proposes use of Implicit Irregularity Detection (IIRD) via use of unsupervised learning on temporal data patterns. The model uses a combination of Regression Analysis, Gaussian Distribution, Fuzzy Rule-base, and Probabilistic Modelling to estimate feature sets that can add periodicity to data samples. It initially constructs a Basic Regular Group (BRG) and performs its expansion via augmentation models. This augmentation is applied till periodicity is not achieved in the datasets, due to which the model is capable of achieving a linearly increasing accuracy 98.5%, that is higher than Density-Based Spatial Clustering of Applications with Noise (DBSCAN) (94.1%), k Means (75.5%), and Hierarchical Clustering (HC) (78.9%) across multiple datasets. This model's performance can be further extended via use of Uncorrelated and Discriminative Feature Selection which is implemented via Constrained Spectral Analysis for efficient feature selection (DUCSAFS) as discussed in [7], which can be deployed

initially explores low-redundant discriminative features, and avoids trivial solutions, which simplifies the optimisation process. Due to these characteristics, the model is applicable for multidimensional datasets with different classes and has minimum overheads. It is capable of achieving an accuracy of 89.5% under different applications, which is higher than

Least Squares (LS) (64.5%), Nonnegative Discriminative Feature Selection (NDFS) (71.9%), Joint Embedding Learning and Sparse Regression (JELSR) (74.8%), Simultaneous Orthogonal basis Clustering Feature Selection (SOCFS) (83.5%), and Structure Optimal Graph Feature Selection (SOGFS) (89.1%) when evaluated under the same datasets. This model showcases superior performance, but doesn't incorporate explainable characteristics, which can be used to further improve it usability. To perform this task, work in [8] proposes use of SOM-based Explainable Clustering Methodology (SOM ECM), for generation of synthetic explanations. It calculates Unified Distance Matrix (U Matrix) for different component planes in order to solve segmentation, clustering, and classification tasks. The model is able to achieve an average accuracy of 79.5% under different applications.

Models that use Unsupervised & Nonlinear Adaptive Manifold Learning (UNAML) [9], Data Normalization for Neural Networks (DNNN) [10], Heterogeneous Coupling with Unsupervised Learning to represent Categorical datasets (HCUL) [11], and use of g Support Vector Machine (SVM) under unary and binary modes [12] are also discussed by researchers. The UNAML Model is capable of handling unsupervised datasets, while DNNN can be used to handle data from heterogenous sources with high efficiency and good classification performance. These models must be combined in order to design an integrated high-performance model that can cater to large-scale datasets. While HCUL showcases higher efficiency for representing data used in classification applications, under multiple heterogeneous datasets. The model

which can be extended via use of SVM for achieving better accuracy, precision, recall and Area Under the Curve (AUC) levels. The UNAML model achieved an accuracy of 85.4%, while ANN showcased an accuracy of 73.9% under different applications. Upon similarevaluation, HCUL that uses multiple kernels was able to classify data with 91.5%, while SVM showcased an accuracy of 83.5% for MicroRNAs based classification applications. But these models do not use clustering techniques, which limits their data representation capabilities. To overcome this limitation, work in

[13] proposes use of Hybrid Unsupervised Clustering (HUC) via integration of Sub-Space Clustering (SSC) & One Class Support Vector Machine (OCSVM) which assists in improving classification performance for multidimensional datasets. The HUC SSC OCSVM Model achieves an accuracy of 89.9%, which is higher than SSC with EA (86.2%), DBSCAN (85.9%), and k Means (83.4%) when averaged for different applications. This efficiency can be improved via integration of model enhancements in existing Neural Networks. Work in [14] proposes such a model, which uses Unsupervised Learning perceptron adopting phase change memory (PCM) synapses with Spike Timing Dependent Plasticity (STDP) & Neural Redundancy (NR) methods. These methods assist in integration of long-term memory availability, which improves classification performance when applied for multidimensional data applications. The PCM STDP NR model showcases an accuracy of 91.5%, which makes it useful for real-time deployments. This model must be validated on larger datasets, and can be further extended via use of Confidential Correspondence Consistency (CCC) as discussed in [15], which assists in high- efficiency augmentation of image sets to improve classification performance for data limited applications. The CCC model is depicted in figure 5, wherein Siamese CNN along with initial disparity, correspondence consistency, and positive sample propagation are used to achieve an accuracy of 91.2% under different datasets. This accuracy is higher than Content CNN (84.5%), and Global Context CNN (GCCNN) (89.5%) which makes it useful for a wide variety of real-time applications

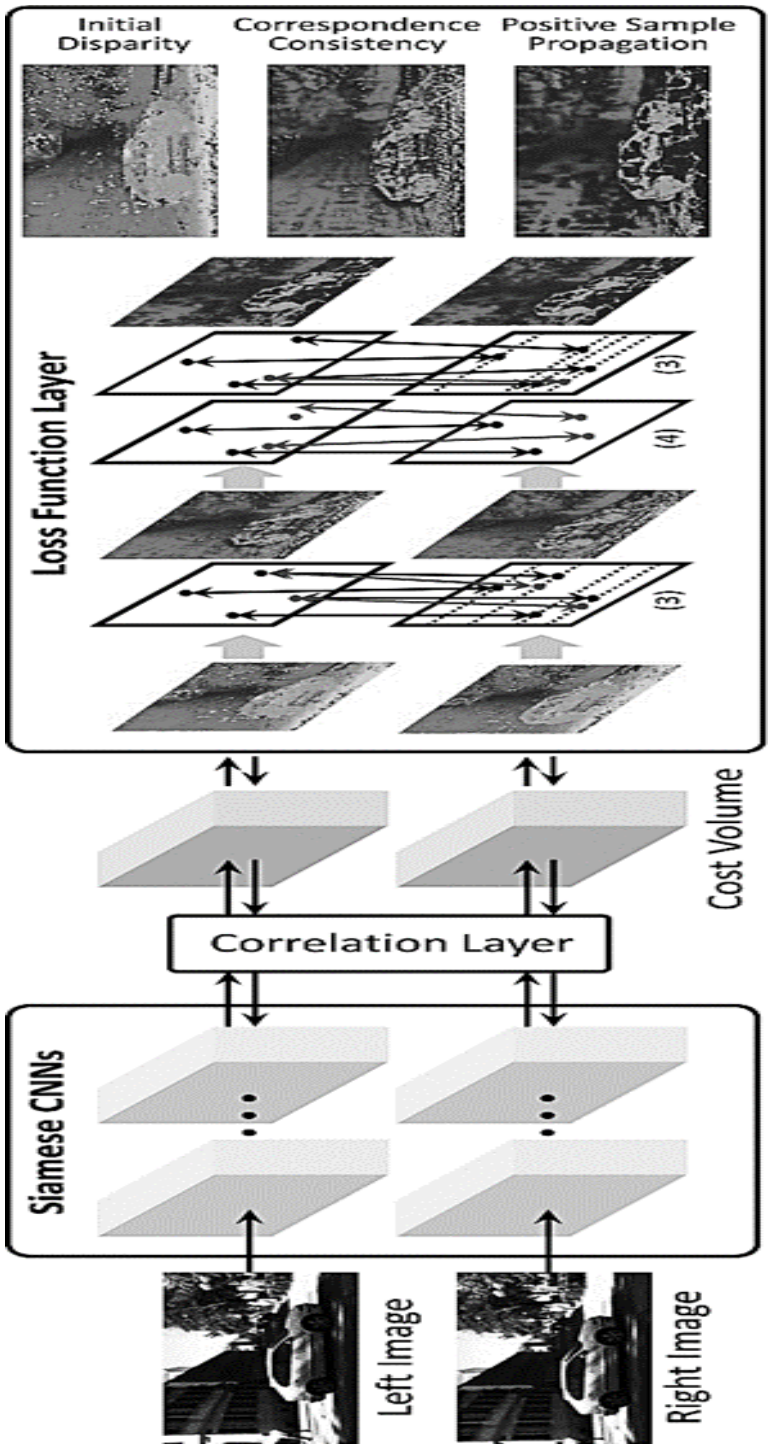

Figure 5. Design of CCC based CNN Model for low error & limited data capabilities-based classification applications [15]

The model must be tested on different datasets, and can be extended via use of low-cost & high- efficiency Q-Learning methods for incremental performance optimizations. Such models are discussed in [16, 17], which propose use of Multistage Method for Leveraging Order- Independent Transparency (MMLOIT), and combination of Event Shift with Histogram Shape (ESHS) which assists in continuously improving model performance via high-density feature extraction & selection techniques. The MMLOIT model is mainly used for data visualization, and can be deployed for a wide variety of applications, while the ESHS model is used for event analysis in terms of event chronology, periodic similarity and aperiodic similarity levels. A combination of both these models should be done to improve classification & representation performance. The MMLOIT model showcases an accuracy of 64.5%, while the ESHS model showcases an accuracy of 91.3% across different datasets. Extensions to these models are discussed in [18, 19] which propose use of Neural Network-Based Blind Equalization (NNBBE), and design of a new distance metric (NDM) which is based on dynamic attribute-level weights that are evaluated via use of frequency probabilities. These models assist in improving classification & pattern analysis performance for multiple applications. The NNBBE model is useful for training existing Neural Networks by integration of blind equalization which improves their accuracy performance. It showcases an accuracy of 96.5%, while NDM is able to achieve clustering accuracy of 91.4%, due to which, both models are useful for high-performance application deployments. These models must be validated on heterogeneous applications, which will assist in estimating its real-time performance. Such applications are discussed in [20, 21], which propose use of pattern analysis for text classification, and perceptual category learning based use cases. Text classification applications can use Variational Autoencoder Neural Networks (VANN) with Graph Regularization (GR), which assists in achieving an accuracy of 85.9% across different datasets.

This model showcases better performance than Autoencoder (AE) (82.8%), Sparse AE (SAE) (78.5%), Stacked AE (STAE) (79.1%),
Denoising AE (DAE) (85.9%), Restricted Boltzmann Machine (RBM) (72.3%), and Deep Belief Networks (DBNs) (73.5%) for the same datasets. While the perceptual category learning model initially converts all datasets into Gaussian distributions, and then mixes these distributions to design Online Mixture Estimation (OME), which assists in achieving an accuracy of 90.5% across different 1D datasets. To performance can be further improved via use of Extreme Learning Machines (ELMs) [22], Unsupervised Linear Discriminant Analysis (ULDA) [23], Support Vector Machine with Measure of Textual Lexical Diversity (SVM MTLD) [24], and CNN fused with Differentiable Feature Clustering (CNN DFC) [25], each of which assist in improving pattern analysis performance via feature augmentation process. ELMs are observed to be highly complex, and thus can be used under high-performance computing scenarios, while ULDA is capable of processing multidimensional data with high efficiency with low complexity, thus it is recommended that ULDA must be used for initial feature representations, while ELMs must be applied for feature learning process. SVMs also showcase good classification performance, and thus can be used to replace ELMs, but they cannot be used for applications with higher number of classes. The CNN DFC model is able to achieve both these characteristics due to use of Differentiable Feature Clustering, which assists in pre-processing the data before actual classification. Due to which, the CNN DFC model is highly useful for large-scale classification applications. The ELM model showcases an accuracy of 96.63%, which is higher than Laplacian Eigenmaps (LE) (91.5%), Spectral Clustering (SC) (89.2%), Deep Autoencoder (DA) (90.2%), and k Means (89.5%) for different datasets. While, the accuracy of ULDA is 86.5%, which is higher than LDA (85.2%), and Real Time LDA (RTLDA) (85.3%) across different multidimensional datasets. SVM showcases an accuracy of 83.1%, but has lower complexity than other models. The CNN DFC model is depicted in figure 6, and outperforms all these models by achieving an accuracy of 95.4%, due to integration of Normalized Response Maps (NRMs), and filtering models for achieving better data processing capabilities.

These models are useful when applied to 2D or 3D datasets, but 1D datasets are used in a wide variety of practical applications. Work in [26, 27, 28] proposes use of SP theory based Neural Networks (SPNNs), customized 1D Reconfigurable Intelligent Surface Beamforming Neural Network (1D RISBNN), and Heterogeneous Unsupervised Domain Adaptation with Grassmann's Linear Monotonic Maps with Geodesic Flow Kernel (GLMM GFK), which assist in extraction of multidomain feature sets for highly efficient data representation purposes. These models utilize Fully Connected Neural Networks (FCNNs) for classifying & processing the extracted data into different application-specific categories. The SPNN Model is highly complex, but showcases an accuracy of 97.5%, which is better than 1D RISBNN that showcases an accuracy of 96.1 %, but can be used for multidimensional datasets. The GLMM GFK uses incremental feature updates, due to which it is capable of achieving accuracy between 86.1% to 96.4% for different applications. These models must be deployed for different applications, which will assist in estimating their real-time performance across multiple scenarios. Work in [29, 30] discusses such applications, wherein Kalman Filter with Pose CNN (KFP CNN), and Unsupervised Two- Path Neural Network (UTPNN) are applied to

video processing, and high-density cell-based image processing applications. The KFP CNN model showcases an accuracy of 98.7%, while UTPNN achieves an accuracy of 85.6% under different datasets. The UTPNN model also proposes a custom Convolution Long-Short- Term Memory (Conv LSTM), which assist in extraction of multiple levels of features for improving data representation efficiency across different scenarios.

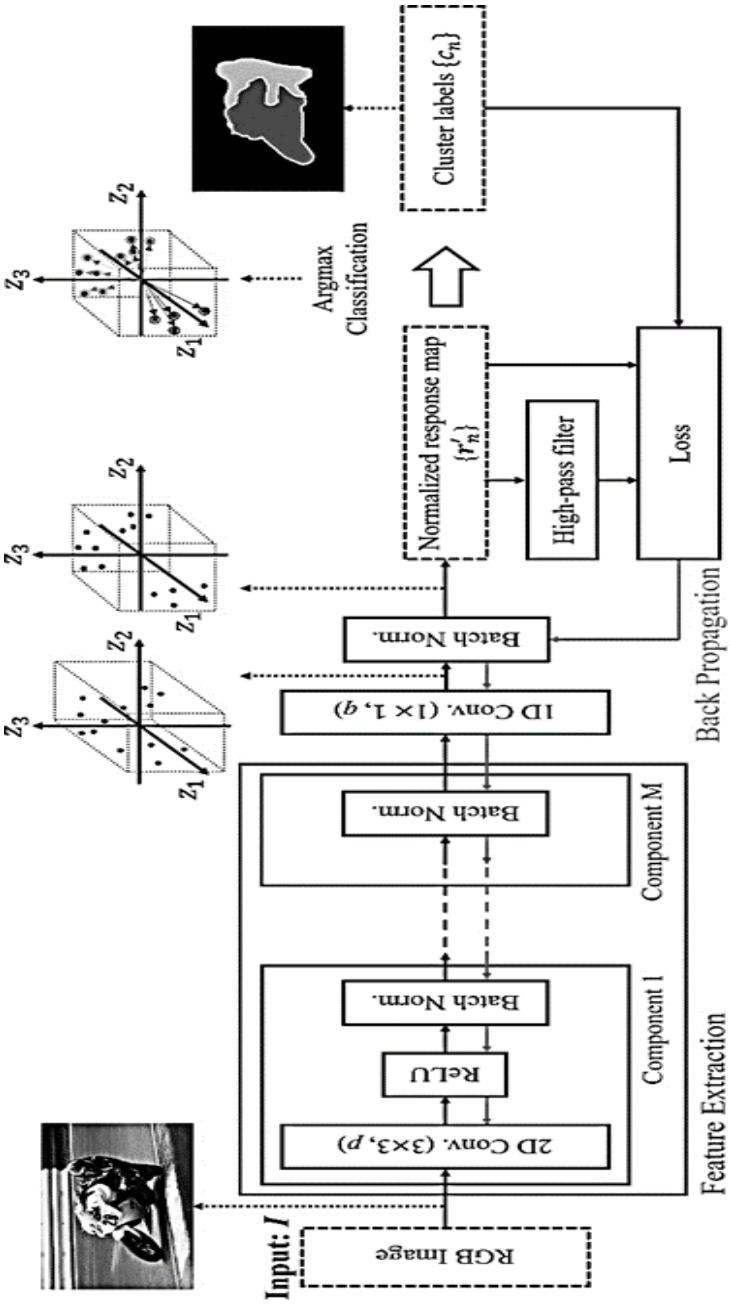

Figure 6. Integration of CNN with DFC for better signal processing performance

Pattern analysis models are also useful for solving issues that require remote & real-time monitoring for multiple inputs. Such applications, and their ML based solutions are proposed in [31, 32, 33], which discuss use of Prediction-based Proactive Drone Management (P2DM) with SVM, Variational Auto-Encoder (VAE) for Unsupervised Deep Spectrum Sensing, and Coupled CNN with Adaptive Response Function Learning (CCNN ARFL) for Unsupervised Hyperspectral Super Resolution applications. The P2DM Model is highly context sensitive, with low energy consumption and lower complexity, but achieves an accuracy of 73.5% under for drone sites. While the VAE Model showcases an accuracy of 93.5%, which makes it useful for spectrum sensing, but can be extended for other use cases. Similarly, the CCNN ARFL uses a combination of Low Resolution & High Resolution Hyper Spectral Imaging with Autoencoder (Lr & Hr HIS AE) as depicted in figure 7, which assists in achieving an accuracy of 91.5% under different dataset configurations. But these models are highly complex, and require large datasets for efficiency operations. To overcome this limitation, work in [34, 35, 36] proposes use of Two Stage CNN (TSNN), Unsupervised Deep Feature Learning (UDFL), and Instance-Based Learning with Q-Learning (IBQL) for data augmentation that can be used with low density datasets. These models integrate different information processing layers, which increases data representation efficiency for cross dataset applications. They also use incremental learning, which assists in continuous training set updates via correlation matching based feedbacks. Due to which the TSNN model showcases an accuracy of 89.1%, while UDFL achieves an accuracy of 94.8%, and while IBQL showcases an accuracy of 96.5% under different dimensional & different categorical datasets.

Extended deep learning models that use Masked Generative Adversarial Networks (M GAN) [37], Spiking Neural Network with Cross Modal Processing (SNN CMP) [38], and Selective Unsupervised Learning via Autoencoder with GAN (SUL AE GAN) [39], are discussed and deployed for large-scale applications. These models utilize application-specific feature processing in order to represent data with minimum overheads. The represented features are processed via augmented learning models which assists in improving their cross-dataset efficiency for different applications.

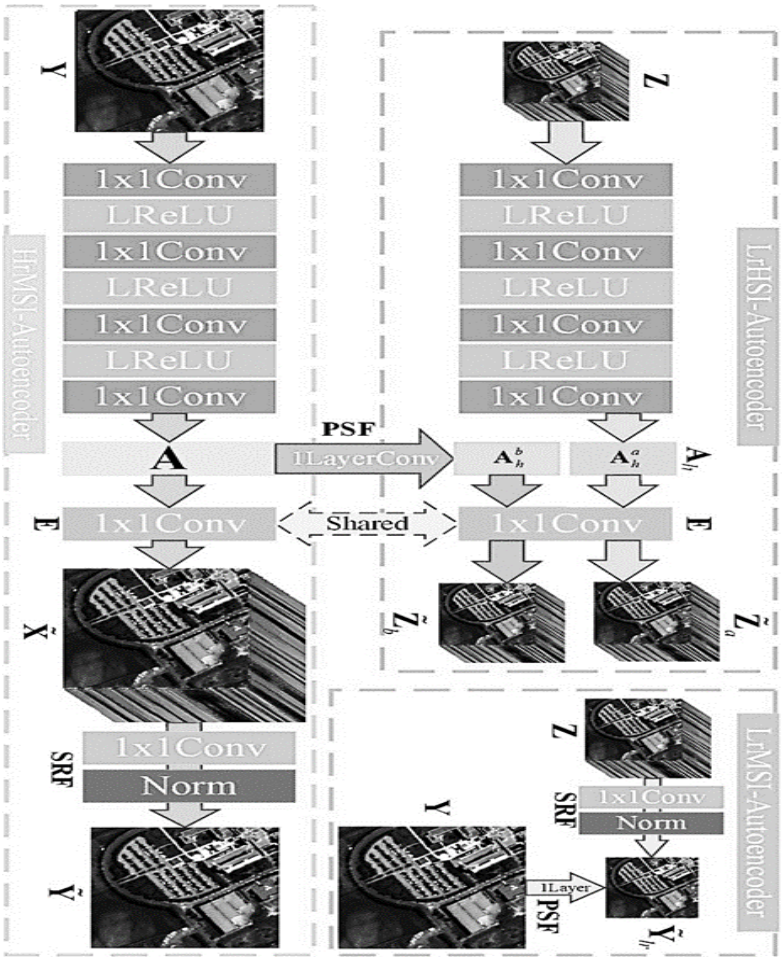

Figure 7. Design of CCNN ARFL Model for deploying high efficiency classification process

The M GAN Model showcases an accuracy of 97.6%, while SNN CMP achieves can accuracy of 95.5%, while SUL AE GAN showcases an accuracy of 92.7% for multidimensional data applications. Extensions to these models are discussed in [40, 41, 42], which proposes use of different metrics like Response Time for Aberrant Response (RTA), kernel density maximum entropy (KDME), and discussion of different fusion & deep learning models which assist in improving processing performance for multiple application types. The RTA model showcases an accuracy of 83.4%, while KDME showcases an accuracy of 93.4% which makes them useful for real-time data processing applications. This performance can be improved via use of bioinspired models like Genetic Algorithm (GA) [43], Genetic Neural Network (GNN), [44] and Particle Swarm Optimization (PSO) based SVM [45] which assists in stochastically modelling different use cases for better learning performance. The GA Model assists in achieving an accuracy of 85.5%, while GNN showcases an accuracy of 91.4%, and PSO with SVM showcases an accuracy of 97.5% under different applications. These models have different use cases, but can be deployed for large-scale scenarios. To further analyze scalability of these models, they are compared in terms of accuracy, precision, recall, computational complexity, and scalability performance in the next section of this text. Based on this discussion, researchers will be able to identify best performing models, for their application-specific use cases.

III. EMPIRICAL EVALUATION AND COMPARISON OF REVIEWED MODELS

From the literature survey it can be observed that existing learning models used for unsupervised analysis of existing cyber physical deployments have wide variety of applications. These models have performance variations based on context, deployment type, data type, and applicability. To facilitate model selection, this section compares the reviewed models in terms of their accuracy (A), precision (P), recall (R), computational complexity (C), and scalability (S) measures. These values are accumulated via pragmatic evaluation of these reference models. Out of these metrics, computational complexity & scalability do not have absolute values, thus, values of these metrics are evaluated in terms of fuzzy ranges of Low (L=1), Medium (M=2), High (H=3), and Very High (VH=4), which will assist readers to identify context-specific models for their deployments. These values can be observed from table 1 as follows,

Model	**A (%)**	**P (%)**	**R (%)**	**C**	**S**
IUD ANN [1]	96.95	74.24	75.60	H	M
CNN [1]	57.53	66.13	68.58	VH	M
DANN [1]	68.23	75.59	77.04	VH	H
iCNN [1]	72.62	84.01	84.83	VH	H
iDANN [1]	85.91	88.30	91.33	VH	H
TUMK ELM [2]	93.5	88.47	91.50	H	H
RMK KM [2]	85.5	89.37	89.04	M	L

SPM [5]					
PSD2 SPM [5]	91.85	87.93	91.74	H	L
SML SPM [5]	92.35	85.64	88.53	H	L
Sc SPM [5]	79.58	87.69	88.41	H	M
KSPM [5]	85	92.53	93.69	H	L
IIRD [6]	98.5	89.37	93.54	VH	H
DB SCAN [6]	94.1	82.83	85.57	H	H
k Means [6]	75.5	81.30	80.34	M	L
HC [6]	78.9	77.63	82.39	L	M
DUC SAFS [7]	89.5	75.30	76.85	H	H
LS [7]	64.5	70.40	72.70	H	H
NDFS [7]	71.9	76.73	78.44	H	H

JELSR [7]	74.8	82.47	83.28	H	H
SOCFS [7]	83.5	84.03	87.51	H	H
SOGFS [7]	89.1	84.67	85.35	H	H
SOM ECM [8]	79.5	79.60	84.13	VH	H
UN AML [9]	85.4	83.60	83.56	VH	M
DNNN [10]	73.9	82.97	86.32	H	M
HCUL [11]	91.5	88.30	89.70	VH	H
SVM [12]	83.5	86.53	89.04	L	M
HUC OC SVM [13]	89.9	87.33	89.38	VH	H
SSC EA [13]	86.2	85.17	88.26	H	H
DB SCAN [13]	85.9	86.93	88.44	H	H
k Means [13]	83.4	88.70	90.43	M	L
STDP [14]	91.5	89.07	92.35	H	M
CCC [15]	91.2	88.40	88.10	VH	H
Content CNN [15]	84.5	79.50	85.97	VH	VH
GC CNN [15]	89.5	81.77	82.02	VH	VH
MML OIT [16]	64.5	84.10	85.38	H	H
ESHS [17]	91.3	93.07	95.42	H	H
BBE [18]	96.5	91.27	93.81	VH	H
NDM [19]	91.4	86.70	88.82	VH	H
VANN GR [20]	85.9	82.40	84.93	VH	H
AE [20]	82.8	80.13	82.72	VH	VH

SAE [20]	78.5	81.17	81.50	VH	VH
STAE [20]	79.1	79.10	82.39	VH	VH
DAE [20]	85.9	77.23	80.56	VH	VH
RBM [20]	72.3	78.77	79.83	VH	VH
DBNs [20]	73.5	86.77	88.09	VH	VH
OME [21]	90.5	92.77	95.36	H	H
ELMs [22]	96.3	92.33	94.98	VH	VH
LE [22]	91.5	90.30	92.47	H	H
SC [22]	89.2	89.63	91.74	H	H
DA [22]	90.2	88.73	91.15	H	VH
k Means [22]	89.5	87.07	89.42	M	L
ULDA [23]	86.5	85.67	87.67	VH	H
LDA [23]	85.2	84.53	87.94	H	H
RT LDA [23]	85.3	87.93	89.32	H	H
SVM MTLD [24]	83.1	92.00	94.06	H	H
CNN DFC [25]	95.4	96.33	98.85	VH	VH
SPNN [26]	97.5	96.30	99.13	VH	H
1D RIS BNN [27]	96.1	96.70	97.77	VH	H
GLMM GFK [28]	95.3	93.20	95.68	VH	H
KFP CNN [29]	98.7	85.93	90.88	VH	VH
UTP NN [30]	85.6	84.20	84.48	H	H
P2DM SVM [31]	73.5	86.17	88.34	H	H
VAE [32]	93.5	91.37	94.40	VH	H
CCNN ARFL [33]	91.5	91.80	93.81	VH	H

TSNN [34]	89.1	93.47	95.81	VH	VH
UDFL [35]	94.8	96.30	98.50	H	H
IBQL [36]	96.5	96.53	98.95	VH	VH
M GAN [37]	97.6	95.27	97.15	VH	VH
SNN CMP [38]	95.5	90.53	94.50	VH	H
SUL AE GAN [39]	92.7	89.83	90.61	VH	VH
RTA [40]	83.4	87.43	90.85	H	H
KDME [41]	93.4	90.10	92.43	H	H
GA [43]	85.5	91.47	92.80	L	H
GNN [44]	91.4	93.57	96.47	H	VH
PSO [45]	97.5	93.75	72.58	H	H

Table 1. Statistical evaluation of different unsupervised learning models

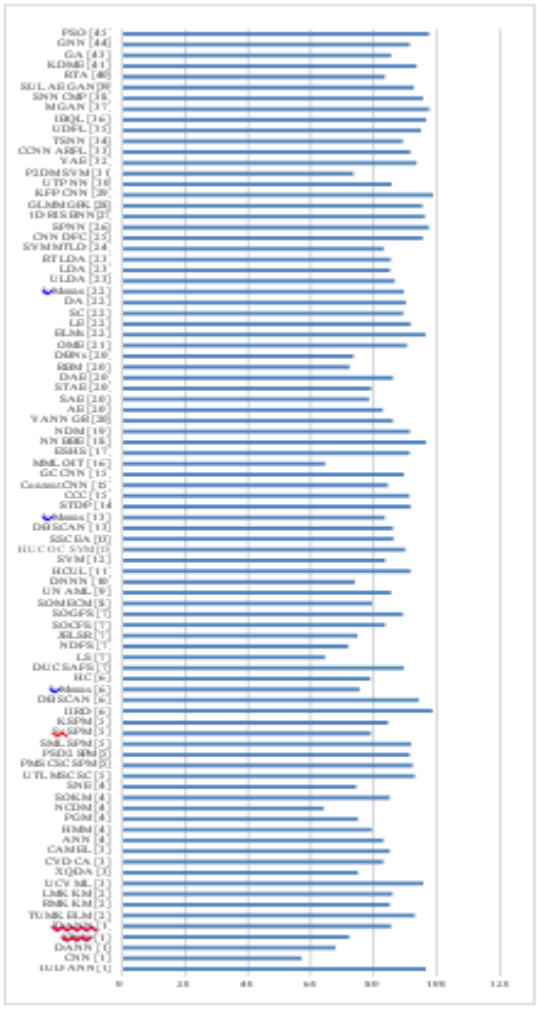

Figure 8. Accuracy of different models

Based on this evaluation and figure 8 it can be observed that KFP CNN [29], IIRD [6], M GAN [37], SPNN [26], PSO [45], IUD ANN [1], NN BBE [18], IBQL [36], ELMs [22], UCV ML [3], Based on this evaluation and figure 8 it can be observed that KFP CNN [29], IIRD [6], M GAN [37], SPNN [26], PSO [45], IUD ANN [1], NN BBE [18], IBQL [36], ELMs [22], UCV ML [3],

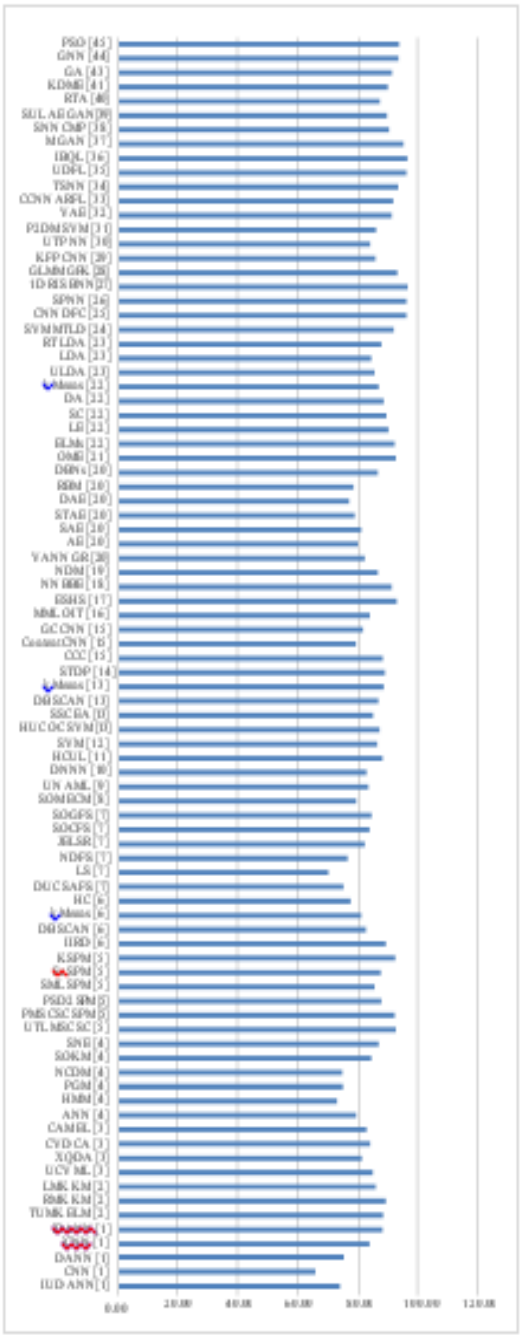

Figure 9. Precision of different models

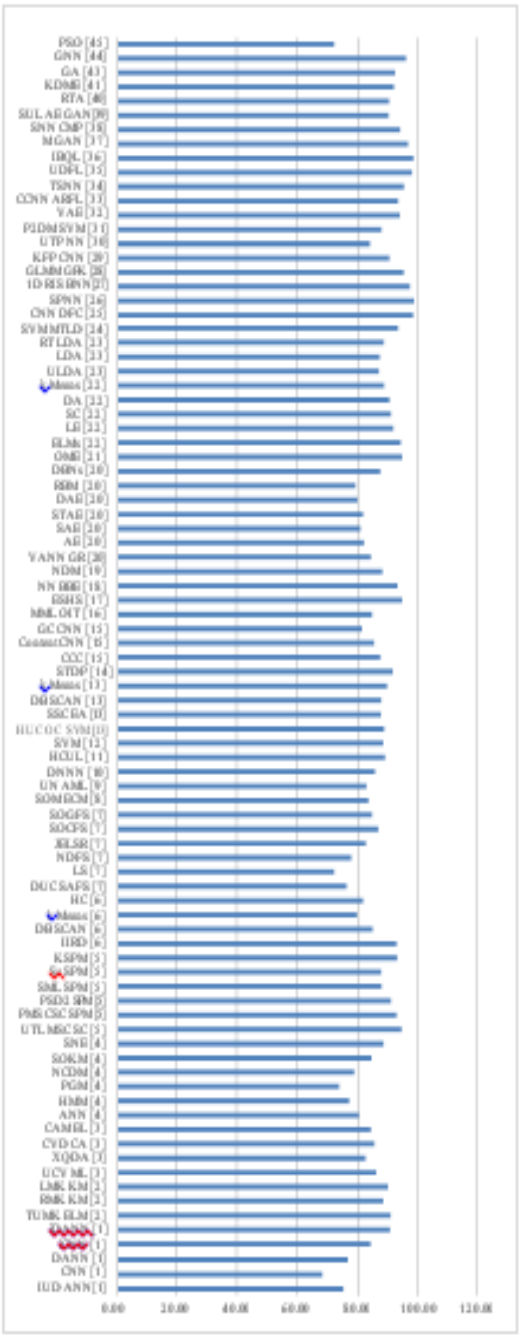

Figure 10. Recall of different models

Similarly, from table 1 and figure 9, it can be observed that 1D RIS BNN [27], IBQL [36], CNN DFC [25], SPNN [26], UDFL [35], M GAN [37], PSO [45], GNN [44], and TSNN [34] have better precision, which makes them useful for applications that require consistent performance across different evaluations.

Similarly, from table 1 and figure 10, it can be observed that SPNN [26], IBQL [36], CNN DFC [25], UDFL [35], 1D RIS BNN [27], M GAN [37], GNN [44], TSNN [34], and GLMM GFK [28] have better recall, which makes them useful for applications that require low error performance across different evaluations.

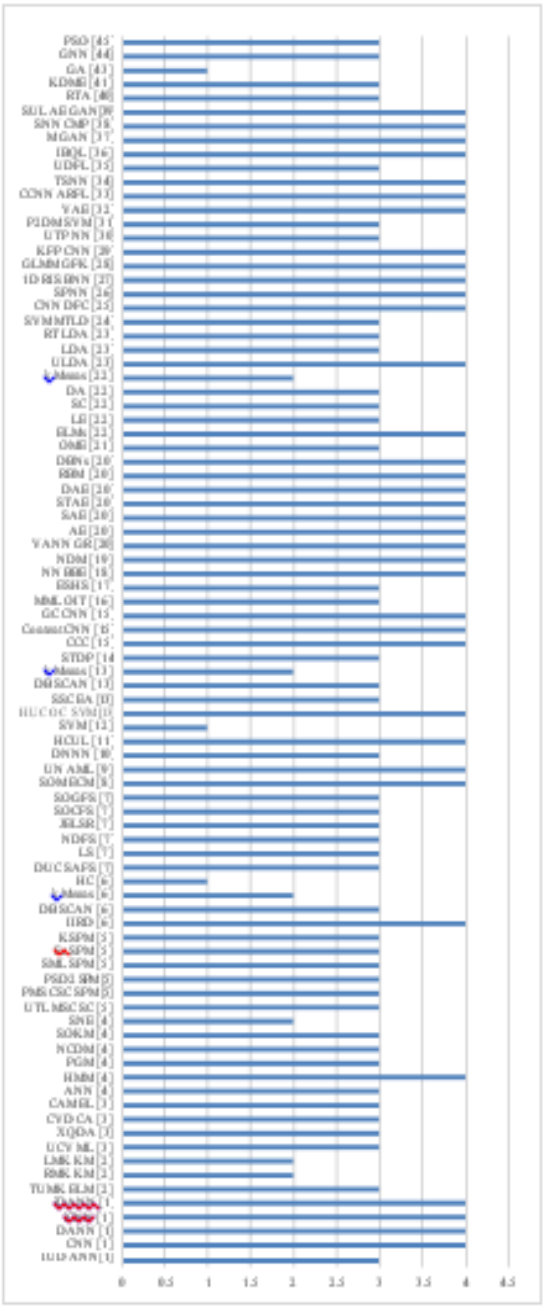

Figure 11. Computational Complexity of different models

Similarly, from table 1 and figure 11, it can be observed that HC [6], SVM [12], GA [43], RMK KM [2], LMK KM [2], SNE [4], and k Means [6] have lower complexity, which makes them useful for high-speed applications across different evaluations.

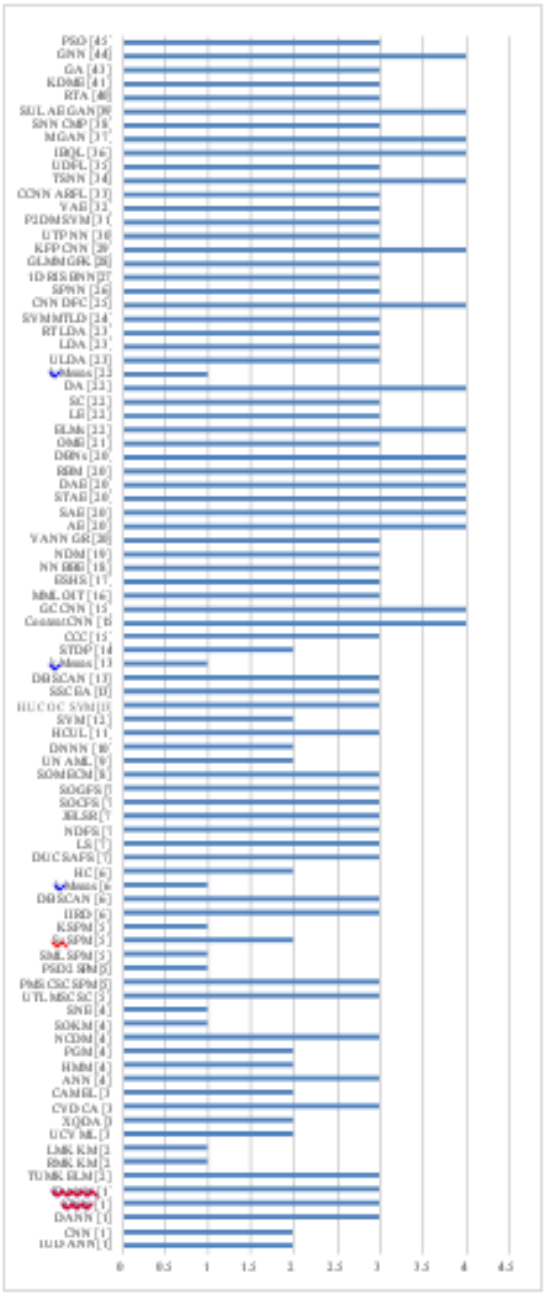

Figure 12. Scalability of different models

Similarly, from table 1 and figure 12, it can be observed that Content CNN [15], GC CNN [15], AE [20], SAE [20], STAE [20], DAE [20], RBM [20] , DBNs [20], and ELMs [22] have higher scalability, which makes them useful for large- scale applications.

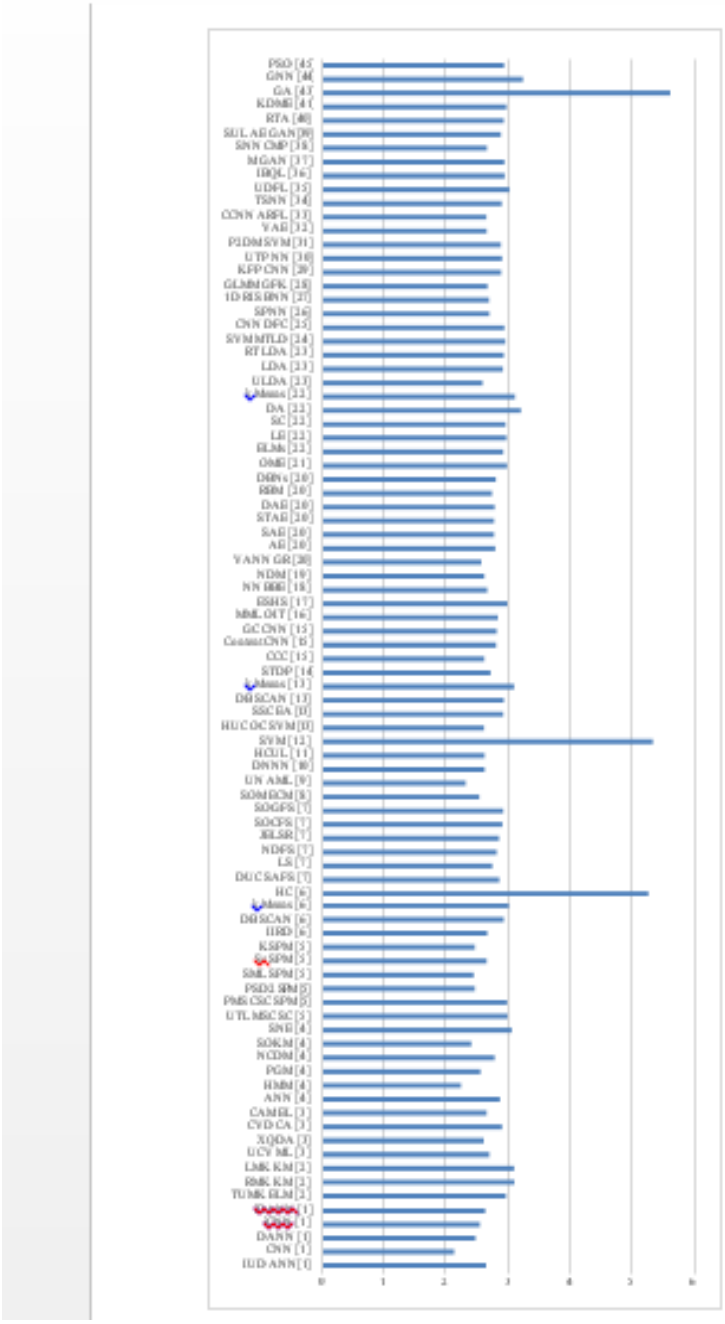

Figure 13. NRM of different models

To further assist in improving model selection

process, a Novel Rank Metric (NRM) is evaluated via equation 1, which assists in combining accuracy, precision, recall, complexity and scalability metrics.

$$NRM = \frac{P + R + A}{300} + \frac{4}{C} + \frac{S}{4} \dots (1)$$

Based on this evaluation and figure 13 it was observed that GA [43], SVM [12], HC [6], GNN [44], DA [22], k Means [22], RMK KM [2], LMK KM [2], SNE [4], UDFL [35], UTL MSC SC [5], ESHS [17], PMS CSC SPM [5], OME [21] , and KDME [41] have better overall performance, which makes them useful for high accuracy, high precision, high recall, low complexity and highly scalable application deployments. Thus, these models must be used when designing unsupervised learning applications for optimum performance under different use cases.

IV. CONCLUSION

This text extensively compares different unsupervised learning models in terms of their context-specific nuances, application-based advantages, functional limitations, and recommends various future enhancements, which will assist in improving its real-time performance. From this evaluation it was observed that existing models use ML methods along with bioinspired techniques for continuous performance optimizations, which assists in improving their real-time performance under different applications. It was also observed that effective feature representation along with optimized distance metrics have better performance when compared with their counterparts. This evaluation concludes that KFP CNN, IIRD, M GAN, SPNN, PSO, IUD ANN, NN BBE, IBQL, ELMs, UCV ML, and D RIS BNN have highest accuracy, D RIS BNN, IBQL, CNN DFC, SPNN, UDFL, M GAN, PSO, GNN, and TSNN have better precision, while, SPNN, IBQL, CNN DFC, UDFL, D RIS BNN, M GAN, GNN, TSNN, and GLMM GFK have better recall, which makes them useful for high accuracy applications that require low error performance across different evaluations. It was also observed that HC, SVM, GA, RMK KM, LMK KM, SNE, and k Means have lower complexity, while Content CNN, GC CNN, AE, SAE, STAE, DAE, RBM, DBNs, and ELMs have higher scalability, which makes them useful for high-speed & large-scale applications. These metrics were combined and a Novel Rank Metric was evaluated, which recommends that GA, SVM, HC, GNN, DA, k Means, RMK KM, LMK KM, SNE, UDFL, UTL MSC SC, ESHS, PMS CSC SPM, OME, and KDME have better overall performance, which makes them useful for high accuracy, high precision, high recall, low complexity and highly scalable application deployments. Thus, these models must be used when designing unsupervised learning applications for optimum performance under different use cases. In future, it is recommended that researchers must use a combination of these models which will assist them in improving their real time performance under different use cases. Furthermore, validation of these models must be done for large-scale applications, which will assist them in recognizing their scalability performance for multiple application scenarios.

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Utilizing Machine Learning for Detecting and Mitigating Distributed Denial-of-Service (DDoS) Attacks

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Abstract — **An attack known as a DDoS (distributed denial-of-service) occurs when the victim is subjected to an excessive volume of requests from the attacker. In order to accomplish this, an attack is launched simultaneously from a huge number of comprised devices, including laptops and Internet of Things (IoT) devices. The primary objective of this attack is to prevent the targeted servers from responding to valid requests, ultimately rendering them unreachable to users.**

The bandwidth and buffer size reduction on the targeted servers is one of the most significant effects of a DDoS attack. This is due to the fact that the servers are overloaded with requests, making it impossible for them to manage all incoming traffic. The outcome is that the targeted servers are overloaded and unable to handle any legitimate requests.

Recently, there has been an increasing trend of DDoS attacks, with attackers frequently using this method to target servers and networks. In response to this, researchers have proposed the utilization of various machine learning techniques, such as logistic regression, random forest classifier, and k-nearest neighbors classifier, for detection and classification different types of DDoS attacks. These machine learning techniques are useful when to analyze network traffic and identify patterns that are indicative of a DDoS attack. By utilizing such techniques, DDoS attacks are detectable in real-time, and protective steps can be taken to safeguard the targeted networks and servers.

Keywords — DDoS, Machine learning, DoS, Security, cyber security, IoT devices.

1.INTRODUCTION

Nowadays, everything from ecommerce to the medical sector has become dependent on the internet [1]. With this rising trend, the malicious activities on the internet have risen too. These activities range from stealing valuable information, stealing access to straight away restricting the services of the target [2]. These restrictions on services attacks in cyber security are called Denial-of-service attacks. Such attacks involve the attacker sending an excessive number of requests to the target website, server, or application. [3]

These attacks aim to restrict access to a particular website, server, or application by overwhelming it with a flood of traffic or requests [4]. The goal of a DoS attack is to make the targeted system unavailable to legitimate users, typically, by overwhelming the system's resources or disrupting its normal functioning [5].

These attacks can be launched using a variety of techniques, such as sending a lot of requests (more than the victim could ever handle) to a server, flooding a network with traffic, or exploiting a vulnerability in a system's software or hardware [6]. Some attackers use botnets, which are networks of compromised computers that can be controlled remotely, to launch DoS attacks [7].

DoS attacks can have a wide range of impacts, from causing temporary disruption of services to causing long-term damage to a system or organization [8]. They can also be used as a smokescreen for other types of cyber attacks, such as data breaches or ransomware attacks [9].

It is important for organizations and individuals to take steps to protect themselves from DoS attacks [10]. This can include implementing firewalls and intrusion detection systems, as well as monitoring network traffic for unusual activity. Additionally, organizations should have incident response plans in place to quickly identify and mitigate the effects of a DoS attack [11].

A DDoS (Distributed-denial-of-service) assault is when this attack is carried out from numerous other machines that are known as botnets or zombies and are directed at a single victim [12]. These requests are far too numerous for the target to process effectively, which forces the target to shut down and renders it unreachable to its actual users, doing a lot of harm [13].

This extremely potent electronic assault has been used to target network equipment and services all over the internet [14]. The detection of DoS and DDoS types of assaults has become an urgent issue as the total number of devices grows day by day as a result of IoT technology.

Machine learning is another field that is becoming more and more popular. A subset of artificial intelligence known as "machine learning" can learn and mimic human learning processes to provide predictions that are more accurate. With the amount of data available during training and testing, machine learning algorithms' performance gradually improves [15].This makes it an excellent choice for predicting such dangerous DDoS attacks. This paper provides following contributions to this topic:

1) Researching several DDoS detection technologies that have recently been created.
2) Analyze and apply multiple feature selection methods prior training the model.
3) To increase the effectiveness of DDoS detection systems and differentiate between various intrusions and DDoS attacks, the proposed system applies various ML models to real-world datasets.

2. LITERATURE REVIEW

This section thoroughly discusses the work done by authors of different research papers that we have studied while researching this topic. Authors of [16] have written about how industries are entering the fourth phase or otherwise known as Industry 4.0 in which the production systems have the man, machine and the product all interconnected. This digitalization has brought a whole new set of disadvantages with it. It has created new opportunities for cyber assaults, including Distributed denial of service (DDoS) attacks, which were not conceivable under the prior system due to its analogue makeup. These cyber attacks are intended to threaten whole production lines or even human lives. In the paper, they used machine learning to build several DDoS attack detection techniques for Industry 4.0 and employ a machine learning strategy to identify cyberattacks. They were getting network traffic data from an actual semiconductor manufacturing facility. They extracted 45 bidirectional network flow features and created several labeled datasets for ML model training and testing. They examined 11 different supervised, unsupervised, and semi-supervised algorithms and evaluated their performance through large-scale simulations. The results show that the supervised algorithm outperforms both unsupervised and semi-supervised algorithms in terms of detection performance. In particular, the decision tree model has an accuracy of 0.999 while limiting the false positive rate to 0.001. They have collected this data from production facilities of a Semiconductor company called Infineon.

To analyze DDoS attack detection performance using the latest CICDoS2019 dataset, work in [17] applied WEKA (an open-source software that provides tools for data preprocessing) with various machine learning (ML) algorithms were used. The model that produced the greatest outcomes was found to be CICDDoS2019. There are six different kinds of machine learning: K Nearest Neighbors (K-NN), Super Vector Machine (SVM), Naive Bayes (NB), Decision Tree (DT), Random Forest (RF), and Logistic Regression (LR) (ML). The methodology applied in this investigation. In the evaluation that was provided, the Decision Tree (DT) and Random Forest (RF) algorithms produced the best accuracy results, with 98% and 98%, respectively. However, the DT is superior to RF since its computing time is lower (4.53 s vs. 84.2 s, respectively). The following is followed by the presentation of concerns for potential future research

On the other side, the authors of [18] suggested a DDoSNet intrusion detection system for SDN settings. . This referred system combines auto encoders and recurrent neural networks and was developed using the Deep Learning (DL) technique (RNN). The CICDDoS2019 dataset has been used to assess the created system. When compared to the current methodologies, authors found that assault detection has significantly improved. In order to secure SDN environments, the suggested solution delivers considerable assurance

A study in [19] used the CICDDoS2019 dataset, to examine the effects of data balancing practices on network traffic categorization issues for various types of DDoS attacks. It provides a wide range of knowledge about reflection- and exploit-based attacks. The gathered data showed the effectiveness of data balancing methods to detect network attacks, including synthetic minority sampling, naïve random sampling, and adaptive synthetic sampling.

The authors of [20] suggested a system that could identify various DDoS attack types using the CICDoS 2019 dataset and a variety of classification techniques. Additionally, they extracted packets from the SDK environment, processed the dataset using a preprocessing function, and then used a classification method to find DDoS assaults. According to the authors, the decision tree outperforms SVM and Naive Bayes machine learning techniques.

A study described in [21] uses various machine learning techniques to analyze the success rate of intrusion detection systems. Using CICDDoS2019, there have been studies on a number of machines learning algorithms, including ANN, Support Vector Machines (SVM), Gaussian Naive Bayes, Multinomial Naive Bayes, Bernoulli ave Bayes, Logistic Regression, K-Nearest Neighbors (KNN), Decision Trees, and Random Forest techniques.

The study illustrates that the most accurate predictive models are K-Nearest Neighbors, Logistic Regression, and Naive Bayes models.

The authors of [22] employed the Deep Neural Network (DNN) to detect DDoS attacks in a sample of packets taken from network traffic using a deep learning technique. Since the DNN model includes feature extraction and classification methods, it can perform quickly and with a high level of detection accuracy even with little samples. The CICDDoS2019 dataset, which consist of a range of DDoS attack variations created in 2019, served as the basis for the researchers' testing. The referred system uses a deep learning model to attain an accuracy rate of 94.57%.

3. PROPOSED SYSTEM

Attacks that use distributed denial of service (DDoS) target IoT devices' vulnerabilities caused by out-of-date firmware or improper configuration. This has to be also considered when designing the models for DDoS detection systems.

The programming language chosen for this research was python. The following libraries were included which are necessary for the project:

1) *Logistic regression* - This is a type of supervised learning model which is often found to be used in classification and predictive analysis. It is also known as the logit model. It models the probability of an event taking place by having a linear combination of one or more independent variables [15,16,17,18].
The logistic function is given by

$$p(x) = \frac{1}{1 + e^{-(x-\mu)/s}}$$

2) *Random forest* - Is a learning technique that is frequently used for classification, regression, and other tasks. It works by building decision trees while the model is being trained [19,20,21,22,23,24]. When decisions or binary outcomes are provided at each phase of a machine learning job, decision trees are a common technique [25,26,27].

3) *K - nearest neighbors* - The k - nearest neighbor or k–nn is a non-parametric learning classifier based on supervised learning. It utilizes proximity of data points when making classification or predictions about the grouping of that data point. Few of the several distance measures that is used to detect these distances are Euclidean distance

$$d(\mathbf{p}, \mathbf{q}) = \sqrt{\sum_{i=1}^{n} (q_i - p_i)^2}$$

, Manhattan distance

$$D_{manhattan} = |x_2 - x_1| + |y_2 - y_1|$$

, etc [28,29,30].

The dataset that has been used for the machine learning model is NSL-KDD dataset. It is an improved dataset over the previous version of this dataset - KDD '99 data set, which was said to have some inherent problems.

4. METHODOLOGY/EXPERIMENTAL

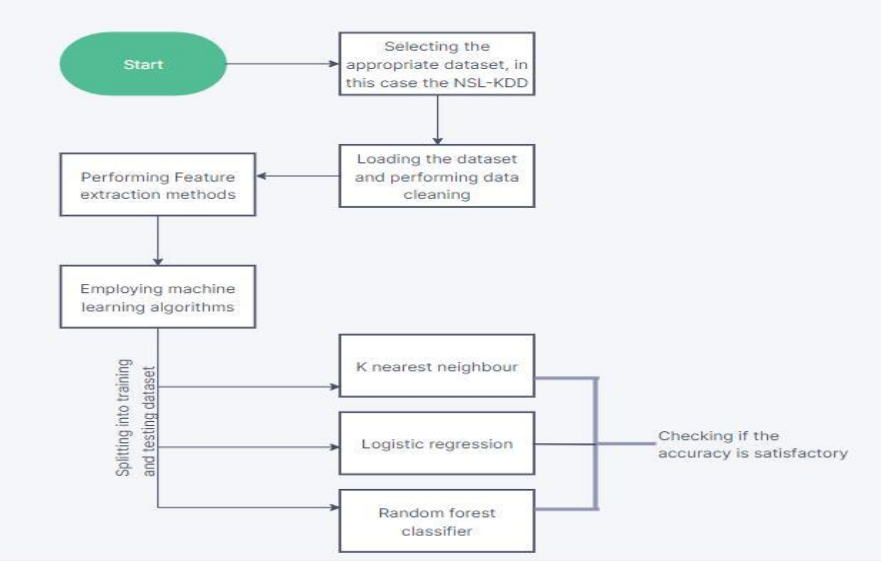


Figure 1. Flowchart for the procedural steps to attain the final result.

Here in the above flowchart (Figure 1), the procedural steps used by the system are shown. This system has included several libraries and modules in its work (Shown in figure 2), including numpy for working with arrays and performing mathematical operations, pandas for data analysis and manipulation, seaborn and matplotlib for data visualization and plotting, and various libraries from sklearn for machine learning and accuracy evaluation.

```
import itertools

import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
import seaborn as sns
# model imports
from sklearn.ensemble import RandomForestClassifier
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
from sklearn.metrics import confusion_matrix
from sklearn.model_selection import cross_val_score
# processing imports
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
```

Figure 2. Libraries used.

The dataset used in this study is the NSL-KDD dataset.The NSL-KDD dataset (NSL stands for "Network Security Laboratory") is a data set of network intrusion detection system (NIDS) created by researchers at the Department of Defense (DoD) Cyber Crime Center (DC3) and the Air Force Research Laboratory (AFRL). The NSL-KDD dataset contains a total of around 25,000 instances, with around 10% of them being attack instances and the rest being normal instances. This covers a broad range of attacks, including as Denial of Service (DoS) attacks, unauthorised access from a remote computer (R2L), and illegitimate access to local superuser (root) rights (U2R). This dataset is in .csv format and does not include column names. The system required the addition of column names and required flagging of all attacks as 1 and normal as 0.

The dataset is then divided into the lists of dos attacks, probe attacks, sybil attacks, and U2R. This proposed system uses a function to map the dataset according to their attack types and plotted pie charts for better visualization of the data. It also plots the pie chart of attack vs normal and normalMCS vs attack pie chart.

After visualizing the dataset, the system splitted the dataset into training and testing parts, using a ratio of 80:20. The proposed system has used the random forest classifier, k nearest neighbor, and logistic regression algorithms for prediction and evaluated the results. The findings demonstrated that, in contrast to logistic regression, which did not perform well and was very inconsistent, both the KNN and Random Forest classifiers performed well and consistently produced high-quality results. While both the KNN and the random forest were producing fast results, the random forest was slightly slower than the KNN.

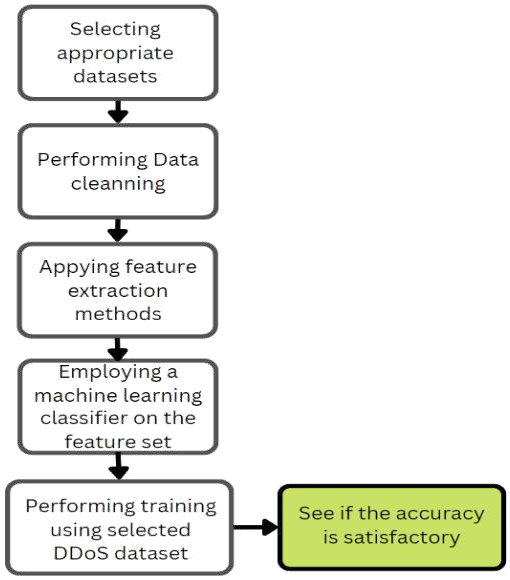
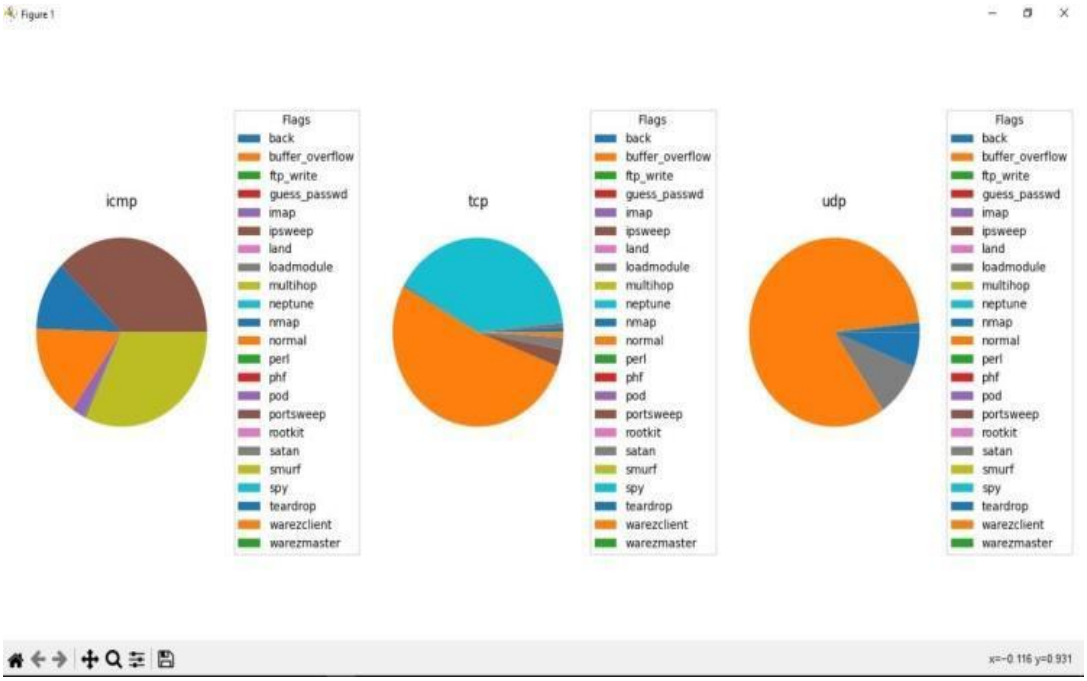


Figure 3: Block diagram for the entire process.

A more general view of the process can be taken from the above block diagram (Figure 3)

The accuracy for both the KNN and Random forest classifier was over 99% while accuracy for logistic regression was barely over 40% and was very inconsistent. Finally, the proposed system plotted the confusion matrix as a performance metric for analyzing their model. This matrix showed DDoS attacks differentiated from the normal and the other intrusion attacks. The terms predicted attack, predicted normal, actual attack, actual normal, predicted attack refers to the attack predicted by the algorithm, and predicted normal refers to the normal predicted by the dataset, whereas the terms actual predicted and actual normal refer to the actual that are actually the attacks and normal, respectively.

5. RESULTS AND DISCUSSIONS



Therefore, these are the attacks on various network protocols, as indicated in figure 4. UDP, TCP, and ICMP. Here, several flags signify various network attacks.

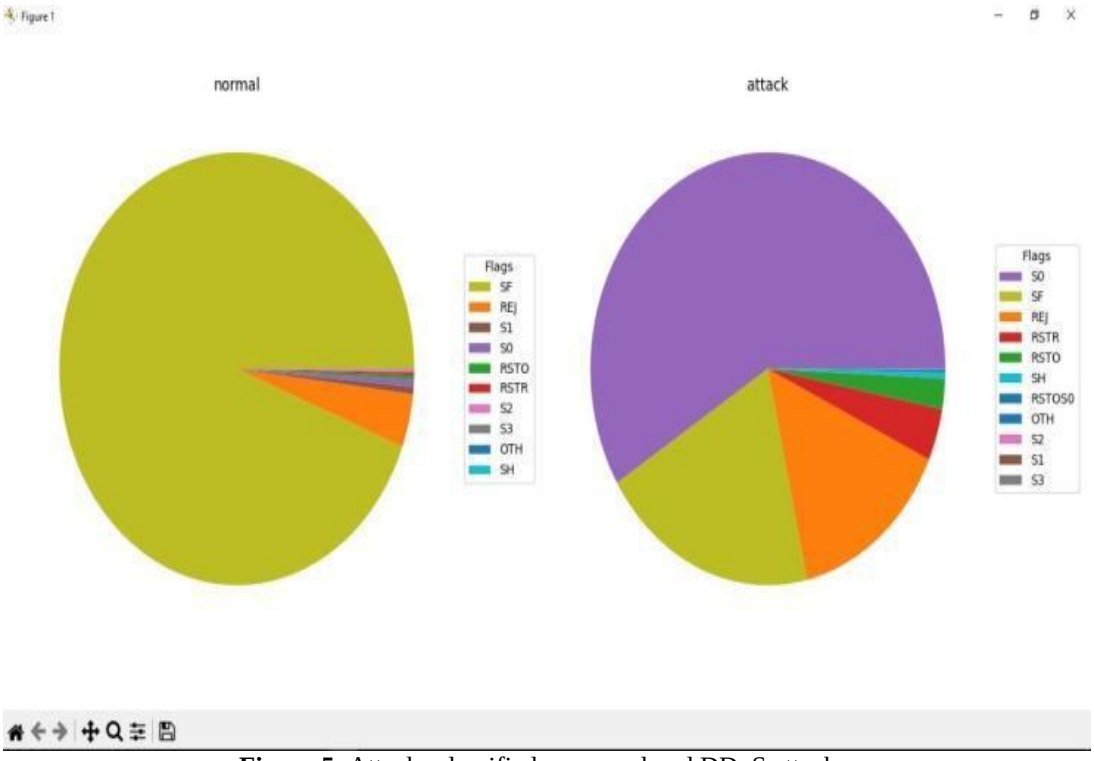


Figure 5: Attacks classified as normal and DDoS attacks.

After this in Figure 5, the attacks are classified into two types of attacks ‘normal’ and ‘attack’- which is DDoS attacks.

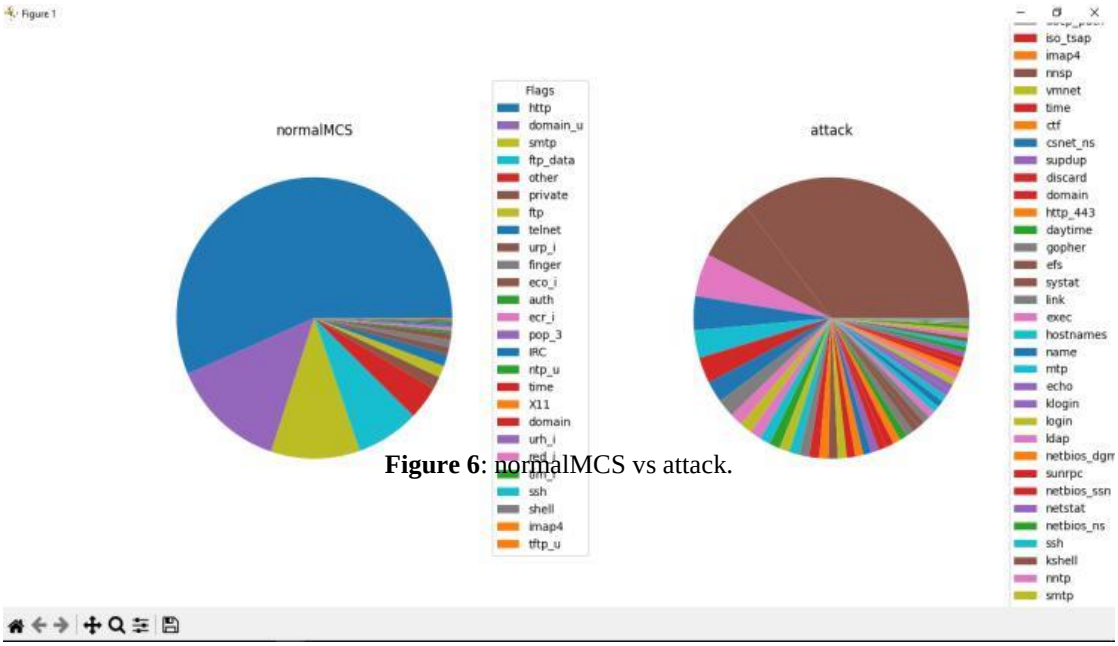


Figure 6: normalMCS vs attack.

Figure 6 illustrates the trends of several flags for attacks and normalMCS. In this context, MCS stands for modulation coding scheme, a industry measure that contains details on numerous factors relating to the relationship between a client and a wireless access point.

After visualizing the dataset, they were predicted using three different models, random forest, k nearest neighbor and logistic regression. The following two observations were made:

1)Both the KNN and Random forest classifiers performed well and were very consistently providing good results while logistic regression did not perform well and was very inconsistent.

2)While the KNN and random forest were providing good results, random forest was taking slightly more time as compared to KNN.

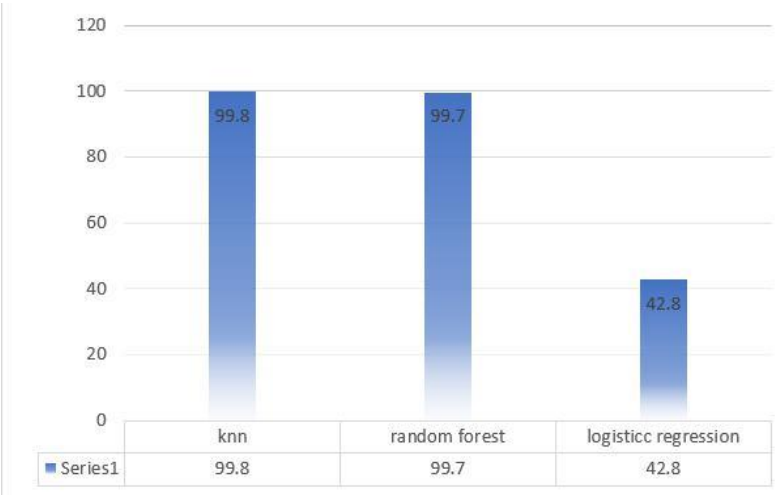


Figure 7: Comparison of accuracies for KNN, Random forest and logistic regression models

As shown in Figure 7, accuracy for both the KNN and Random forest classifier was over 99%, while accuracy for logistic regression was just 40% and was quite inconsistent.

TABLE 1. Comparison between all reviewed papers.

Research work	**Algorithm**	**Detection accuracy**
[16]	Decision Tree	0.95
[17]	Random Forest	0.98
[18]	Recurrent Neural Network with autoencoders	0.9254
[19]	SMOTE	0.9351
[20]	Decision Tree	0.9215
[21]	Artificial Neural Network, Support Vector Machine, Guassian Naïve Bayes, Random Forest Algorithm & K-Nearest Neighbor	Naïve Bayes offers the best detection accuracy
[22]	Deep Neural Network	0.9457
This paper	K- NN, Random Forest and logistic regression	0.99

Finally, the confusion matrix was then plotted as a performance metric for proposed model. DDoS attacks can be distinguished from common intrusion attempts and other attacks in the Figure 8.

There are four categories in the confusion matrix: predicted attack, predicted normal, actual attack, and actual normal. The predicted attack refers to the attack predicted by proposed algorithm, and the predicted normal refers to the normal predicted by proposed system dataset. The actual predicted and actual normal, on the other hand, are the actual, which are, respectively, the attacks and the normal.

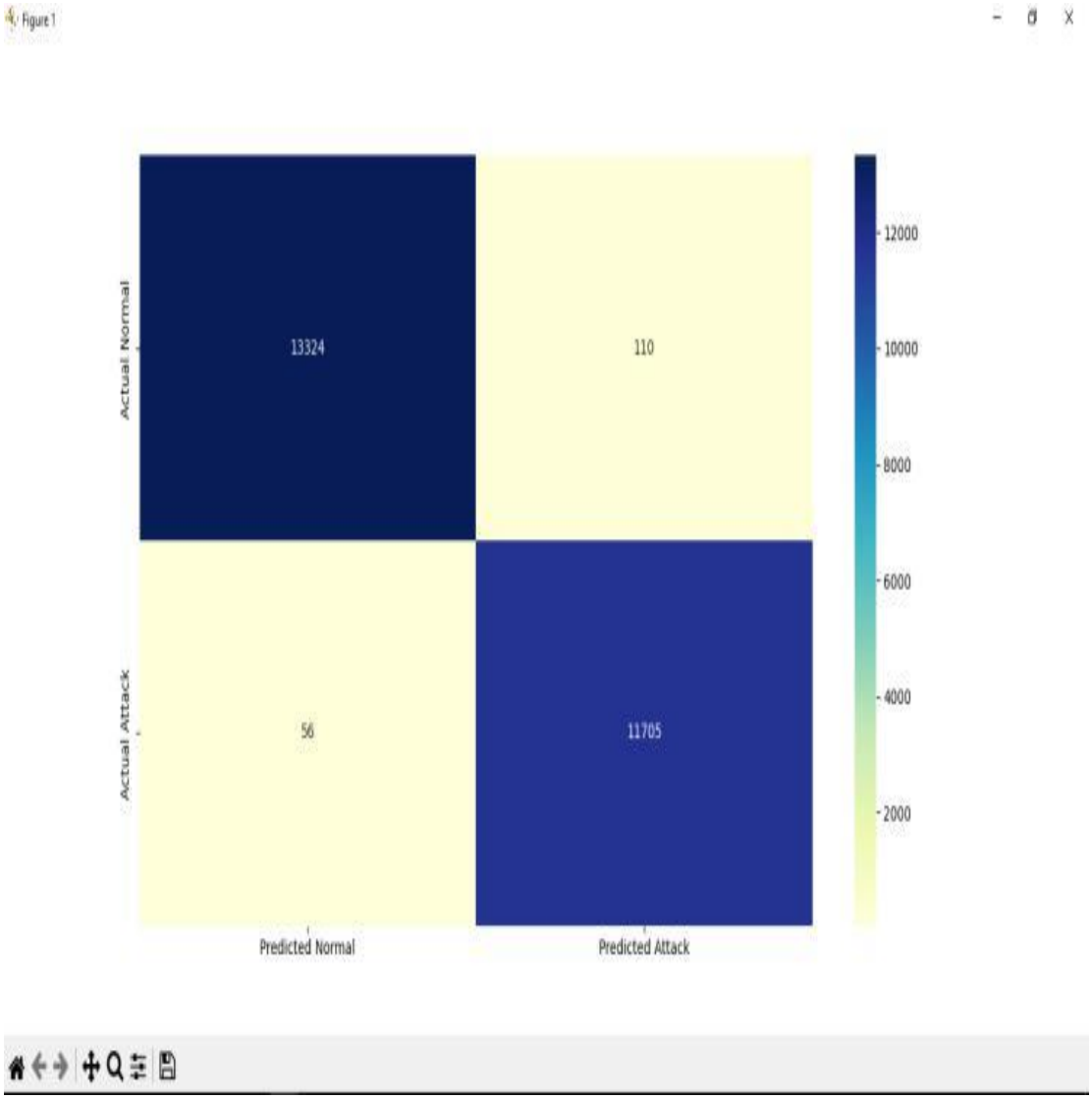


Figure 8: Confusion matrix of the result achieved.

traffic, making it difficult for legitimate users to access the targeted system.

Machine learning (ML) has proven to be a valuable tool in detecting and mitigating DDoS attacks. Network traffic analysis using ML algorithms can be used to detect patterns in behaviour that refer to a DDoS attack. For instance, ML models can be trained to identify particular traffic kinds or pattern types that are frequently used in DDoS attacks.

The source of an attack can be detected using ML-based DDoS detection systems, which is crucial for tracing the attackers and taking appropriate action. In addition, ML can be used to create mitigation strategies like rate limiting or traffic shaping that can lessen the effects of an attack.

6 CONCLUSION

DDoS attacks, a subset of DoS attacks, target a single system or network by using a number of compromised systems. These attacks are launched by a distributed network of attackers, often using botnets, which makes them more difficult to detect and mitigate. DDoS attacks can generate a massive amount of

Although ML has demonstrated potential in the defense against DDoS attacks, considerable work remains. DDoS attacks are always changing, and attackers are constantly coming up with new techniques for preventing attacks. Additionally, locating DDoS attacks might be challenging. because to the complexity and volume of network data. However, researchers and practitioners are constantly enhancing ML-based DDoS detection and mitigation strategies due to the ongoing growth of ML technology.

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D DoS attack detection using Machine

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Abstract. **Currently, the most dangerous cyber-attack is the distributed denial of service attacks also known as the ddos attack. This is primarily accomplished through network traffic bombardment, in which attackers attempt to generate a large number of fake IP address requests, which can affect the server's ability to provide resources to legitimate customers, and which can affect server resources, such as bandwidth speed, buffer size, fiber optic cable transmission rate which are slowed down. This work proposes a machine learning approach for distributed denial-of-service assaults. To detect assaults and typical circumstances, machine learning methods such as K-Nearest Neighbor, Decision Tree, Logistic Regression, Naive Bayes, and Quadratic Discriminant Analysis are utilized. The Mininet's auto generated dataset is used for experimental purposes. In this study, the Google colab platform was employed for implementation, and the findings were analyzed and compared. Other machine learning techniques employed in denial-of-service attacks are compared to previous work.**

Keywords: DDoS Detection, Mininet decision tree, naive bayes, quadratic discriminant analysis, k-nearest neighbor and logistic regression.

1 Introduction

In today's world the internet has become one of the fastest advancing technologies. Everything is available at the user's fingertips. However, with technological advancements, security threats have also become very common. In more specific terms, network attacks are the common threat among various organizations. One such attack is called a Denial of Service (DoS) attack. In such an attack the server of service provider, also called as target machine, is flooded with heavy traffic in the form of multiple bogus requests which eventually make the server inaccessible to the genuine requests. This is because of the reason that a server can accept and respond to only a specific number of requests at a particular time. Hence this practice ultimately shuts the system or network down. Hence DoS attack affects the intended workflow of the organization. DoS attacks are however easier to detect since the IP address of the sender will be the same of every request and hence the attacker can be easily traced or the attack can be mitigated. The advanced version of DoS attack is called DDoS attack. It stands for Distributed Denial of Service (DDoS) attack. In these types of attacks, the requests are sent to the target machine from multiple source machines with different IP addresses. The network of these source machines is known as botnets and all the devices in this botnet are controlled by the attacker.To recognize and avoid this kind of attack, the target machine will have to distinguish between the attacking requests and the genuine ones and hence need to block all the attacking requests In this work, various machine learning models have been proposed which will carry out the task of detecting malicious requests. These machine learning algorithms can very accurately differentiate legitimate requests from the malicious one. The models are trained on a dataset which is generated by using Mininet emulator and it is a SDN specific dataset. It is mostly employed by various deep learning and machine learning algorithms for the classification of requests. Thus, the attack can be prevented by blocking all those detected malicious requests.

2 Literature Review

In the field of Cyber security, DDoS attacks have more risk. In most DDoS attacks, the victim's device and the attacker's device are connected to each other in the network at the application and network layers. This attack can lead to huge loss of data, security and private information and can also lead to huge financial losses if some business has been targeted by the attacker. In order to avoid this, it is important to be able to classify between the legitimate and illegitimate requests i.e., one must be able to detect the illegitimate requests to avoid huge traffic of requests and thus prevent DDoS attack. So, to solve this issue, machine learning models like Naive Bayes which is a probabilistic model or a Random Forest classification model can also be used to detect DDoS attacks by training these models on the past datasets containing the records of legitimate and illegitimate requests [1].

Cloud Computing has been like a boon in this Information Technology domain. It provides resources to the users quickly and requires less maintenance. But cloud computing also has some vulnerabilities which leads to a scope for DDoS attacks. These assaults rank among the most severe ones that negatively impact cloud performance. A DDoS assault targets vulnerable machines that have been compromised. C.4.5 is an algorithm which has been designed to detect DDoS attacks. This algorithm uses digital signatures to validate the legitimate requests by generating a decision tree [2].

DDoS attacks are often placed from the cloud by the attacker instead of using the attacker's own device. Attackers use this approach to place DDoS attacks because it provides higher network bandwidth and also helps the attacker to achieve anonymity. As per past records it is very difficult to trace back the attacker if the attacker uses this approach. Different machine learning models can therefore be employed to detect such attacks in order to overcome this problem. A model can be trained based on the past records and statistical analysis of the cloud's server. This type of model was built by some researchers and they had obtained a very high accuracy of 99.7% in successfully detecting such attacks [4].

Distributed Denial of Service (DDoS) attacks occur at various OSI layers like the transport , application and network layers. The research paper is composed of the CIC IDS 2017 dataset. The dataset has been generated on various application layer protocols using twenty-five users. The protocols used are HTTP, SSH, FTP and HTTPS. The machine Learning models used in this research were Random Forest and MLP. [6]

Various mitigation techniques like blacklisting IP addresses, white-listing IP addresses, rate limiting etc. are used to place DDoS attacks. DDoS attacks lead to loss of money as well as prestige of an organization. CIC IDS 2017 dataset consists of weekly reports related to all requests made. The DoS attacks details are present in Wednesday's reports. The authors have deployed different kinds of models like AdaBoost, Neural Networks, XGBoost and Random Forest. In this research all the incoming requests are sent for signature extraction after which the above-mentioned machine learning algorithms are applied to them. If the request is benign, then the request is processed otherwise an alert is issued for possible DDoS attack.[7]

In the article, lower-level functionality is abstracted, and enables network administrators to set up, manage, alter, and automate network behavior management. This article gives the ideas of how to implement SDN controller security. What DDoS looks like Identifying attacks requires categorizing incoming requests for which machine learning techniques have been utilized for separating the connections into valid and unauthorized connections. The two models utilized were the neural network (NN) and the support vector machine (SVM).[9]

The authors of this study have suggested a Network the NIDS (Intrusion Detection System) can DDoS assaults can be of both the old and new kind. The ability of this NIDS's ensemble models to combine a variety of classifiers with the idea that each classifier may concentrate on a particular area is one of its key features, as it allows for a more thorough understanding of the various features and types of incursions system for defense against additional incursions. The success rate for this system was found to be 99.1%.[10]

They suggested a DDoS detection and protection strategy in this work by using machine-learning-based Software Defined Network (SDN) technologies Deep neural network (DNN) and machine learning (ML) models. The DNN and ML classifiers combined with SDN variables which are centralized can effectively alleviate the negative impact of DDoS attack on the network system. Furthermore, they have undertaken two sorts of different assault scenarios, one from within and one from beyond relating to the network system. Experiment results show that the more sophisticated DDoS detect mechanism may not yield more accurate findings, than the straightforward one.[11]

DDoS attacks have become fatal for internet networking. Early detection of these attacks is the key to mitigate them. Automatic identification of such attacks through the use of machine learning techniques is the major mechanism at play in this area. However, performance of attack detection is dependent on the accuracy of these machine learning models. Consequently, DeepDefence, a deep learning-based strategy, is recommended. Deep learning is capable of detecting such attacks with better accuracies as deep learning approaches are capable of extracting high level features from the dataset utilizing the low-level ones.[13] The networking design known as Software Defined Network (SDN) enables the creation of virtual hardware components. This adds a feature to dynamically change the connections which was restricted in the earlier architectures. SDN is however prone to DDoS attacks. To handle or detect these DDoS attacks, machine learning approaches are good to use which can automatically detect the attacks. Decision Tree or Support Vector Machine (SVM) are two examples of the many machine learning models that can be utilized. Based on several researches, Decision Tree and SVM are the models which outperformed various other machine learning models especially when SDN specific datasets were used.[14] Deep Face Forward (DFF), a deep learning technique along with SVM(Support Vector Machine) has been used to detect Distributed Denial of Service(DDoS) attacks. Preprocessing is conducted on the dataset to speed up the classification process. The DARPA Intrusion Detection Evaluation Dataset has been used to evaluate the various models. The DFF technique has been known to classify data with a higher accuracy. [18]

3 Methodology

3.1 Dataset Description

The quantity of valid records and attributes must be taken into consideration when selecting or importing datasets, as well as the sort of methods that should be employed, which might be supervised, unsupervised, or semi-supervised approaches. Supervised techniques have been used in this research paper. The dataset used is a SDN (Software Designed Network) specific dataset[1] which is created by using the Mininet emulator. It is used to classify network

traffic using machine learning models. A Mininet emulator is a tool which works in a virtual environment for visualizing switches in SDNs. While creating the dataset, ten

topologies were created in the Mininet emulator. A Ryu controller was connected to all the switches. The data from one switch (the victim) was considered and all the other nine switches were placing benign or malignant attacks on the victim switch. The type of requests sent to the victim switch were:

1. Benign UDP (User Datagram Protocol) and malignant UDP flood attack
2. Benign TCP (Transmission Control Protocol) and malignant TCP Syn attack
3. Benign ICMP (Internet Control Message Protocol) and malignant ICMP attack

The dataset comprises 23 features out of which the last feature is the target variable. It has 2 values - benign traffic is labeled as 0 and malignant traffic is labeled as 1.

The dataset contains 20 numeric and 3 categorical features.

The dataset consists of excised features. Some more features are derived from the excised features.

The Mininet simulation was kept running for a total of 250 minutes. In the total run time about 1,04,345 instances of records were collected. The dataset is saved in CSV format and its dataset's qualities are logical and competent, allowing for a precise and efficient forecast of an engineering graduate's salary. The dataset schema is depicted in Table 1.

Name of the Attribute	Type	Categories
dt	int	2488, 11335, 11605, 9906 ...
switch	int	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
src	object	10.0.0.8, 10.0.0.9, 10.0.0.3 …
dst	object	10.0.0.8, 10.0.0.7, 10.0.0.3 …
pktcount	int	0, 126395, 90333, 45304 …
bytecount	int	0, 48294064, 96294978 ...
dur	int	0, 100, 280, 200, 1881 ...
dur_nsec	int	0, 716000000, 734000000 ...
tot_dur	float	0, 1.01E+11, 2.81E+11..
flows	int	2, 3, 5, 7, 9, 15, 17...
packetins	int	4, 1790 1943,1931 ...
pktperflow	int	0, 13534, 13531, 13537, ...
byteperflow	int	14426178, 14427244 ...
pktrate	int	0, 451, 446, 639, 238 ...
Pairflow	int	0, 1
Protocol	object	UDP, TCP, ICMP.
port_no	int	1, 2, 3,4 ,5
tx_bytes	int	3665, 161293091, 3413 ...
rx_bytes	int	4715, 4169, 3665 ,3413 ….
tx_kbps	int	0, 12831, 7676, 10271 ….
rx_kbps	float	0, 6307, 3838, 6400 ….
tot_kbps	float	0, 16578, 19164, 6307 ….
label	int	0,1

Table 1. Dataset Schema

3.2 Dataset Preprocessing

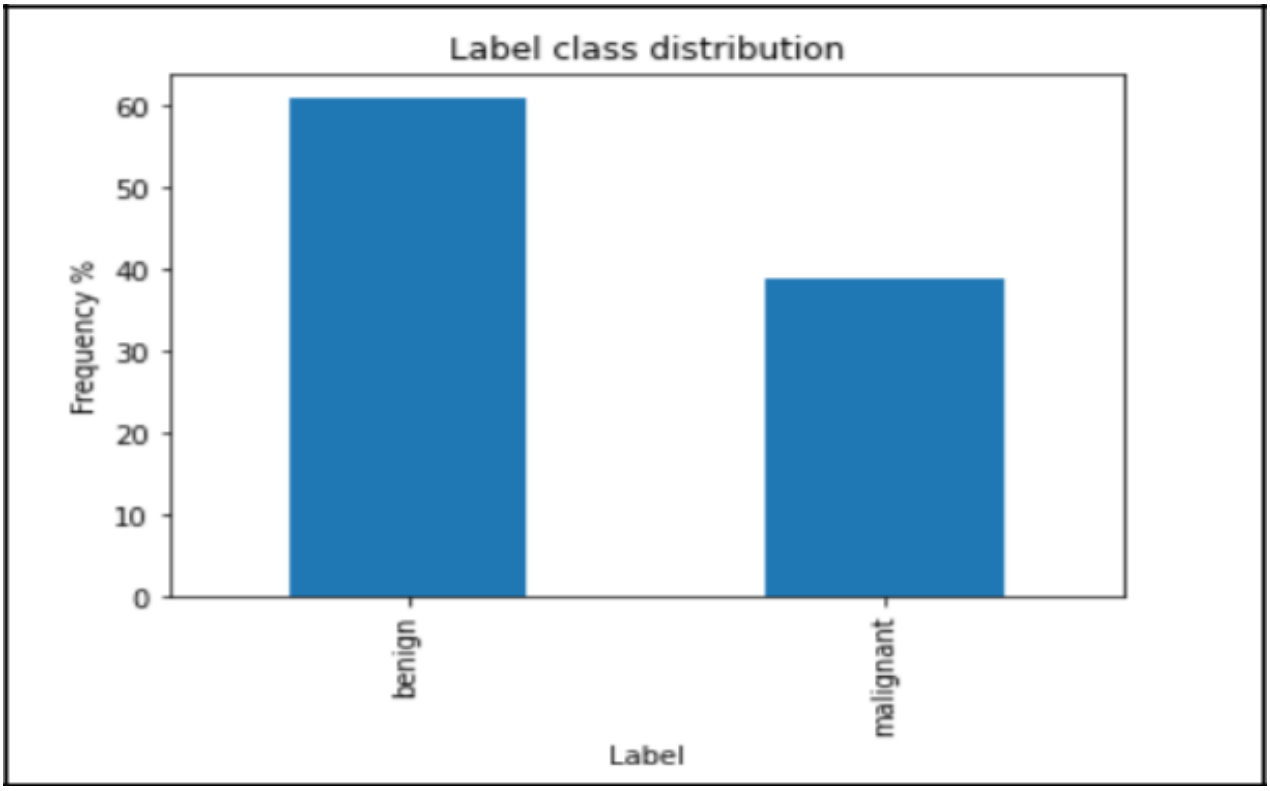
Data Cleaning

The data cleaning method entails finding the data, extracting it, cleaning it, and integrating it into a dataset that can be analyzed as per requirements. It was observed that two features, tot_kbps and rx_kbps contained null values. All the null values were set to 1 and then imputed with their mean to get better results and remove any abnormalities.

On visualizing the data it was found that 60.9934% of requests in the data were benign and 39.0065% were malignant. (Fig 1.)

Fig 1. Distribution of Benign and Malignant Labels

The distribution of all the protocols for the malignant attacks were calculated and depicted in Fig 2. UDP Flood attack was the most commonly used attack with a value of 42.5%, TCP Syn attack was the second with 34.2% and ICMP attack had value 23.3%.



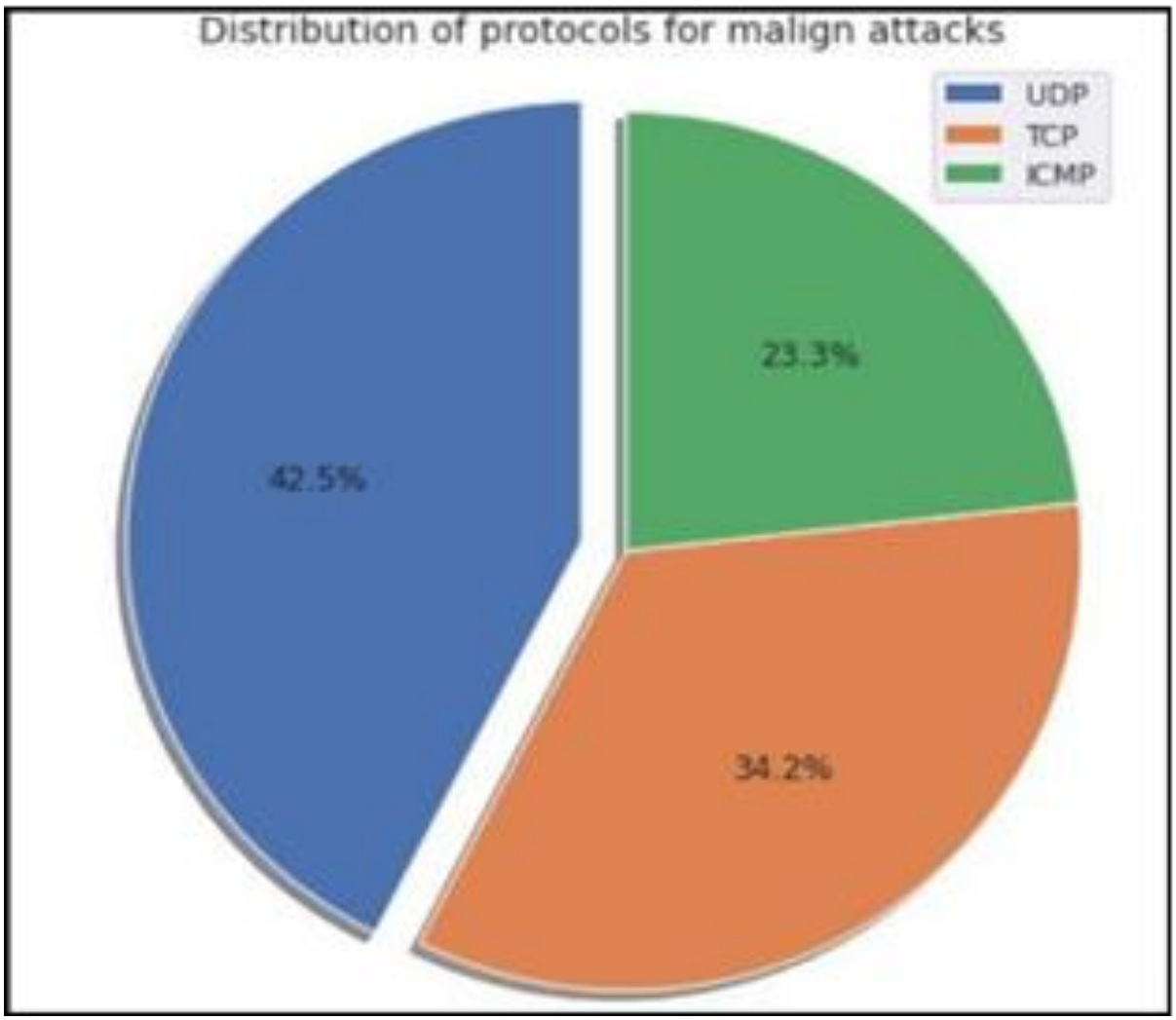


Fig 2. Distribution of Protocol for Malignant attacks

All duplicate records were removed to prevent bias in the performance of machine learning models. Continuous and discrete features were identified. While analyzing the categorial features, i.e. src (the source address) in Fig 3, dst(the destination address) in Fig 4 and the Protocol In Fig 5 were observed.

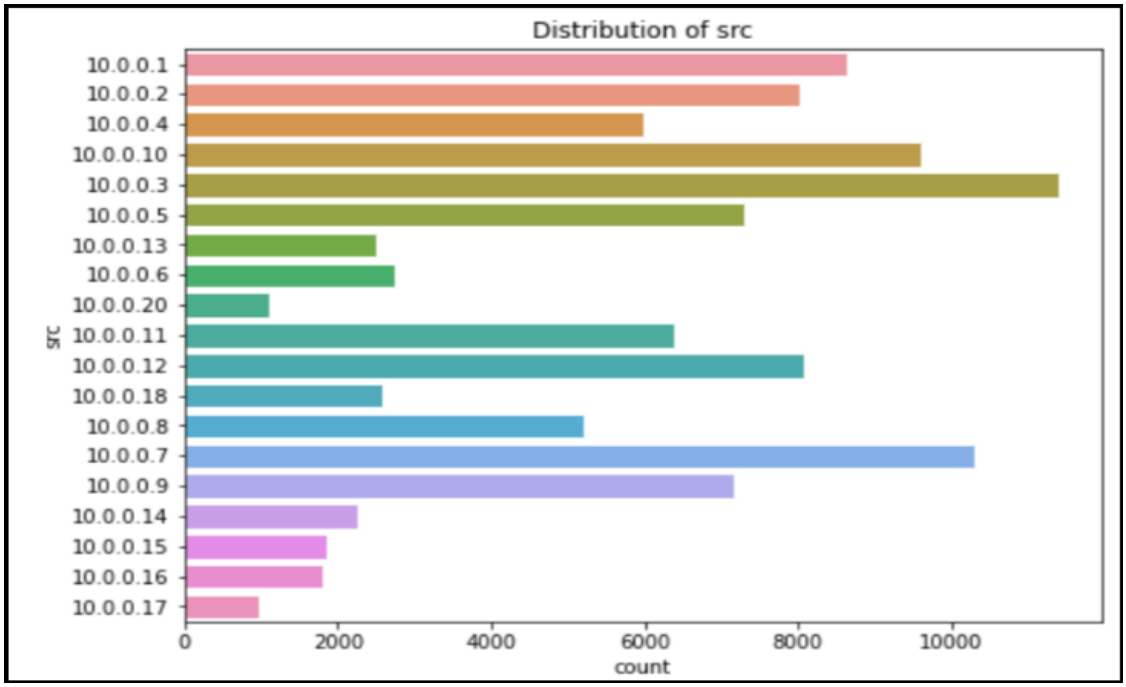


Fig 3. Distribution of src (Source IP Address)

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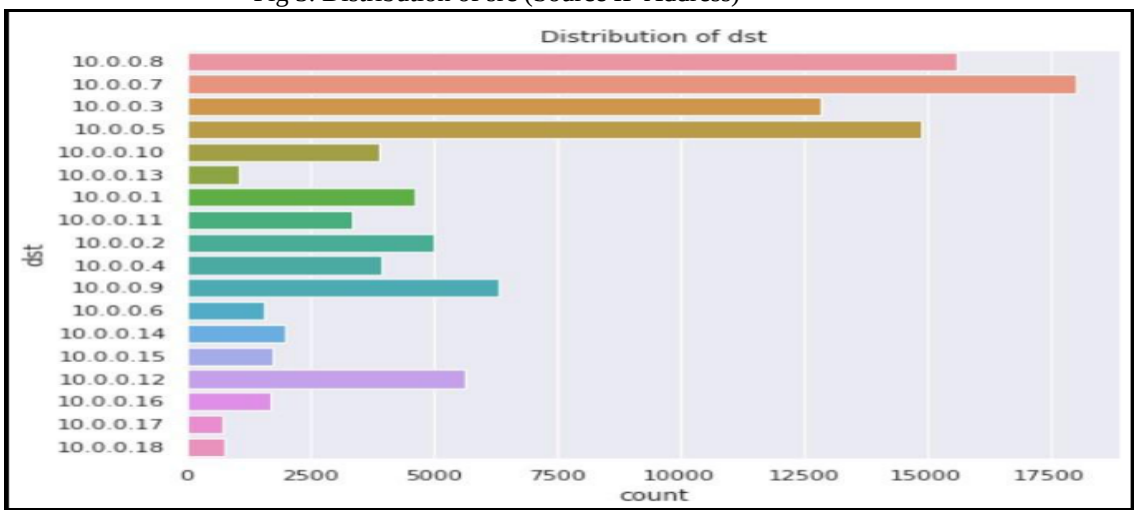

Fig 4. Distribution of dst (Destination IP Address)

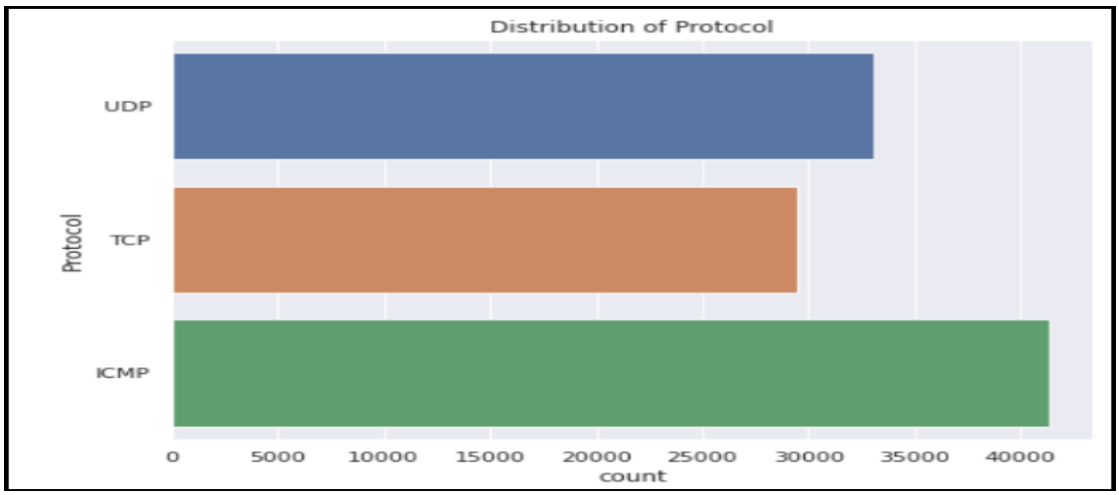

Fig 5. Distribution of Protocol

On visualizing the data, outliers were discovered for pktcount for different Protocols which had to be eliminated since they decrease the correlation by scattering the data and causing r to approach zero. As a result, the pktcount column outliers were removed using their index positions to enhance the r2 value. The categorical features - src,dst and Protocol were encoded. After encoding the dataset had 103839 rows and 57 columns. Fig 6. illustrates the system workflow.

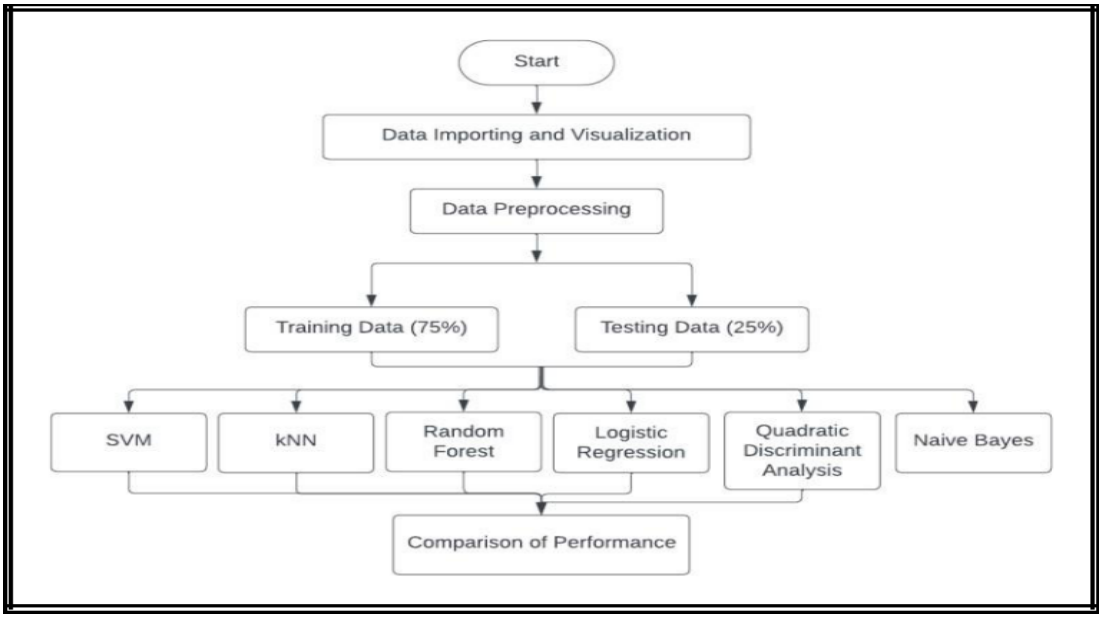

Fig 6. Workflow

10

To classify the attacks 5 supervised machine learning models were used - K-Nearest Neighbors, Logistic Regression, Quadratic Discriminant Analysis, Decision Trees and Naive Bayes Algorithms. The dataset was divided into 75% training data and 25% testing data.

Regression Modeling

a) Manhattan Distance -

$$(,)=\sum| - |$$
$$=0$$

b) Euclidean Distance –

$$(,) \quad =\sqrt{\sum(-)^2}$$
$$=0$$

c) Minkowski Distance –

$$(,) \quad =(\sum| - |)^{1/}$$
$$=0$$

K-Nearest Neighbor

K-Nearest Neighbor also known as kNN is a supervised learning classification model which classifies the data according to similarity or by grouping individual data points. In kNN, the distance of one data point from its neighbors is calculated. The common methods of calculating the distances are:

The accuracy of this classifier was found to be 96.47%.

Decision Tree Regression

A regression model is built in the shape of a tree structure in the decision tree technique. It gradually splits the dataset into small chunks and builds a decision tree to go with it. The ultimate result is a tree with leaf nodes and decision nodes. A decision node can contain multiple branches, each representing a value for the characteristic under consideration. The test attribute's information gain is calculated first, and the formula is provided below.

The entropy for each characteristic is then determined, which is nothing more than the information gain minus the likelihood of that attribute. Finally, the gain for each property is computed, and the attribute with the highest gain is designated as the root node. Similarly, a numerical goal selection is represented as a leaf node. The root node represents the uppermost decision node in a tree that shows the best predictor. The accuracy for this classifier was found to be 96.51%.

$$( )=-\sum ( ) \quad 2 ( )$$

Naive Bayes Classifier

The Bayes theorem and strong (naive) independence assumptions form the foundation of the fundamental probabilistic classifier known as a naive bayes classifier. The classifier is mostly based on the concept of conditional probability principle. In the project scenario, it will evaluate the likelihood of both situations where it will treat the hypothesis as true first for that the detected ddos attack is real and then calculate the probability and finally for that the detected ddos attack is false and calculate the probability. The hypothesis with the highest probability will be accepted. The accuracy of this classifier was found to be 71.59%.

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Quadratic Discriminant Analysis

Each class in QDA, or quadratic discriminant analysis, is believed to have a Gaussian distribution. It resembles linear discriminant analysis a lot. The only difference is that in QDA every class has the same average and co-variance. The percentage of data-points that belong to a class are called class-specific priors. The average of the input variables that are included in a class gives the mean vector. The covariance of the class-specific vectors results in a covariance matrix which is class specific. The accuracy of this classifier when applied on the DDoS attack detection dataset was found to be 50.33%.

Logistic Regression

Using a predetermined set of independent factors, logistic regression is used to predict the categorical dependent variable. In classification problems, the output is predicted via logistic regression. As a result, the output must be a discrete or categorical value. But it provides the probabilistic values that fall between 0 and 1. Logistic regression is quite similar to linear regression. The main difference is that machine learning models based on linear regression are generally used to address regression problems in which the output variables are continuous while classification problems in which the output variables are discrete classes, are solved by making use of machine learning models based on logistic regression. The logistic function's curve shows the possibility of several things, including whether or not the cells are

malignant, whether or not a mouse is obese depending on its value, etc. While classifying observations using various sources of data, logistic regression can be used to quickly identify the factors that will work well. The projected values are converted to probabilities using a mathematical tool called the sigmoid function. The logistic regression's result must fall within the range of 0 and 1, and because it cannot go beyond this value, it has the shape of an "S" curve. We apply the threshold value idea in logistic regression, which establishes the likelihood of either 0 or 1. Examples include values that incline to 1 over the threshold value and to 0 below it. The accuracy of this classifier was found to be 83.90%.

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Results

After applying all the data preprocessing and refining methods on the dataset, different machine learning classification models were applied on it. The results obtained after application of various machine learning algorithms on the columns are as presented in Table 2 and Fig 7.

Classification Models	Accuracy
Decision Tree	96.513867
KNN	96.472137
Logistic Regression	83.901515
Naive Bayes	71.590909
Quadratic	50.327427

Table 2. Accuracy Comparison

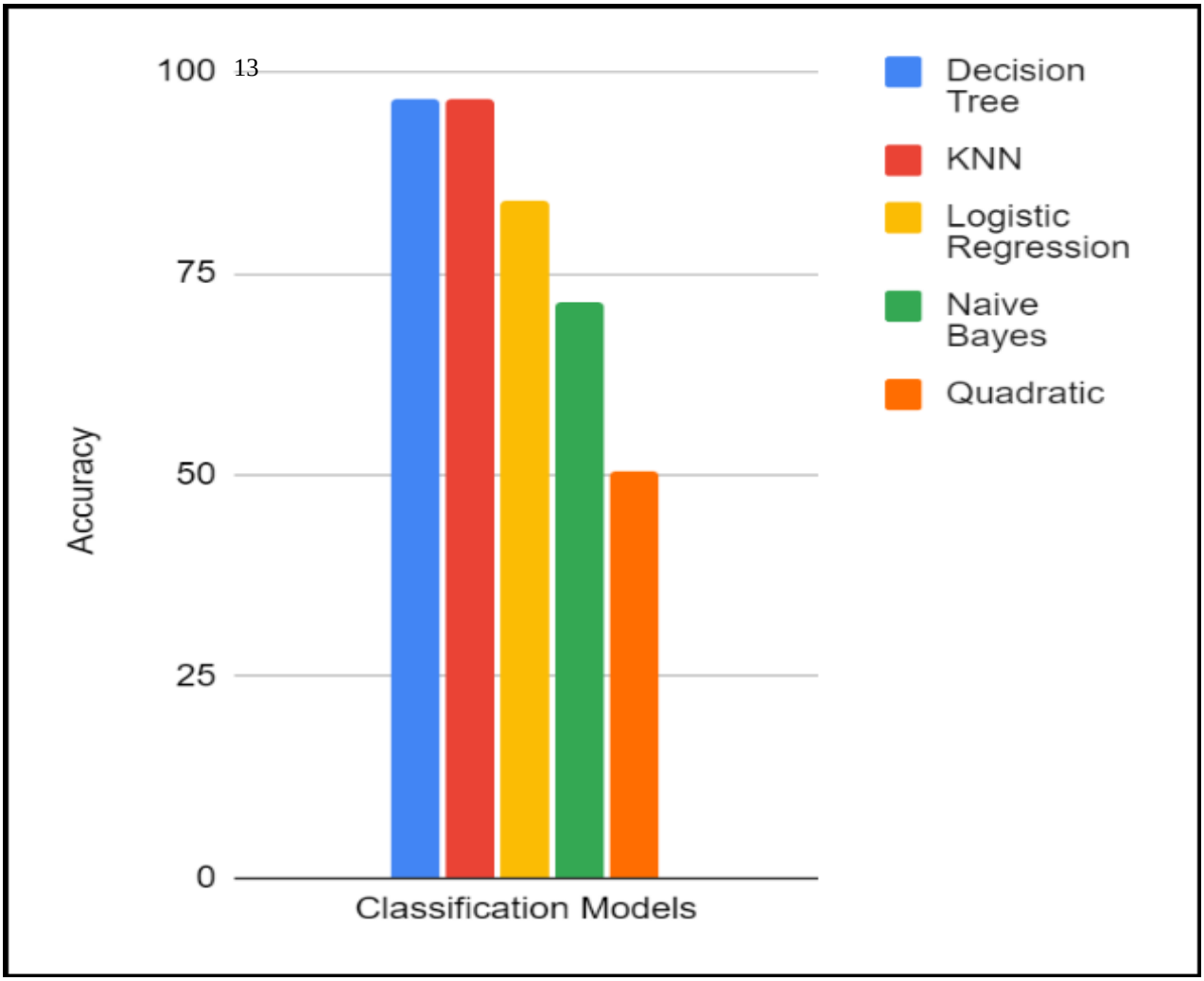

Fig 7. Bar chart depicting accuracy of different classification models

After comparing the results of all the models, the best accuracy of 96.513867% was obtained by applying the Decision Tree Classification model. KNN model also resulted in a good accuracy of 96.472137%.

Fig 8. represents the confusion matrix for the Decision Tree classification model. In Fig. 8, True positive (TP) denotes the number of positive predictions (1) which were correct. False positive (FP) denotes the number of positive predictions (1) which were incorrectly classified. False negative (FN) shows the number of negative predictions (0) which were incorrectly classified. True negative (TN) highlights the number of negative predictions (0) which were correctly classified. Thus, by using confusion matrix, various performance parameters of machine learning models including accuracy, precision and recall are formulated as

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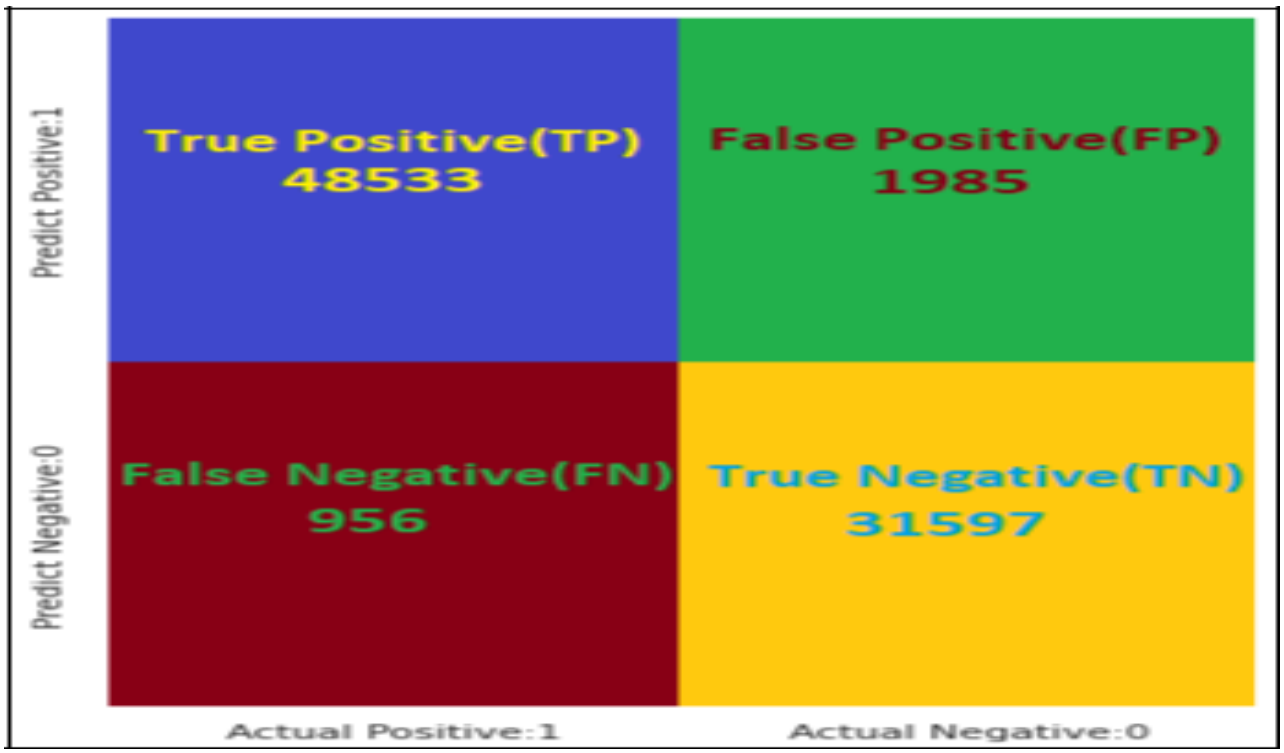

Fig 8. Confusion Matrix for the Decision Tree classification model

Hence accuracy of 96.513867% was obtained after applying the Decision Tree model. Also, other performance parameters such as recall and precision were calculated as 97.0696% and 94.4098% respectively.

5 Conclusion

DDoS attack detection is possible using machine learning methods. This simply means that the genuine requests and attacking requests can be distinguished using a machine learning approach.
In this work, DDoS attack analysis has been done using a dataset which is based on SDN. The dataset contained a total of 23 features originally.

The last column of the dataset is the output feature. The output feature is a class label that categorizes the traffic type into two classes i.e., benign and malignant. The malignant traffic requests are labeled with 1 whereas the benign traffic requests are labeled with 0. Dataset has total 104345 entries. The data pre-processing steps were performed. This includes data cleaning, followed by One Hot encoding and finally normalization. After the preprocessing of data, the data-frame entries were reduced to 103839 with 57 features which were later fed into the model.

After performing the tests, the machine learning model of Decision Tree which provided the most accurate results was used as the prominent model. The accuracy of the Decision Tree model was better than that of the other machine learning models which were used in the study. The accuracy of the Decision Tree was found to be 96.51% and is approximately equal to the accuracy of KNN model (96.47%).

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Handwritten modi character and digit recognition using a deep learning algorithm.

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Abstract: - 'MODI' is an ancient writing script compared to other Indian languages. In ancient human society, the dominant information is stored and communicated through the medium of documents. Hence document image analysis is an important research area in image processing and pattern recognition.

In the offline recognition system, neural networks have emerged as fast and reliable tools for classification towards achieving high recognition accuracy. .An artificial Neural Network (ANN) is used as the backend for classification and recognition tasks. This paper aims to discuss implementation of the Convolutional Neural Network (CNN) algorithm for handwritten character recognition. With the help of this algorithm, the approach will be generalized and accurate.

Keywords: - Artificial Intelligence, Handwritten Character Recognition (HCR), Convolutional Neural Network, Deep Learning Algorithm.

I. Introduction: - MODI is a very

popular and most used ancient script which was used for writing purposes only, a cursive type of writing in 'Marathi' (the primary language of Maharashtra state in western India). There are several theories about the origin of this script. One of them claims that in the 12th Century, MODI was developed by 'Hemadpant' or 'Hemadri. In this paper, the topic of discussion is the Handwritten Character Recognition (HCR) technique. HCR has been in quite a few research works in the last decade and is getting much more attention daily. It is essential because we can make the computer learn and recognize the regional languages pretty well. If we do that, it opens a new world of endless possibilities. Most of the works about HCR pertain to the recognition of handwritten characters, which can directly serve as the input for the computer. Research has been done on common languages such as English, French, and Hindi and other foreign languages such as Chinese, Japanese, etc.

For an offline character recognition system, the input image is acquired from the scanner. As we obtained the scanned digital image, the second step is preprocessing [1]. It essentially enhances the image rendering it suitable for segmentation. Erosion, dilation, opening, closing, and smoothing operations are used for preprocessing. The binarization process converts a grayscale image into a binary image using a global thresholding technique. Detection of edges in the binarized image using the Sobel technique, dilating the image and filling the holes present are the operations performed in the last two stages to produce the preprocessed image suitable for segmentation.

The segmentation process divides the input image into distinct characters, and each character is subsequently enlarged into m x n pixels in the direction of the training network. The features will be extracted from Boundary tracing and their Fourier Descriptors. The character will be identified by analyzing its shape and

comparing the features that distinguish each character.

The Selection of the appropriate feature extraction method is probably the most critical factor in achieving high recognition performance. Several methods of feature extraction for character recognition are available. The widely used feature extraction methods are Template matching, Deformable templates, Unitary Image transforms, Graph description, Projection Histograms, Contour profiles, Zoning, Geometric moment invariants, Zernike Moments, Spline curve approximation, Fourier descriptors, Gradient features, Gabor features [2].

II. Literature Survey: - Kulkarni et al. [3] introduced a chain coding and image centroid-based recognition model for vowels in MODI script. The median filter was used to reduce noise, the global threshold for binarization, flood fill to prevent boundary breaks, and size normalisation in this study. Two layers of feed-forward Neural networks and SVM were used to classify the data. and received a recognition rating of 65.3 % to 73.5 %.

Recognition of MODI Scripts Besekar D.N. & Ramteke R.J. [4] conducted the theoretical analysis, and Devanagari, MODI, and Roman scripts were compared. This experiment revealed that structural pieces for the MODI script were difficult to extract. Internal and external segmentations were examined and advocated in this paper. MODI script internal segmentation. Both structural and topological aspects were proposed in this study.

According to this study, HOCR for MODI script was a difficult procedure comparing to other handwritten scripts because to the cursive nature, variances in character, handwriting habits, and comparable structure of characters. Solley Joseph and his colleagues [5] For text detection in the MODI script, a CNN autoencoder implemented as a feature representation is recommended. The CNN au- to encoder was used to decrease the feature set size from 3600 to 300. SVM was used to classify the acquired characteristics. The accuracy of MODI script text detection is 99.3%, which is higher than any other MODI script letter accuracy rate. The attainment of great accuracy in MODI text detection is the study's key contribution.

Tamhankar et al [6] addresses each character from archaic MODI Script manuscripts are segmented in this study. Only when consecutive letters are split by a zero-pixel column could the vertical Projection Profile (VPP) approach properly distinguish characters from a line. Based on the authors' earlier research, the study proposes a unique technique for extracting each character from a line that use a dual thresholding criterion to reduce segmentation error. In terms of execution time, the tactics used in this study are basic and relatively successful.

Savitri Chandure and Vandana Inamdar's [7] work includes establishing an image dataset for MODI handwritten characters as well as constructing a supervised Transfer Learning (TL)-based classification system. To retrain the network and transfer weights, it employs Deep CNN Alexnet as a pre-trained network. As a feature extractor, this network pulls features from many network levels. To create classifier models, SVM is trained on activation properties. These models are being examined further in terms of accuracy and feature analysis. To choose in-depth discriminant features, both subjective and objective evaluations are applied. Handwritten MODI character identification was 92.32% accurate, whereas handwritten Devnagari character recognition was 97.25% accurate.

Manisha Deshmukh and her colleagues [8] offer a technique for recognising off-line handwritten Modi Numerals. A non-overlapping blocking method is employed to extract the characteristics of the handwritten Modi numeral chain code feature extraction technique. For Modi numeral recognition, a correlation coefficient is employed. Different numerical image non-overlapping divisions and other data set sizes are used to assess the experimental outcomes. On a database of 30000 images, the maximum identification rate of 85.21% was attained through testing. The recognition findings reveal that 5X5 grid divisions work better.

Snehal R. Rathi et al. [9] described the many procedures involved in converting Modi characters to English using image processing techniques. Several important papers written in the 'Modi' language have remained dormant. These publications include vital information and data. If correctly deciphered, they can be quite useful. The challenge of Modi OCR and handwriting recognition is a difficult one, and professionals are working hard to analyze the difficulties and come up with alternative solutions. Many issues remain unsolved, and active research in this field is required to bring this potential problem to favorable levels when items including the answer become available to the general public.

Sanjay S. Gharde et al [10] presents the ability to recognize and identify handwritten MODI characters is displayed. To construct a database of handwritten samples, the ANESP programmed is utilized. The MODI script manuscript has been obtained and pre-processed. Invariant Affine and Moment Two methods for extracting features from handwritten separated samples are Moment Invariant and Moment Invariant. For identification and recognition, machine learning technology is applied. A support vector machine is one of the machine learning algorithms that is used as a classifier. This support-vector machine uses a linear kernel function to do classification. For handwritten MODI script samples, this system has a good recognition rate. Researchers will be able to learn more about a previously unknown time of history because to this finding.

Table 1: Summary of Literature Review.

Title	methodology used	Results	Remark
Recognition of handwritten modi numerals using hu and zernike features (2014)	feed-forward Neural networks and SVM	65.3 % to 73.5 %.	The accuracy is less
Handwritten character recognition of MODI script using convolutional neural network-based feature extraction method and support vector machine classifier (2020)	CNN	99.3%,	There is need of increase the dataset also need to use transfer learning algorithm
A novel approach for character segmentation of offline handwritten marathi documents written in modi script (2020)	dual thresholding segmentation and CNN	96.25%	The system is accurate, this can be extend to multilingual systems
Handwritten modi character recognition using transfer learning with discriminant feature analysis (2021)	Deep CNN Alexnet	97.25%	Limited dataset is used
Off-line handwritten modi numerals recognition using chain code (2015)		85.21%	The accuracy is low
Recognition of characters in Indian MODI script (2016)	SVM	78%	The accuracy is low

III. PROBLEM STATEMENT:-

This project aims to pre-process, segment, and recognition of MODI characters. The

segmentation and recognition of the MODI character from a handwritten script incorporate considerable problems. Hence, this system takes the handwritten MODI characters as input and effectively trains the CNN algorithm to recognize the pattern.

IV. OBJECTIVES: -

To create a dataset for MODI characters and digits
To pre-process and segment the data
Prepare the dataset as training and Testing
To develop an algorithm for MODI character detection and recognition
To test the system on unknown samples
To evaluate the performance of the system

V. METHODOLOGY

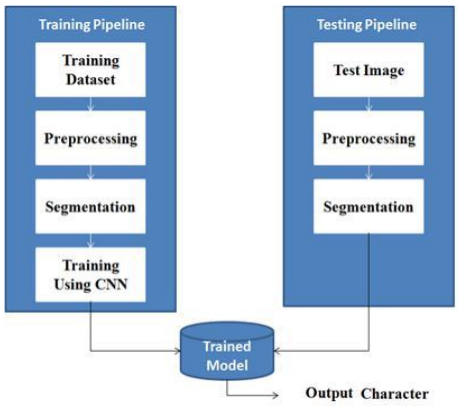

Fig.1. Block diagram of MODI character recognition system.

Block Diagram Description: -

A. MODI Character Dataset

The proposed system uses handwritten MODI characters dataset from IEEE Dataport. Different writers of different writing styles create the handwritten MODI character dataset. The variation in the writing style and capture of images in the different light conditions makes the system more accurate. Hence the dataset is created with different styles and in different light conditions.

All 46 characters with its label are shown in Fig. 2. For each character folder is created separately with its folder name as its label. So, there are total 46 folders as shown in Fig. 3. Each folder has 90 samples of respective characters.

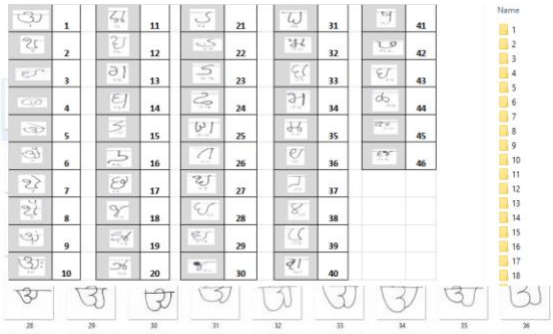

Fig.2 Basic MODI characters with its labels.

Fig.3 Characters image samples of class label 1

B. Preprocessing

The captured images may be of different sizes. Hence to get uniformity in the dataset images, each image needs to resize to the exact size. In this system, the images are resized into 256x256. The images are also affected by different noises like salt & pepper and Gaussian noise. The median filter is used to remove the salt & pepper noise, and the Gaussian filter is used to remove the respective noise.

C. Segmentation

The background of the captured image and character segmentation is performed using thresholding. The thresholding technique converts the image into binary. The region

of interest, i.e., the character, is cropped and saved for further processing.

D. Training and Testing using CNN

This system trains the training data with the convolutional neural network. The detailed blocks of the CNN are shown in Fig.2.

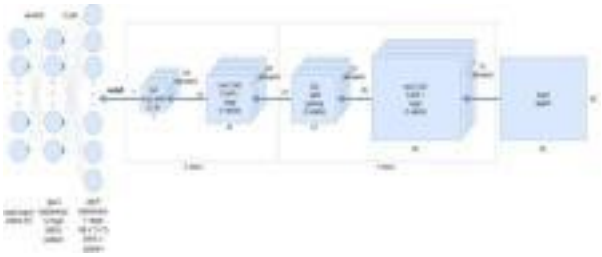

Fig.4 Block Diagram of CNN algorithm.

Convolutional Layer

The Convolutional layer performs the core building block of a Convolutional Network that does most of the computational heavy lifting. The primary purpose of the Convolution layer is to extract features from the input data, an image. Through the use of tiny squares from the input image to learn image attributes, convolution preserves the spatial relationship between pixels. By using a group of teachable neurons, the input image is distorted. This produces a feature map or activation map in the output image, and after that, the feature maps are fed as input data to the next Convolutional layer.

Pooling Layer

The pooling layer reduces the dimensionality of each activation map but continues to have the essential information. The input images are divided into a set of non-overlapping rectangles. Each region is down-sampled by a non-linear operation such as average or maximum. This layer achieves better generalization and faster convergence, is robust to translation and distortion, and is usually placed between Convolutional layers.

ReLU Layer

ReLU is a non-linear operation that includes rectifier-using units. It is an element-wise operation, which means it is applied per pixel and reconstitutes all negative values in the feature map by zero. To understand how the ReLU operates, we assume that there is a neuron input given as x, and the rectifier is defined as $f(x)= \max(0,x)$ in the literature for neural networks image. The FCL aims to employ these features for classifying the input image into various classes based on the training dataset. FCL is the final pooling layer feeding the features to a classifier that uses the Softmax activation function. The

Fully Connected Layer's output probabilities are added up, and the result is

1. By utilising Softmax as the activation function, this is secured. A vector of arbitrary real-valued scores is compressed by the Softmax function into a vector of values between zero and one that adds up to one.

Flattening Layer

High resolution data is efficiently resolved into representations of objects using a convolutional neural network. Therefore, it is possible to see the fully connected layer as adding a conventional classifier to the network's information-rich output in order to "understand" the findings and ultimately provide a classification result. Linking this fully connected layer to the network requires flattening the convolutional neural network's dimensions output.

Fully Connected Layer

The FCL aims to employ these features for classifying the input image into various classes based on the training dataset. FCL is the final pooling layer, given the features of a classifier that uses the Softmax activation function. The sum of all the output probabilities from the FC is 1. The Softmax function is used as the activation function. The Softmax function reduces a vector of arbitrary real-valued scores to a vector of

values that range from zero to one and add to one.

Training and Testing using Vgg16

The ImageNet Large Scale Visual Recognition Challenge is an annual computer vision contest (ILSVRC). Each year, teams participate in two challenges. Object localization, the initial stage, is locating objects in an image that fall within 200 classifications. The second method includes classifying each image into one of a thousand different groups. Karen Simonyan and Andrew Zisserman introduced VGG 16 in 2014.

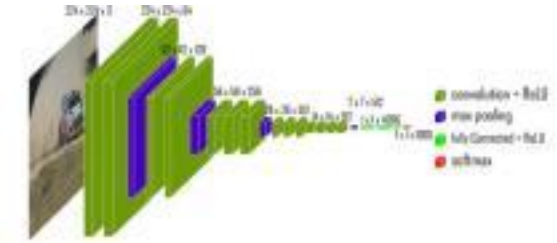

Fig.5 VGG-16 model architecture [11]

On the ImageNet dataset, which has 14 million photos divided into 1000 classes, this model achieves top-5 test accuracy of 92.7%. A dimensional image is sent to the network as input (224, 224, 3). 64 channels and a 3*3 filter size are present in the first two layers along with the same padding. Two layers with 256-layer convolutions, a filter size layer, and a max pool layer of stride (2, 2) are added next (3, 3). A stride (2, 2) max pooling layer that was exactly like the one before it came next. The next two convolution layers contain 256 filters each, with a 3 and 3 filter size. Next, there are two sets of three convolution layers, and then a max pool layer comes after that. Each has 512-filter size and the same padding (3, 3). This image is then sent to the stack of two convolution layers.We use 3*3 filters in these convolution and max pooling layers instead of 7*7, ZF-11*11, and AlexNet filters. Additionally, some of the layers use 1*1 pixels to change the number of input channels. After each convolution layer, 1-pixel padding is provided to prevent the spatial characteristic of the image. After adding a convolution and max-pooling layer to the stack, we got a (7, 7,512) feature map. To construct a feature vector with the value 1, 25088, this result is flattened.

There are then three completely linked layers that come next: the first produces a vector of size (1, 4096) using the most recent feature vector as input, the second produces a vector of size (1, 4096), and the third produces a vector of size (1, 1000) using the ILSVRC challenge's 1000 classes. The output of the third fully connected layer is then passed to the SoftMax layer, which normalizes the classification vector. the top five categories for assessment after the output of the classification vector. ReLU is used by every hidden layer as its activation function. ReLU is more effective in terms of computing since it yields.

A research effort called ImageNet aims to create a sizable library of photographs with annotations, such as labels for the pictures. InceptionV1, InceptionV2, VGG-16, and VGG-19 are just a few of the pre-trained models that have been trained using ImageNet's diverse set of image classifications. These models were built from scratch and trained on millions of photographs from a vast variety of various image categories utilizing powerful GPUs. As a result of the model's extensive training data, it has developed a solid understanding of low-level features like shapes, edges, rotations, and lighting. Based on the principles of transfer learning, the pretrained model should be able to extract pertinent characteristics from these incoming photos even if they belong to entirely different categories than the original dataset.

SOFTWARE & HARDWARE:

A. Hardware

1) Hard Disk: 200 GB

2) RAM: 8 GB

3) Processor: Intel Pentium i5 and above

B. Software Resources Required

1) Technology Used: Python

2) IDE: Python IDE

3) Operating System: Windows XP or above

ADVANTAGES & APPLICATIONS

Easy to recognize ancient characters and numerals.

The system will be more accurate. Training required more time.

In the history department, to understand the ancient character.

In the history department, to understand the ancient character in literature.

CONCLUSION:

In this approach, the MODI character recognition using a convolutional neural network algorithm has been presented. Different writers of different writing styles create the handwritten MODI character and the numeral dataset. The dataset is split into training (80%) and Testing (20%). CNN algorithm is used to train and test the MODI character, and numerals and performance are evaluated using precision, recall, and F-measure parameters.

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Irrigation using IOT Sensors

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Abstract – **Today's world is experiencing a water shortage, making it urgent to implement clever irrigationtechniques. The project explains how IOT may be used to manage irrigation intelligently. The goal of this project is to save time and steer clear of issues like ongoing vigilance. By intelligently allocating water to the plants/fields according to their water needs, it also promotes water conservation. Thus, tailoring the amount of water to the specific needs of different plants/fields. Additionally useful in agriculture, parks, and lawns, this system. This system basically measures the moisture level of the soil and if it is found to be low, it automatically pumps waterto the soil till the soil moisture reaches a threshold value. On a user's mobile phone, access to and monitoring of this data is simple.**

Keywords: Soil moisture sensors, IoT, Arduino IDE, Android,Node MCU..

I. INTRODUCTION

The development model of smart agriculture can become a real-time observation system of properties which includes temperature, moisture, soil moisture, and pH. By sacrificing the concept of modern irrigation systems, farmers can save up to 51% of water. This idea relies on two of his irrigation strategies: B. Overhead sprinkler, flood supply system. Through IoT, you can manage multiple operations of the sector from anywhere at any time. To overcome these shortcomings, new techniques are used in irrigation techniques that apply only small amounts of water to the basal zone component of the plant.

Soil wetting stress in plants is prohibited as fields are automatically irrigated by following their watering schedule. Usual techniques such as mechanical equipment and surface irrigation require almost half as much water. Fields can also be supplied with appropriate amounts of water. Dry rows between fields can result in continuous bandages throughout the watering method. Fertilizers can also be applied in this manner and are lessexpensive.

The new technology significantly reduces soil and wind erosion compared to overhead mechanical jig systems. Soil properties can outline the shape of dripping properties within the root zone of plants that receive moisture. It offers an artistic approach to living, allowing you to manage your electronics with your smartphone while saving energy. It has impacted all areas of business, not just smart farming, smart parking, smart building, environmental monitoring, and careful transportation.

II. LITERATURE REVIEW

A literature review of smart irrigation systems using NodeMCU microcontroller boards can be divided into three main areas: the use of NodeMCU in irrigation systems, the benefits of using smart irrigation systems, and the challenges and future directions for the development of these systems. NodeMCU has been included into a number of smart irrigation systems to regulate and track a number of irrigation-related variables, including soil moisture content, water flow, and environmental conditions. NodeMCU has been used in various smart irrigation systems to control and monitor various aspects of the irrigation process, such as soil moisture levels, water flow, and weather conditions.

The underneath steps are taken into consideration during the initial investigation: understanding the current methodologies, comprehending the demands, and creating a system abstract. In this study, sensors were placed in the root zone of the plant to measure temperature, humidity, and soil moisture. The sensors sent data to an Android application. To control the amount of water, a microcontroller was programmed with the threshold value of a soil moisture sensor. The android app displays information on temperature, humidity, and soil moisture. The goal of this project, "Irrigation with IOT Sensors," is to create an automated irrigation system that turns on and off the pumping motor based on how much moisture is present in the soil. Along with measurements for soil moisture, the planned project also provided temperature and humidity values. For a remote agricultural plantation that needs water, this research article suggests a NodeMCU-based remote irrigation system. When the soil's humidity drops below the predetermined level, provisions must be made for water. However, we were unaware of the soil moisture level at the time, therefore to address this shortcoming, a system that incorporated additional features for temperature and soil moisture values that were shown on farmer mobile applications was proposed. The system made use of a NodeMCU esp-8266 board, which comes with a Wi-Fi module already installed. Improved crop yields, lower labour costs, and higher water efficiency are all advantages of employing smart irrigation systems. These devices can also aid in resource conservation and the reduction of water waste. To further optimise irrigation, smart irrigation systems can be used with other technologies like weather forecasting and precision farming.

Smart irrigation systems are designed to improve the efficiency and productivity of agricultural irrigation, but their implementation is not without challenges. Some of these challenges include scalability, reliability, and security. Scalability refers to the ability of the system to function effectively in different sized areas and environments. Reliability is crucial, as the system must be dependable and consistently provide the desired results. Security is also a concern, as these systems often rely on

remote monitoring and control and may be vulnerable to hacking or other forms of cyber-attack.

To overcome these challenges, research is needed to develop more accurate and cost-effective sensors, and to improve the integration of these systems with other technologies. The use of IoT sensors, for example, can improve the precision and automation of irrigation systems, and can also provide valuable data on factors such as temperature and humidity. Additionally, the integration of IoT technology in agriculture can help address issues of food security, supply, and distribution.

However, most studies on smart irrigation systems have been conducted in controlled environments, and further testing is needed to address real-world challenges. Additionally, the use of NodeMCU microcontroller boards has demonstrated potential for improving irrigation efficiency and crop yields, but further research and development is necessary to fully realize this potential.

Overall, smart irrigation systems have the potential to significantly improve agricultural irrigation, but further research and development is needed to overcome challenges and fully realize this potential. As technology continues to advance, it is likely that smart irrigation systems will become increasingly popular among farmers.

III. METHODOLOGY

Write the NodeMCU code in the Arduino IDE and then upload it in the NodeMCU using a USB cable. Then enable the device hotspot and then check the 'Online' status in the Blynk App. Then insert the probes of soil moisture sensor inside the soil. For obtaining values for temperature and humidity of the surrounding area, we make use of DHT 11 sensor.

The app displays records of moisture level detected by the soil moisture sensor, as well as temperature and humidity readings taken by the DHT11 sensor. Fig 1 shows the system flowchart for better understanding of our project.

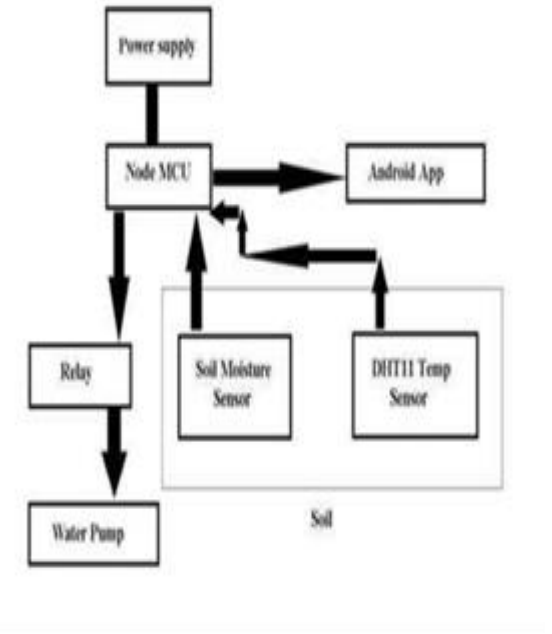


Fig 1. System Flowchart

It can be said from the flowchart that first power supply is given to Node MCU. The DHT11 Temperature Sensor and Soil Moisture Sensor then sense the temperature and the level of soil moisture, respectively, and send those results to the NodeMCU. If the moisture value is less than 500, then the motor starts, and the soil is watered. Else when the value is greater than 500, the motor remains in off position. As a result, the values are shown on the "Blynk" Android app.

The given figure Fig 2 shows the app interface of our project. We can see the readings of moisture, temperature and humidity (in percentage). We can also turn on the water pump manually by tapping on the "ON" button.

Fig2. Blynk App Interface

The given figure Fig 3 portrays the hardware setup of our project.

Fig 3. Hardware Setup

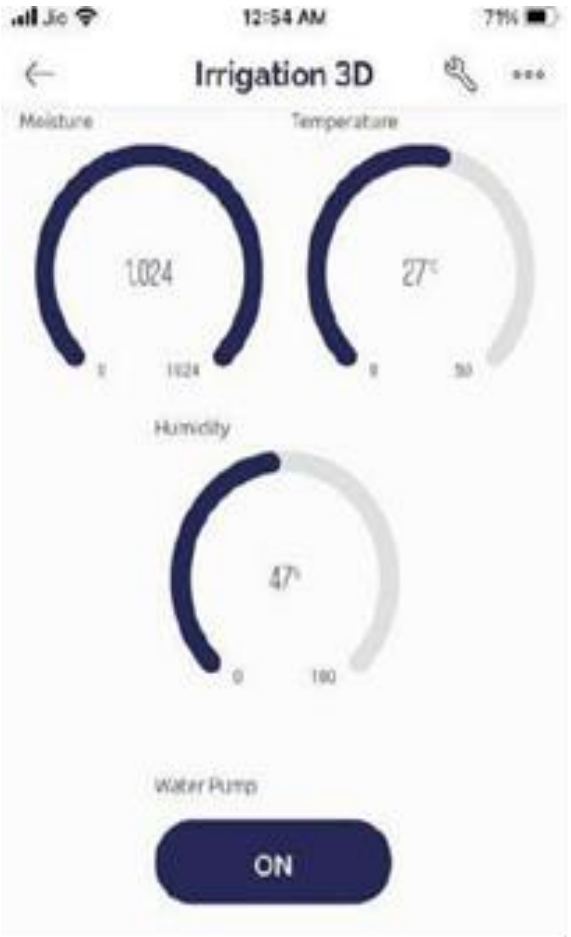
IV. SYSTEM ARCHITECTURE A. Hardware

The hardware components of our system include thefollowing components: -

- ESP8266 Node MCU Wi-Fi Module: A

sophisticated Application Programming Interface for hardware input/output devices is NodeMCU [6]. It uses Lua, an interactive script, as opposed to Arduino-style code. It is an open source Internet of Things platform. Espressif Systems firmware is used to put it into practise. There are 16 input/output pins on NodeMCU. They

have 16 input/output pins. Consequently, a single node can link to 16 nodes. The ESP8266 Wi-Fi SoC is integrated with the Tensilica Xtensa LX106 core, which is often utilised in IoT applications. Instead of the development kits, "NodeMCU" often refers to the firmware. ESP8266, a NodeMCU with a built-in WiFi



module, as shown in Fig 4

Fig 4. ESP8266 Node MCU Wi-Fi Module

• Soil Moisture sensor: A kind of soil moisture sensor is depicted in Fig 5. It includes two tests that involve injecting current into the soil. After that, it examines the soil's blockage to determine the soil's amount of moisture. We know that when water is close by, dirt is more likely to conduct power easily, meaning that such soil has less resistance (R), however, dry soil has low conductivity, and thus, offers higher resistance than wet soil. This intensity feature is the foundation of the sensor. The resistance must be converted to voltage at some point; this is accomplished using a circuit that is visible inside the sensor and that does the conversion

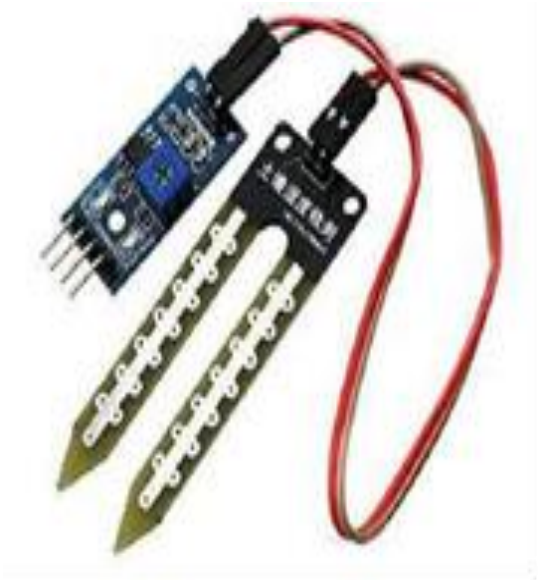


Fig 5. Soil Moisture Sensor

• DHT11 sensor: Temperature and humidity measurements are accurate to +0.5 degrees. On the rear of the sensor, the DTH-11 sensor has an IC, a temperature sensor, and a moisture sensing sensor. It includes both 4 and 3 pins. Fig 6 shows an explanation of connection using the DTH-11 sensor.

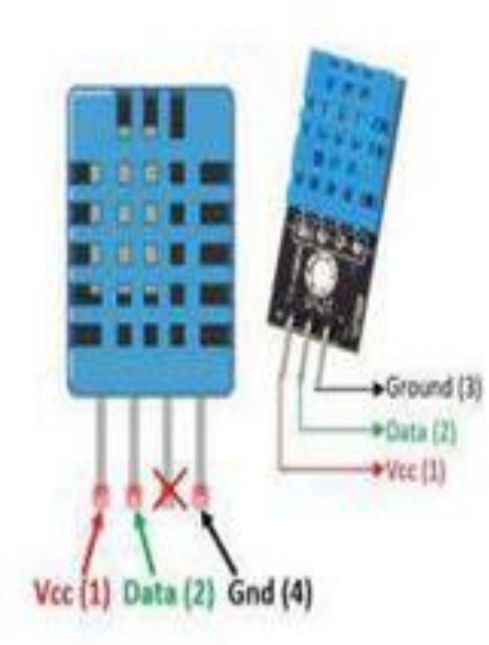


Fig 6. DHT-11 Sensor

• Pump motor - Draw water from a water source

```
}
//virtual button
BLYNK_WRITE(V0) {
  motor = param.asInt();
}

void pumpmotor () {
  if (sensor > 500) {
    digitalWrite (D5, LOW);
  }
  else if (sensor < 500) {
    digitalWrite (D5, HIGH);
  }
}
void stoper () {
  digitalWrite(D5, HIGH);
}
void loop()
{
  digitalWrite (D6, LOW);
  digitalWrite (D5, HIGH);
  Blynk.run();
  timer.run();
  sendTemps();
  if (motor == 1) {
    pumpmotor();
  }
  else if (motor == 0) {
```

Fig 7. Arduino IDE Code Snippet

Jumper wires - Connecting components of the system with the NodeMCU.

B. Software Used

Arduino IDE and BLYNK App were used as

software in our system.

- Arduino IDE - Used for writing the hardware code.
- BLYNK App - Application for automating our system.

In the Arduino IDE setup part, we first have to install the required libraries. Then from the Blynk Web we have to obtain our Authorization token of our account. This verifies the user's account. Then we have to set our mobile phone's hotspot name and password as ssid and pass respectively.

We then take two variables for storing humidity and temperature values as float values. Then allocate those values to virtual pins of Blynk App. Similarly, we store values of temperature.

For motor we take motor variable to read status of motor. Then we write pump motor function. In this we check the reading of soil moisture sensor. If the value is If the value is greater than 500 then the digital pin of NodeMCU is made Low. Else it turns High. Then we write a stoper function for maintaining the motor in off condition.

In Loop part we run the Blynk function. Here we check the motor status using if-else. If it is on then pump motor function is executed else stopper function is executed. Fig 7 portrays the code snippet

C. Hardware Connections

The DHT11 sensor consists of three pins +, OUT and

-. + connected to the 3V3 of NodeMCU, OUT with the D4 and - to the GND.

Soil moisture sensor module has four pins AO, DO, Vcc, GND. AO connected to the controller's AO, GND to the

GND and Vcc to the 3V3 power supply pin of NodeMCU. positive and negative terminal of the module is connected with the sensor.

Sr No.	Time	Temperature	Humidity (percentage)	Soil Moisture readings	Pump status
1.	9:00 am	21 °C	38%	480	ON
2.	10:00 am	24 °C	87%	940	OFF
3.	12:00 pm	28°C	68%	674	OFF
4.	3:00 pm	31°C	52%	557	OFF
5.	4:00 pm	30°C	33%	440	ON
6.	6:00 pm	27°C	89%	976	OFF

Relay module has IN, GND and Vcc. IN pin connected to the D6 pin, GND to GND and Vcc to the 3.3 V power supply of NodeMCU. The output of the relay is then joined with the motor and the external battery source. The given figure Fig 8. explains the pin diagram of the setup.

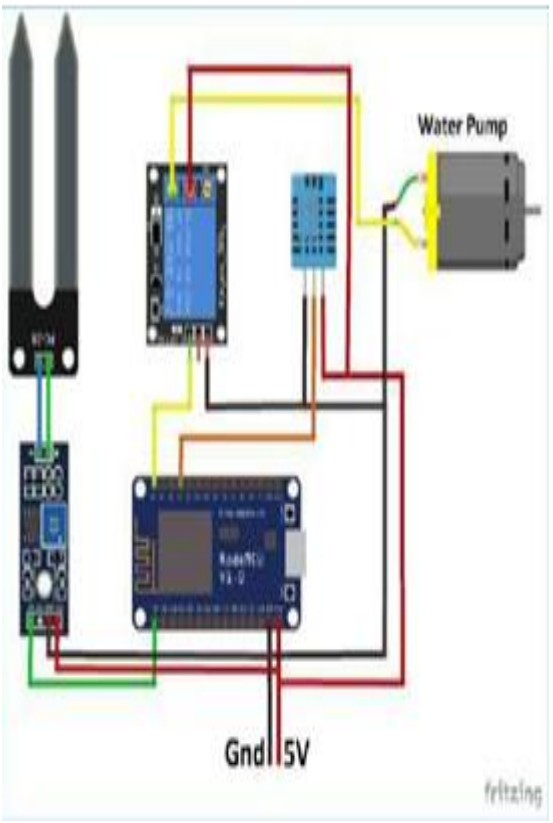


Fig 8. Pin Diagram

V. RESULT AND DISCUSSION

We obtained result of the experimental setup for one day. In that we checked the values of temperature, humidity and soil moisture for various time slots. We analysed the watering levels for the soil for a particular day.

In Table 1. it is seen that the soil moisture level goes down in the afternoon time slot from 12pm to 4pm.

Table 1. Result of Experimental Setup

We can conclude that auto watering level of soil can be setup once in morning slot at 9:00 am and again in afternoon slot at 4:00pm.

VI. FUTURE SCOPE

Water use efficiency can be improved by better predicting irrigation needs, adjusting times and amounts to meet crop water needs, and adaptively compensating for water losses. This reduces irrigation water consumption and increases yields. As systems become more sophisticated and intelligent, better trained models will be deployed to make betterirrigation decisions. Therefore, much of the stress andburden associated with irrigation is alleviated for farmers and users.

VII. CONCLUSION

The primary purpose of this irrigation project is aimed at farmers and consumers who can effectively manage their watering schedules to irrigate their plants and crops. This project will be of great benefit to farmers facing water shortages. Intelligent farming has been successfully implemented to improve consumers by checking the real-time values of temperature and humidity on the app. This also saves parameters in a very convenient way. This project allows consumers to check the status of various parameters on-site at any time. You can better control or maintain the parameters of the field.

Finally, it can be concluded that automatic irrigation systems are more efficient than scheduled irrigation.

ACKNOWLEDGMENT

We are grateful to those who have helped guide and provide feedback throughout the project, as well as for providing the necessary resources to make the project a success. I would also like to extend my gratitude to My team members for helping me in the formatting of this paper. I am also immensely thankful to all my other colleagues who gave a thoughtfulinsight into this paper. Finally, I wish to thank my parents for their support throughout the study

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Satellite IOT: Internet from Space

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Abstract - **Today, the majority of people on the planet need access to high-speed internet. In this age of online labour and commerce, everyone—including offices and businesses, their employees, teachers, and students— an Internet service with a high speed is necessary for their jobs to function effectively. Satellite internet of things can be used to solve this issue. By optimizing satellite orbits in certain regions, satellite constellation design enables greater communication demands to be met with fewer satellites. LEO satellite constellations offer better global coverage, low propagation loss, and minimal propagation latency compared to conventional geostationary earth orbit (GEO) systems. LEO broadband will be a crucial component of the connectivity toolset. Starlink would produce an aerial numerical degree of concentration of approximately 0.01 objects per square degree, a constellation of 12,000 satellites that would dominate LEO below 600 kilometres. To ground-based observatories, such massive spacecraft at low altitude look visually bright. An overview of possible effects on ground-based astronomy was provided by the anticipated number of bright satellites as a function of the season, the length of the night, and latitude**.

Keywords – ***Satellite, IOT, Constellation, Internet, LEO, Starlink, Edge computing.***

I. INTRODUCTION

IOT is a world in itself of smart technology where devices are connected in a network. This network of computers need fully functional Internet connection. Current infrastructure of Internet depends highly on optic fiber cables laid underground, since cellular coverage only reaches approximately 15% of earth with limited connectivity and for places with harsh terrains like North-Eastern India these cable connections are non-economic and non-feasible. This results in decline in growth of those regions. To overcome these challenges Satellite IOT comes into picture. The term "satellite IoT" describes the use of satellite networks and services to connect servers with terrestrial Internet of Things endpoints and sensors.

Satellite internet works by transmitting a fibre internet signal from the system server to a satellite in orbit. The satellite dish is then used to catch the internet signal. All of the devices are linked to the internet using a modem that is connected to the dish. FTTH technology is presently being used by mobile network operators in India, including Reliance JIO, Bharti Airtel, BSNL, and many more. At a time when internet speed is a key concern, high- speed internet services based on satellites, like Starlink, may change the game.

How does the Internet work?

The majority of Internet services need a complex network of optic fibre lines to send data. Your phone may initially be connected to this network of optical fibre via cellular data or any WiFi hotspot. Data from data centres is transmitted across optical fibre lines as light pulses upon request.

How does Satellite Television work ?

All satellites used for satellite TV purposes are parked in GEO orbit of around 42,000 km earth. A channel has a video production facility which beams its signal to a rented transponder in GEO. Any DTH(Direct-to-home broadcasting service) provider can access the signal once they have made a business agreement with program source. Then they transmit signals to end user via other satellites which are angled to dish antennas. These signals have to travel a huge distance via two satellites. Even though the signals travel at speed of light such a large distance would cause a delay of 0.5 seconds (latency). Due to this latency GEO satellites can not be used to provide internet services throughout the globe.

II. LEO SATELLITE CONSTELLATION

A comparison between LEO constellation IOT systems and conventional geostationary orbit systems is made in reference [7]. The benefits are described, including low propagation delay, minimal propagation loss, and global coverage. The authors provide an explanation of why modernizing the IoT protocol is essential to enhancing the compatibility of LEO satellite constellations with terrestrial IoT systems.

It suggests structure of LEO constellations, spectrum allocation, suitability for heterogeneous networks, and access and routing protocols. Paper describes the drawbacks of terrestrial based LPWAN and other traditional systems like WiFi and NFC. It also highlights advantages of LEO satellite constellation technology like, time efficiency in terms of propagation delay, shorter signal loss and unconstrained from extreme topographies.

Authors have discussed limitations of geostationary satellite systems like weather influence indirect results and system cost. Paper emphasizes on how LEO constellation without inter satellite links are more suitable for data tolerant applications due to their low cost and complexity.

Due to severe propagation limitations, the current satellite operating frequencies, the Ku and Ka band, have considerable power consumption. Since there is no universal method for frequency distribution, authors explain how using permitted frequency ranges requires local suppliers to engage with local radio authority. The conclusion is that using the same frequency channels as domestic Iot applications for LEO constellations is now a practical alternative.

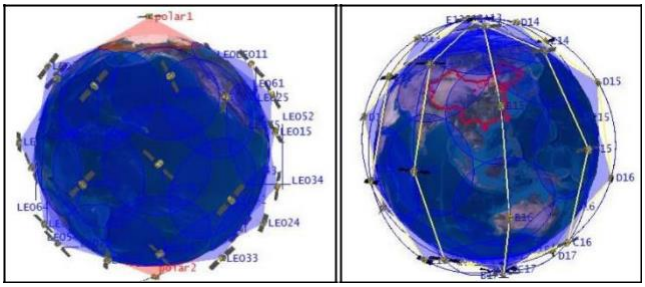

Figure 1. LEO Constellation A. Without ISL & B. With ISL
Source: Adapted from [7]

Reference[8] mainly talks about how we can use satellites for environmental studies of remote areas. It explains how the researchers built a satellite-enabled Internet of remote objects to transmit collected data from remote locations of the Tibetan plateau.

The proposed system will transmit and retrieve data using the Xingyun satellite constellation. The key environmental variables that the system tracks include air temperatures, relative humidity, precipitation, snow depth, temperature of the ground, rate of stream flow and species that can synthesise sunlight. The authors have showed how the satellite Internet of remote objects architecture can send data monitored to a data centre through satellites.

According to authors, ground IOT terminal, the constellation of IOT satellites, and a centralized data centre to store data are the three primary components of the architecture of the Internet of Remote Things network facilitated by satellites.

On the Tibetan Plateau, authors have set five IOT terminals on the ground. Three terminals are located in isolated sections of the Qilian highlands and are used to monitor snow depth and tree growth in that region. The first terminal is used to gather weather data at the end of Mugagangqiong Glacier.. The second terminal is on the slope opposite Jialabailei Glacier.

Using the Xingyun project constellation, authors have created a system to monitor data in the most isolated regions of the Tibetan plateau. The relative humidity, temperature of the ground, depth of snow, radiation that has been triggered by photosynthesis, tree stemflow rate and diameters of tree stemare all monitored by this IORT network. The findings in the paper's conclusion show that the IORT network performed better consistently when sending cached data of packets which are smaller than 200 Bytes in size.

Reference [9] notes different satellite IOT constellations and evaluates their quality of experience (QOE). It proposes a architecture for satellite constellation based on satellite IOT changeable network topology. QOE factors defined in the paper are optimized using a multi-layer tabu search algorithm (MLTS). Satellite constellations built using MLTS algorithm are tested and proved to be superior to traditional constellations.

Steps for constructing satellite constellation:

1. SIOT network model is build.
    a. Using a space time graph(STG), the dynamic network topology of SIOT is analysed
    b. The problem is intended to maximise the user's quality of experience
2. QOE evaluation is done by 4 factors
    a. Coverage performance - It directly affects QOE so is treated as a prerequisite
    b. Communication fluency - It is promoted using classical tabu search (CTS) algorithm
    c. Regional demand capacity - It is expanded using tabu greedy search (TGS) algorithm
    d. Profitability - It is improved using tabu search genetic algorithm (TSGA)
3. QOE value is calculated using weighting formula
4. Satellite's orbit determines its constellation

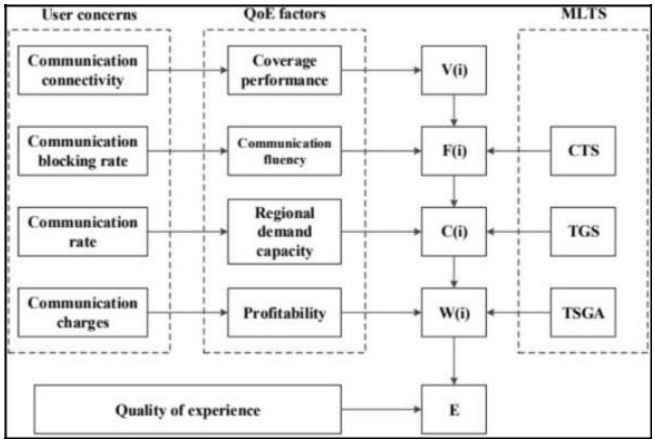

Figure 2. A. QOE Aware Evaluation Framework
Source: Adapted from [9]

$$\text{Max } E = \frac{\sum_{i \in N_i} V(i)[\frac{F(i)}{F_{average}} \cdot \rho_f + \frac{C(i)}{C_{sat}} \cdot \rho_c + \frac{W(i)}{W_{max}} \cdot \rho_w]}{N(i)}, \quad (1)$$

subject to:

$$\rho_f + \rho_c + \rho_w = 1, \quad (1a)$$

$$V(i) = \begin{cases} 0, if\ \theta_{UA} \geq \theta \\ 1, if\ \theta_{UA} < \theta, \end{cases} \quad (1b)$$

$$S_r(i) \cdot f[i] < S_{sum}, \quad (1c)$$

$$B(i) \cdot f[i] < B_{th}, \quad (1d)$$

$$C(i) \cdot f[i] < C_{total}. \quad (1e)$$

Figure 2. B. Objective Function To Maximize QOE
Source: Adapted from [9]

Reference [11] proposes a framework for simulation of network behavior of big satellite constellations like Starlink, Kuiper and OneWeb who have planned to launch thousands of satellite in LEO to provide global broadband internet.

Authors mention that use of satellite for internet connectivity is not a new idea. These constellations, which have fewer satellites, have been utilised in the past for satellite telephony, shipping, and limited connection for remote locations. Paper has discussed the drawbacks of GEO satellites and how we can use LEO satellites to improve it.

Paper has taken into consideration some of networking challenges of LEO networks and thus proposed Hypatia and analysis framework which provides packet level LEO simulation and network visualization. Using the regulatory data that businesses have submitted to regulating agencies like the Federal Communications Commission, It investigates end-to-end relationships between LEO constellation networks in terms of path topology and shifting latencies. Additionally, it shows how constellation networks' hotspots for traffic evolve when more satellites are added.

Along with explaining the architecture of Hypatia, the paper also outlines how to build up a LEO simulation network. The outputs are GS-satellite and ISL connection as well as time-varying forward state. It accepts inputs such as satellite trajectory, TLE, and ground station locations.

The research finishes by outlining how Hypatia not only gives quantitative support for recent works, but also

highlights the difficulties associated with LEO networking and fills in the infrastructure gaps necessary for advancement. Many intersatellite link (ISL) relays can transmit Internet of Things (IoT) messages that have been captured by satellites to a ground gateway, where they can then connect to a ground network.

Mega-constellations with enormous satellites require more ISL relays than ordinary constellations do, and the quantity and position of terrestrial gateways have a big impact on this requirement. In this article, we concentrate on the ISL usage for connecting satellites and gateways and offer a creative, practical method for computing the ISL utilization statistic. We then use model transformation to build a mixed-integer optimization model with a focus on reducing overall ISL utilization for the gateway site optimization (GSO) problem.

One ISL relay is also referred to as one hop. The requirement for ground gates is significantly reduced by the usage of ISLs, and expanding the number of gateways can reduce the number of ISL hops required to reach gateways.

We want to lower the overall ISL usage in MCN by making the greatest use of the gateway locations while the gateway number is fixed. In order to decrease the overall ISL usage, this study formulates a gateway site optimization (GSO) problem to determine the best sites from the provided candidate set. Here, the relationship between ISL and Ground gateway stations is inverse.

Following is the summary of major contributions:

A fresh approach to measuring ISL utilisation is suggested: ISL consumption is measured as a traffic-weighted hopcount. the needed ISL hop-count was calculated using an analytical hop-count model, which is less computationally expensive than standard route calculating methods.

In order to, reduce this ISL generally speaking utilization, we are making an optimization model for mixed integers for addressing the site improvement for gateways (GSO) problem. Decoupling of the gateway allocation is followed by a reduction of the GSO problem for a problem in algebraic nonlinear programming. An IBD-PSO method with three distinct schemes is proposed to resolve the GSO problem.
Modeling demonstrates that the suggested ISL utilization assessment approach saves over 80% more computing time than the conventional way and validate the method.

The proposed IBD-PSO method is also supported by the results. We then examine implications of gateway count and requirement for traffic patterns using Starlink. The difference in hop-count between satellites that are rising and descending is discovered and examined. Due to the uneven distribution of traffic demand, gateway locations in heavy need locations were desirable (not in outer sea).

Reference [13] aims to provide internet access to the places which are non-feasible, non-economic in terrestrial way. LEO is the solution to the aforementioned problem. We are unable to use GEO due to the key advantages of LEO, including its small loss, small delay and high coverage and high orders of magnitude.

Due to its rapid rotation, traffic analysis is crucial. It is difficult to examine the LEO satellite-based IoT's business model because terminals are distributed around the globe and LEO satellites move swiftly, in addition to the fact that there are many different businesses. In order to develop a LEO space - based Internet of Things' design, it's important that we examine both the rule and the traffic features. Beam coverage and traffic sources are continually shifting because of the rapid movement of many satellites.

Additionally, business distribution is made more complex and unstable by the unequal distribution of terminals worldwide.

Reference [14] takes into consideration how satellite IOT can revolutionize every day IOT devices and their networks in our surrounding. It proposes a miniaturized multi-band circularly polarized antenna design for addressing satellite-terrestrial communication. The microstrip antenna operates on super high frequency (i.e. microwaves) and are intended to be used by existing satellite in geostationary orbits.

Authors have designed complete structure of antenna along with its design equation. This antenna's patch size is determined using the following formula:

$$W_p = \frac{c}{2f_r\sqrt{\frac{\epsilon_r + 1}{2}}}$$

Where
f_r : frequency of resonating.
c : is speed of light in air which is given by $3x10^8$ m\sec.
ϵ_r : permitivity of dielectric substrate is 4.4.

Figure 3. Patch Width Formula
Source: Adapted from [14]

Simulation results show obtained loss values of 5.8 GHz, 6.76 GHz, and 8.4 GHz, respectively, at -36.67 dB, -27.22 dB, and -40.83 dB which are way better than the desired loss of less than -10dB from conventional antenna design.

Because of its small size, cheap price, construction simplicity, poor profile, and easily portable, this antenna also finds use in Along with satellite IOT, there are army, aerospace, naval transport, oil, and gas uses.

III. CLOUD EDGE COMPUTING

Networking devices is one of the main prospects for the development of the Internet in the future. Even though More IoT gadgets are being created, a few isolated regions lack internet connectivity.

Thanks to the vast satellite television channels' reach, the problems covering of the ground and communication disruption caused by natural disasters may both be handled. Commercial satellite providers like OneWeb [19], and SpaceX Starlink[20] have put forth proposals for satellite constellations, boosting spending and research on satellite-related technologies and enhancing the capability and intelligence of satellites.

In traditional satellite communication, there is no network and most satellites are single stars or single chains for observation, relay, and communication.

The available processors aboard the satellites are underpowered and unable to keep up with the rising demand for space computing jobs because of the energy consumption restrictions. However, neither the pace of satellite communication between satellites nor that between satellites and the earth has generally increased [15].

Improvement in communication of satellite to ground or satellite to satellite.

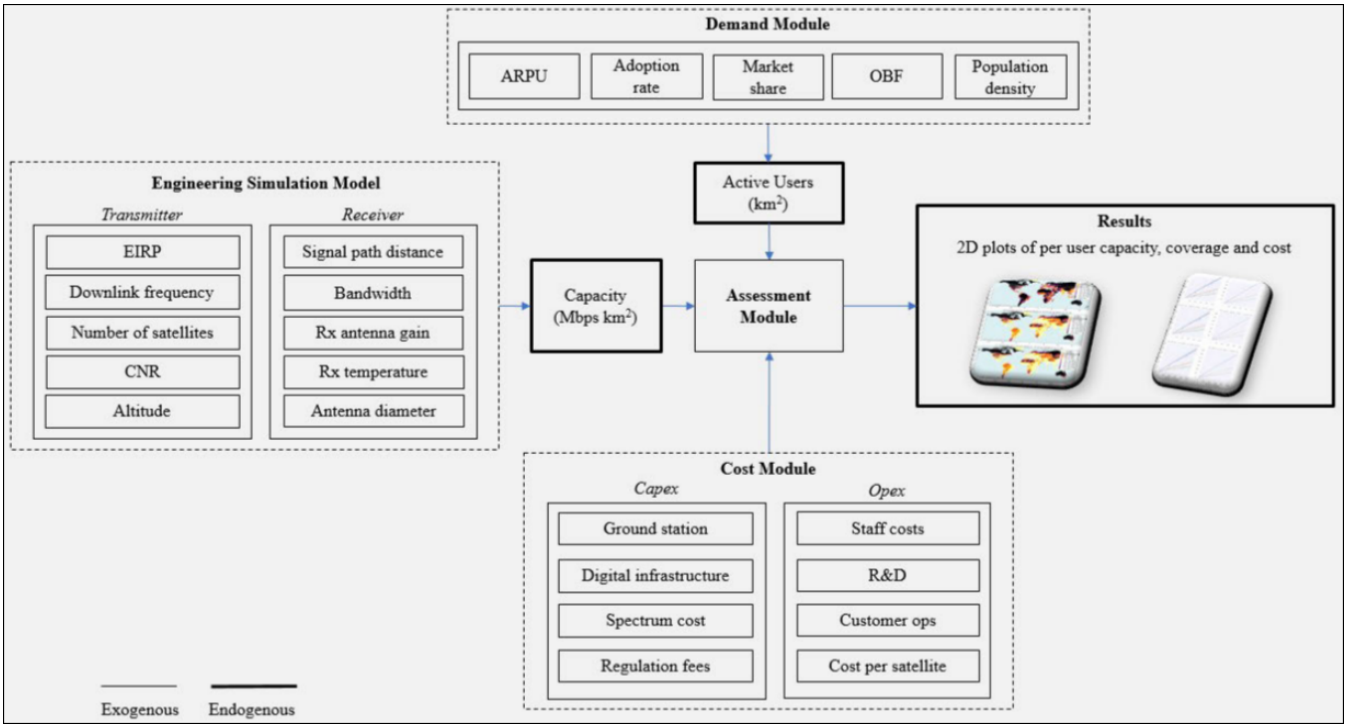

Figure 4. Framework For LEO Satellite Network
Source: Adapted from [19]

Generally, Due to onboard data generation and continuous computation leads to delay in transmission. Let us, take an example of this – Image data processing.

- Large image data is transferred from cloud computing center of satellite ground station
- Then with reasoning through deep learning model, the processed result is distributed to user
- But image generated is of Gigabytes size, so transmission have delay, as it occupy large satellite bandwidth, and as simultaneously large data computation is also happening there

Consequently, paper proposes the idea of "Edge Intelligent Computation"

1. Cloud (Cloud Node = connection nodes)
2. Fog (Edge Node = gateway nodes)
3. Mist (Ground Node= ground nodes)

In paper [19] authors gave each satellite some computation power to satellite too which utilize each satellite as an edge device, allowing processing to be done while the satellite is in orbit and reducing transmission time.

On one hand edge device can ask help to other two or also help them by combining other edge devices to form a fast service cluster.

If we want High computation power and real time retrieval of data then cloud node will be the best option but If we want High Computation and low real time retrieval the ground node will be the best option. Because if data is requested by a client then first it makes a request to its nearest ground station and then it goes to the satellite connected to it and then it get transfers to satellite near to the database and finally from database it retrieve data and transfer it to the client.

Most powerful computation is of ground station which is followed by cloud node and least computation power is given to edge node which is mostly used as support node.

So, cloud-edge computation can reduce data processing and communication latency, conserve bandwidth, and enhance bandwidth interconnection and reduce pressure on ground stations. Paper explain the architecture of A storage system, an IoT satellite constellation, and a terrestrial IoT endpoint make up the three primary components of a space - based Internet of isolated objects system.

In order to give space missions (nanosatellite terminals) high-speed continuous broadband access from the burgeoning Internet service suppliers in space, We offer a technique for creating an orbital multi-layer information network (SIN). The rapid development of nanosatellite constellations in lower orbits for satellite downstream analysis, such as earth observation, satellite imagery, and Internet of Things (IoT) data collecting, as well as satellite technology such as satellite downsizing and recyclable rocket launch., have all served as inspiration for this idea. In particular, broadband communication directly to/from the nanosatellites can be used with satellite- enabled internet suppliers like OneWeb, SES O3b, and Starlink, allowing to higher levels of interconnection among structures of space networks.

Additionally, such a kind of setup achieves real-time and dependable space communications while having more profitability and obviating the requirement for too many ground stations. To achieve this goal, Effective scaled space backhauling must be created by use of inter-satellite links (ISLs) along with inter-orbit connectivity (IOLs). The key factors that made this new idea possible are specifically using software-defined networking (SDN)-based design and service-oriented radio access methods that apply the best routing strategies over a large number of ISLs and IOLs. Therefore, establishing this mutual connection between adaptable satellite nodes in various orbits will bring about a development in the planning and management of satellite networks and upcoming space missions.

We offer advice on how to create an data network in space with multiple layers and orbits (SIN) so that the expanding space-based Internet suppliers may supply high-speed, uninterrupted broadband access to space missions. Real-time and trustworthy communications in space are made possible by this configuration, which is also more inexpensive This gets rid of the requirement for too many ground stations. The key enablers for this novel strategy are software-defined networking (SDN)-based system and service-oriented radio access techniques [16].

Additionally discussed are the most current NGSO satellite-based broadband technologies, satellite network improvements, and nanosat satellite projects. More interconnections for space network topologies is made possible by the recommended connectivity design, which may also enable nanosats to reach their full potential.

The report outlines a novel strategy for resolving the connection problems that several satellites in lower orbits are experiencing. The proposed connectivity design enables increased connectivity for space network topologies. A lot of technical obstacles need to be removed in order to build such a network structure. This essay's key objectives are the development of effective SDN-based satellite networking and routing mechanisms and appropriate radio access strategies.

The suggested architecture in this article has the potential to change the development and deployment of upcoming satellite missions while also opening up new options for satellite operators. The report opens the door for a seamless connection between nanosat missions and space-based Internet infrastructure, which will encourage more study in this area.

IV. STARLINK AND OTHER SPACE TECH GIANTS

Project Starlink is a satellite Internet constellation being managed by Elon Musk's SpaceX, that provides satellite-based Internet access around the world. The Starlink constellation consists of interconnected satellites in its LEO (Low Earth Orbit) communicating with dedicated ground transceivers. Starlink may only provide services in countries that SpaceX has authorized to provide services in those territories. Starlink is not yet fully mobile. Starlink claims that it will initially need about 30,000 satellites in the sky for the Starlink constellation to be complete and "fully mobile". Currently, the US Federal Communications Commission (FCC) allows the company to launch about 12,000 satellites into the sky [1].

Paper [18] begins by describing how the proposed 12,000-satellite mega constellation Starlink would dominate space below 600 kilometers, resulting in an aerial number density of about 0.01 units per sq degree. To ground- based observatories, such enormous and low-altitude satellites look visually dazzling. The projected number of lighted satellites has been predicted by the author as a function of latitude, time of day, and season [18]. The author has also outlined potential ramifications for ground-based astronomy.

Authors of [18] has used the U.S. catalogue of space Starlink to launch Darksat, whose nadir surface had an unique covering, is also discussed in the paper. Initial observations indicated that this covering had essentially no impact on the brightness of the satellites [18].

The effects of bright satellites passing through observatories' fields of vision, including ghost pictures, electronic crosstalk, and effects on flat fluids, are shown in Paper [18]. When passing near some telescopes, bright satellites may scatter light into the field and reduce the limiting magnitude. Additionally, these satellites are probably strong thermal infrared generators. The last section of Paper [18] focuses on the rapidly changing population of large satellite mega constellations in orbits under 600 kilometres, which affect ground-based observations of space, particularly by serving as sources of reflected sunlight, twilight observations and long- exposure observations with large fields of view can be made. According to the authors of [19], there is still no open-source approach for gaining access to the technological economics of satellite broadband communication. The paper provides a generalizable technoeconomic model to access the economics of satellite constellation engineering. It also provides an evaluation of the Kuiper, OneWeb, and Starlink LEO constellations' potential capacity and price per user. The importance of LEO broadband as a component of the connectivity toolset is discussed by the authors.

Motivated by the reality that a huge portion of the global population still lacks access to a reliable broadband service Theoretical model presented in the paper enables approximate estimation of constellation capacity based on parameters submitted to the Federal Communications Commission. The code base for model is completely open source. Modern results revealed that mean aggregate capacity of around 11 Gbps, 4 Gbps and 8 Gbps could be accomplished by Starlink, Kuiper and One Web respectively. It also highlights that success of these models depend on subscriber densities required to be lower than 1 user per 10 km2.

The article describes a few topics, including what could be the maximum capacity per user for four different kinds of constellations, how much capacity different LEO broadband constellations might supply, what might be the potential cost per user, and which geographical areas are the most lucrative for Leo constellations?

Comparing LEO systems to other MNO systems' scalability is discussed in the paper. A variety of models make up the technological economic framework for satellite networks: System model, cost model, system and economic model integration, demand model, and engineering simulation model are the first five. Free space path loss, received power, carrier-to-noise ratio, spectral efficiency, channel capacity, and aggregate channel capacity are studied in relation to the Starlink, OneWeb, and Kuiper constellations [19].

V. FUTURE OF SATELLITE IOT AND RESEARCH

Future research can concentrate on the issue of non-linearity in the multiple access to satellite resources in order to improve on the current simplifications. The framework can also be changed to accommodate other anticipated

objects as a source of obtaining data for research. Author has
generalizable for satellite constellations. The results of the
proposed a model for observing impacts of mega satellite
investigations being done now may create a market for the
sale
in LEO with the help of observing group
of extra C-, Ku-, and Ka-band facilities for
geostationary
SeeSat. This model demonstrates that most satellites are
easily
satellites. This example demonstrates
situations where
visible to the naked eye from dark places. The attempt by
business locations are situated in remote
regions and

reciprocal connection can only be accomplished through satellite communications.

Institutional services that are provided between these institutions also need for ICN-based solutions because they need specific security measures. Another crucial necessity in this regard is the multicast capability, which is required in some systems that only distribute data to specific user groups. Since remote entities are the main recipients of data sharing, a hierarchical name method seems more viable because it may also be used to satisfy multicast needs. Application of identity-based signatures (IBS) combined with encryption in the latter situation, where source (identity)validation is first carried out before content decryption, is particularly effective.

VI. Conclusion

Interest in the possible use of satellite constellations for Internet of Things applications is developing. LEO constellation based IoT is worthy of attention and study given the booming IoT environment and its potential as a strong companion to terrestrial systems. Further studies on the system security, transmission technology and low power consumption design are required to turn this topic into a reliable cost-benefit solution.

Starlink encircles the entire planet, from Antarctica to the middle of the ocean, it can offer internet access wherever. Due of the price differential between Starlink and Indian Internet Service Providers, the Indian market may cause challenges for Starlink.

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Web Based Portal for Complete Data Engineering

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Abstract—**Machine Learning has become the need of today's world. Any intelligent system is incomplete without Machine Learning. People use ML models in various applications. Every ML-based project has to go through some of the steps during the development process. This process consists of certain common steps which every ML project needs to follow. The process of building ML models is tedious and time consuming. There are some common problems which people face while developing ML-based projects. That includes lack of resources and infrastructure, lack of uniformity in codebase and writing repetitive code for every project. These problems are very serious as building ML models needs a lot of effort and time. This paper aims to describe some of the problems that people face during the development of ML-based projects. It also provides a solution to reduce many problems and save efforts in the development process. The system proposed in this paper can save a lot of time and effort in building ML models. It will help to build projects faster and increase efficiency.**

Keywords—Machine Learning, ML pipeline, ML models, Web based Portal.

I. INTRODUCTION

Currently, to make any project involving machine learning or data science[4] one thing that comes at the forefront of the project is the data preprocessing[5] part. Without the proper data preprocessing, no project can be made that can give the desired results. Whenever, a database is picked up to work on, in its raw form it has many flaws, irregularities and redundant data as well. All these irregularities need to be overcome and the data must be made feasible to serve machine learning models or to make any future assumptions from this data. This process of removing the irregularities is nothing but the preprocessing.

Presently, the preprocessing part is carried out by using various coding techniques and making use of various data science libraries. Examples of such libraries are Pandas, Numpy, Matplotlib, etc. Below image shows the typical coding snap of any data preprocessing part.

Figure 1: Typical Preprocessing Process

Any data cleaning or data preprocessing part involves few standard steps:

a. Exploratory Data analysis
b. Data Preprocessing
c. Feature Engineering

Presently, these steps are implemented by coding using the libraries as discussed earlier.

However, since these steps of data preprocessing are something very standard and need to be done every time you start with a fresh dataset. When one has to do it every time with every new project, then it feels the requirement of some easier process to do so. At the same time, for the people who do not want to code, or don't know how to code, for them this becomes a big hurdle to get the data done to start any fresh project.

Here, this portal is proposed, which can conduct all these steps of data preprocessing without using a single line code. A user of the portal has to just upload the data set and get his job done by just a few clicks.

Figure 2: Upload the Database

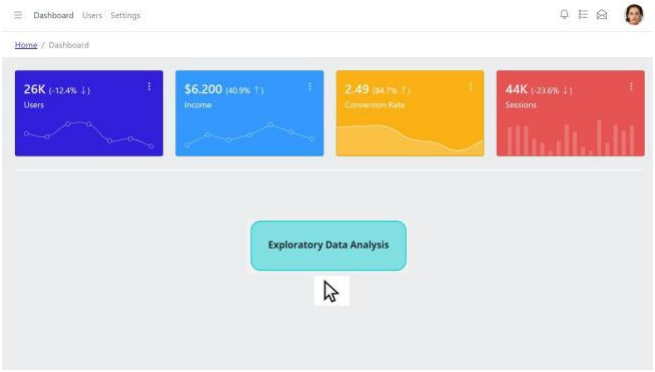

Figure 3: Select the Functionality

Such a portal will prove to be handy for the frequent coders who don't want to code every single time the same steps and also it's going to save a lot of time in the development of bigger projects.

II. LITERATURE SURVEY

Machine learning is one of the popular domains on which people write articles, technical papers and books. In this literature people write about various architectures, different techniques to implement models, various machine learning algorithms and problems that people face during its implementation.

There are certain challenges that people face during practical implementation of machine learning models. In the research paper "Challenges In The Deployment And Operation Of Machine Learning In Practice" by Bair, Jöhren and Seebacher[1] , many such problems are discussed in detail. This paper contains a complete analysis of various challenges that ML practitioners face. That includes pre deployment issues like encryption of data, data format,etc and deployment issues like scalability and resource availability issues to train on big data. It also talks about some non technical challenges such as interpretability and transparency of complex machine learning models. It also suggests some solutions to solve some of the problems that are described in this paper.According to this paper, there are many problems which are unknown to ml theretitians. In order to get complete data they conducted interviews and surveys of industry experts who are working in this field for many years. It is focused on studying the cause of these problems in order to solve them.

According to Ashmore [2], for developing any ML-based project there are four stages:

- **Data management**, means collecting and transforming data into correct format
- **Model learning**, means learning features used in prediction
- **Model verification**, means testing accuracy of results from model
- **Model deployment**, means using a trained model in a production environment.[6]

There are many small steps under each of four stages. In the paper "Challenges in Deploying Machine Learning: a Survey of Case Studies" by Andrei Paleyes, Raoul-Gabriel Urma and Neil D. Lawrence [3], detailed description about various problems in each of these steps is mentioned. It also describes main causes for these problems.

There are more such papers and articles describing problems related to ml pipeline, workflow and deployment of models. It shows that developing and managing ML models is a difficult task and a lot of resources are used to do this task. There is a need for some generalized pipeline to reduce some of the problems and fasten up the process of developing and deploying ML models.

III. PROBLEM DESCRIPTION

Every ML project goes through some common steps in the development phase. Some of the common steps are:

1. Gathering Data
2. Generating Hypothesis
3. Exploratory Data Analysis (EDA)
4. Data Preprocessing
5. Feature Engineering
6. Model Selection
7. Model Training and Evaluation
8. Hyperparameter Tuning
9. Model Deployment

Traditional way of writing code for these steps is very tedious. There is no uniformity in the code. People write repetitive code for various steps in the ML pipeline in every project. It is time consuming and requires a lot of resources to build. There is a need to automate some of the steps of this pipeline. This can save a lot of time and resources. People can build their project in less time and effort. It can boost efficiency and improve the quality of the project.

3

IV. Proposed System

The proposed system for the problems and hurdles discussed so far in the field of data engineering, would be this "Web Based Portal For Complete Data Engineering". The overview of features of this system can be seen pictorially as;

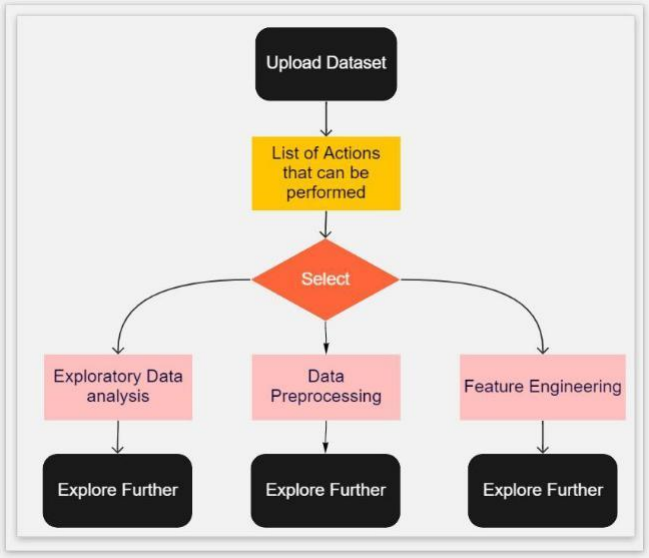

Figure 4: Features Overview

The detailed features of this system are as follows:

1. Users must login to the account.
2. Users should be able to load a dataset from source(File, Database, Cloud Storage).
3. Users should be able to choose a component from the below 3 categories.
    a. Exploratory Data analysis
    b. Data Preprocessing
    c. Feature Engineering
4. User should select any options like If user select Exploratory Data Analysis, the user will get
    a. All column details like missing values in specific columns, mode, median, mean, memory size, etc.
    b. Correlations between dependent and independent features.
    c. Missing values Plotting as well as % of missing values in each column.
    d. Sample of First rows and last rows
5. In EDA we have a lot of Graphs (count plot, scatter plot, box plot, etc) and we have to provide the ability to plot graphs based on the dataset. Eg: If a user wants to perform some specific task like outliers detection then here user will get an option to plot a scatter plot or box plot.
6. If the user select Data Preprocessing, the user will get 4 options:
    a. Data Cleaning
    b. Data Integration
    c. Data Reduction
    d. Data Transformation

    Example: If user select data cleaning
    - User will get a percentage (%) of missing values in each column
    - If in our columns we have 95% of missing values user should drop this column
    - If in our columns we have 40% of missing values and our columns are categorical columns, users can apply mode here and so on.
7. If the user select Feature engineering, the user will get 4 options
    a. Handling Imbalanced data
    b. Handling categorical data
    c. Based on categorical data, users should do the operations like One-Hot Encoding, Label encoding, Target encoding, etc.
    d. Users should also add a manual process to handling categorical data.

V. CONCLUSION

Machine Learning is being used in almost all the projects. There are some problems that people face while building, deploying and maintaining ML models.These problems are very common and serious. The portal described in this paper can help to reduce some of the problems that people face.The portal will be helpful to perform some important steps of the ML pipeline such as Exploratory Data Analysis, Data Preprocessing, Feature Engineering, etc with less effort and in less time. It will improve the speed of development and will reduce repetitive work.

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Arcade 2D Top-Down Shooter

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Abstract— **Video Game is a part of entertainment that grows fleetly. To enhance the development of content, games must be suitable to produce anon-boring game atmosphere similar to Replay- capability. The Roguelike game relies on Procedural Content Generation as a vessel for games and perm death systems. The existing system have minor loopholes and some glitches containing in them. The A* Pathfinding algorithm is used to create space and content from a game grounded on the direction the algorithm is going. And methodology like ray casting for shooting and line of site are used in our game. Game design further using unity assets. Future works for our project is to make it 3D and adding many more features by using assets for 2D version.**

Keywords— ray casting, pathfinder, unity.

1. INTRODUCTION

A top-down shooter is a type of video game in which the player views the action from a top-down perspective, typically with the player character at the bottom of the screen and the enemies or targets at the top. In Unity, a 2D top-down shooter can be created using the UnityEngine.Tilemap package, which allows for the creation of tile-based levels, and the UnityEngine.InputSystem package, which allows for player input and movement. To create a basic top-down shooter in Unity, you would need to do the following: Create a new Unity project and set it up for 2D developmentCreate a player character, which can be controlled using the Unity Engine [2]. Input System package to handle player input Create enemies or targets for the player to shoot, which can be randomly generated or placed in the scene using the Unity Engine. Tile map package Implement a shooting system, which can be accomplished using Unity's built-in physics engine or by creating custom script to handle bullet spawning and collision detection Add a user interface, including a health bar, score, and other elements that will provide feedback to the player Add sound effects and background music to the game.It's important to note that this is a high level overview and you would need to have knowledge in programming, game design and Unity to implement it.

2. LITERATURE SURVEY

The Make Code environment is an open source online web environment that allows programming in blocks of code, using the scripting language JavaScript and Python. The simulator can be controlled with a keyboard, or with a gamepad connected to the computer (e.g. Xbox gamepad). It is also possible to test the created games on a special game console (approx. 35 €), and on mobile devices [1].

Construct 2 enables anyone to create a computer game in easy and straightforward fashion. Drawings on old-school 2D games, objects (main character, platforms, gems, signatures) have been created. The environment is accessible and easy to use, with an interface susceptible to third party plug-ins [2]. Over 30 Games were chosen to form a representative set, mixing older titles and new ones. Patterns were chosen taking into account their relevancy (if it is often mentioned in the community or works) and recurrence (if they were observed in a substantial amount of the games that were played) [3].

Literature in the field offers a number of papers devoted to the development of indie games. The process of making an indie survival game was explained by David Michael and how to choose the right tools for your needs [4].

An action game is a game that requires hand-eye coordination and fast response from players. In 2D avatar based actionplatform games, a player has to navigate an avatar through 2D environment. Both the avatar and its enemies have limited number of hits that they can take before they are considered defeated. Previous work described an experimental game that could read and execute ADL. In this paper, we used ADL to create a dataset of enemies from existing action-platform games. These enemies were then used to evaluate our AI through battle performance comparison [5].

The proposed method uses machine-learning methods available at Unity's ML-Agents library. The most important design aspect to be considered in the presented method is the relative configuration of the dungeon strategic rooms. In this paper, the chosen event rooms were the boss and shop. Event rooms are present in many dungeon crawler games, such as The Legend of Zelda and The Biding of Isaac. It is important to design the map positioning of these rooms so designers can have more control over the order they appear [6].

The input device which is primarily used to manipulate video games is called a game controller. Some of the most common game controllers are gamepads, mice, keyboards, and joysticks. Playing games by using keyboard will not give a realistic feeling. If we play the games using our hand gestures it will be more realistic [7].

New technologies enable the realization of game ideas that previously only could be implemented through significant effort. This paper presents the design, implementation and

verification of a generic version of the A* pathfinding algorithm, with the capability to navigate in multidimensional space, thereby given a 5D sparse matrix, enabling the creation of 3D worlds in computer games that could be used to facilitate time-travel and travel between parallel universes in a straightforward fashion [8].

A proposed framework that captures data while the user plays a game in order to generate a graph that can be shown at the end of the session. It also informs to the game designer characteristics and behaviors of the gameplay as well as the player's behavior during the game [9].

We examine the field of psychology and what works have been done to gain insights into differences among peoples' characteristics and motivations. In particular, we dive into player-centric video game research. Goals and rewards are linked concepts that underlie both human society and neurology. They remain a powerful driving force in influencing human behavior [10].

The summary from the literature survey is that The proposed method uses machine-learning methods to design dungeon strategic rooms, such as the boss and shop. The input device used to manipulate video games is called a game controller, and new technologies enable the realization of game ideas. This paper presents a generic version of the A* pathfinding algorithm, with the capability to navigate in multidimensional space, and a proposed framework that captures data while the user plays a game to generate a graph. It also examines the field of psychology and what works have been done to gain insights into differences among peoples' characteristics and motivations.

3. PROBLEM DEFINATION

Performance optimization: The game may experience lag or reduced frame rates, affecting the overall user experience.
Balancing: The game may be too difficult or too easy, causing players to become frustrated or bored.
User interface: The user interface may be confusing or poorly designed, affecting player engagement.
Collision detection: The player's bullets and other game objects may not be colliding correctly with each other, causing unexpected behavior.
Level design: The levels may be poorly designed or too repetitive, affecting player interest.
Sound effects: The sound effects may not be synchronized with the game play, causing distractions for the player.
Performance optimization: To resolve performance issues, consider using object pooling, reducing the number of active objects on the screen, and using optimized sprite renderers.
Balancing:To resolve balancing issues, consider implementing adjustable difficulty levels, providing more opportunities for player progression, and adjusting the strength and frequency of enemies and power-ups.
User interface: To improve the user interface, consider using clear and concise text, intuitive button placement, and providing visual cues for important actions.
Collision detection: To resolve collision detection issues, consider using Box Colliders and Polygon Colliders, and ensuring that the colliders are correctly positioned and sized for each object.
Level design: To improve level design, consider adding variety to the environment, providing clear objectives and paths, and adding interesting obstacles and power-ups.
Sound effects: To resolve sound effect issues, consider using sound effects that are synchronized with the game play, and adjusting the volume levels to provide an immersive experience.

4. EXISTING SYSTEM

The game's parcels include parameters that control the scene rendering or physical behaviors, such as camera, audio, drugs, and new variables added by the game developer. The actors are responsible for representing any game element and executing the game sense, and can acquire new parcels to meet the game needs. Each scene is composed of a set of actors and a list of rules[6].

5. PROPOSED SYSTEM

Game Concept: Fast-paced, top-down shooters where the player must navigate through levels filled with enemy forces and defeat the final boss to win. The player will use ray casting to shoot enemies, and the AI will use line of sight and pathfinding to navigate the environment and attack the player.
Game Mechanics: The player will have a range of weapons at their disposal, including a primary weapon and secondary weapons. The player will use ray casting to shoot enemies,

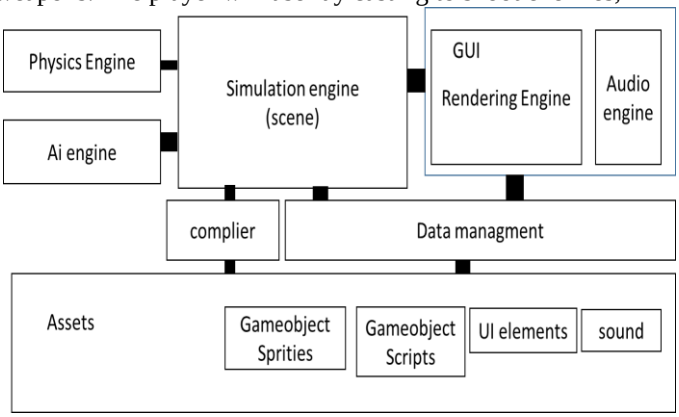


Figure 1

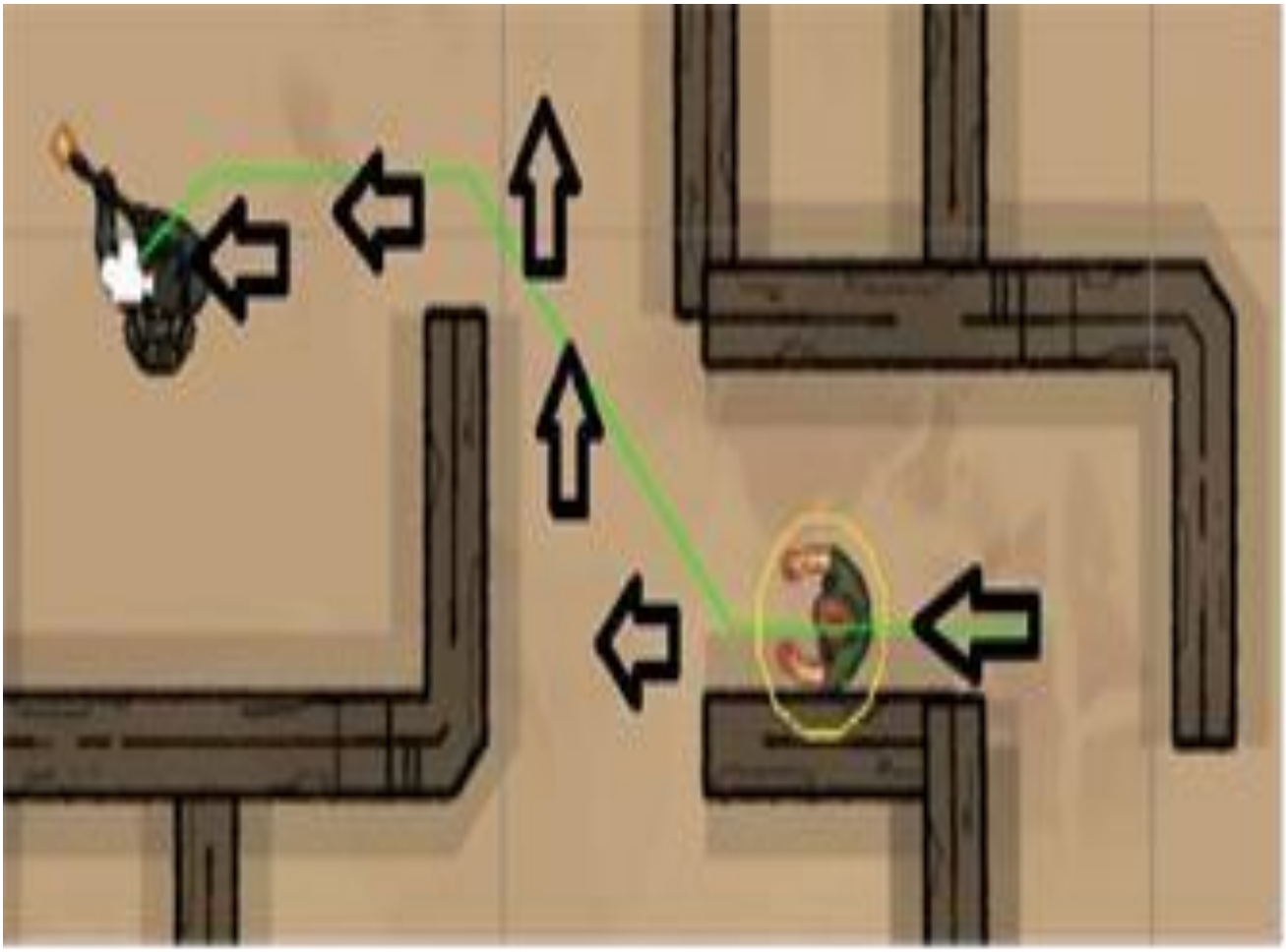
and the AI will use line of sight and pathfinding to navigate the environment and attack the player. The player will also be able to collect power-ups and upgrades throughout the game to enhance their abilities.
Levels: The game will feature a variety of levels set in different environments, including urban, industrial, and extraterrestrial locations. Each level will present different challenges and obstacles for the player to overcome. Art Style: The game will have a stylized look and feel, using shaders to enhance the visual effects.
Target Audience: The game is aimed at players who enjoy fast-paced action and challenging gameplay. It will appeal to fans of classic top-down shooters, as well as those who enjoy stylized

and visually impressive games. Monetization: The game will be sold for a one-time fee, with no in-app purchases or advertisements. Ray casting Shooting: Use ray casting to detect if the player's shots hit enemies. You can use the Physics2D.Raycast method to shoot rays from the player's weapon and check for collisions with enemies. Shade: Create shades to add visual effects to the game. For example, you could create a simple sprite shader to change the sprite's colour or add a flash effect when the player or enemy is hit. UI System for Health: Implement a UI system to display the player's health. You can use Unity's built-in UI system to create health bars and other UI elements.

5.1 GAME DESIGN

Creating a score UI in Unity 2D can involve several key steps:
Creating the UI element: This can be done using Unity's built-in UI system, such as creating a Text or Image element, or creating a custom UI using Unity's canvas system. Displaying the score: The UI element should display the player's current score, which can be stored in a variable and updated as the player collects items or defeats enemies.
Positioning the UI element: The UI element should be positioned on the screen in a location that is easy for the player to see, such as the top-centre or top-right of the screen. Updating the score: The score should be updated in real-time as the player collects items or defeats enemies, this can be done by using a script that updates the score variable and displays it in the UI element.
Adding a script: To handle the score updating, you will need to add a script to the UI element, the script should check for events such as collecting items or defeating enemies, and then increase the score. High score: You can add a high score system, where the player's high score will be saved and displayed, this will make the game more challenging and re-playable. Customizable: You can make the UI elements customizable by adding options in the main menu to change the font size, colour, position, etc.
Testing: After implementing the score UI, it is important to test it in game to make sure that everything is working as expected, and to make any necessary adjustments. By following these steps, you can create a functional and visually appealing score UI in your Unity 2D game
Creating a health system for the player in Unity 2D can involve several key steps:

- Creating the UI element: This can be done using Unity's built-in UI system, such as creating a Text or Image element, or creating a custom UI using Unity's canvas system.
- Displaying the health: The UI element should display the player's current health, which can be stored in a variable and updated as the player takes damage or uses health items.
- Positioning the UI element: The UI element should be positioned on the screen in a location that is easy for the player to see, such as the top-centre or top-right of the screen.
- Updating the health: The health should be updated in realtime as the player takes damage or uses health items, this can be done by using a script that updates the health variable and displays it in the UI element.
- Adding a script: To handle the health system, you will need to add a script to the player character, the script should check for events such as taking damage or using health items, and then update the health variable accordingly.
- Death: When the health reaches 0, the player dies, you can implement death mechanics such as game over screen, or respawn the player at the last checkpoint.
- Testing: After implementing the health system, it is important to test it in game to make sure that everything is working as expected, and to make any necessary adjustments.
- 5.2 PATHFINDING ALGORITHM
- A* (A-Star) pathfinding is a popular algorithm used for finding the shortest path between two points in a game. In a top-down shooter game, A* pathfinding can be used to create intelligent enemy AI that can navigate around obstacles and chase the player character. To implement A* pathfinding in a Unity top-down shooter game, the first step would be to create a navigation grid or map of the game world. This grid would divide the game world into small cells or nodes, each of which can be marked as walkable or not walkable. Next, the A* algorithm would be implemented to find the shortest path between the enemy character's current position and the player character's position. The algorithm would use the navigation grid and a set of heuristic rules to determine the most efficient path. Once the path has been found, the enemy character can then move along the path using character controller systems. A* Pathfinding can also be used to implement other features such as cover system, where the enemies can hide behind cover, and flanking, where the enemies can try to move to a player's side or rear to gain an advantage. It is important to note that A* Pathfinding can be computationally expensive and may have a performance impact on the game, especially in large and complex game worlds. To mitigate this, various optimization techniques such as caching, multithreading or using a different pathfinding algorithm should be considered.



- Figure 2
- Overall, A* pathfinding can greatly enhance the gameplay of a top-down shooter game by providing intelligent enemy AI that can navigate the game world and pursue the player character. With the right implementation and optimization, it
-
- can be a powerful tool for creating engaging and challenging Figure 5 show the failure at the level and menu button direct gameplay [8]. us to play that level again to unlock the next level.
-

6. RESULT AND DISCUSSION

Based on the implementation that was done, the game had been created, and the following screenshots were directly Taken from the game.

Figure 3: Menu Display

Figure 3 show that the main menu of this game that shows how controls is there game. Here, the player can access how to play, controls of the game.

Figure 4 : Mission Complete Display

Figure 4 show the completion of the level and menu button direct us to the next level.

Figure 5 : Mission Failed Display

Figure 6 : Mission/Level Display

Figure 6 show levels in the game there are 5 -6 mission. After completion of 1 st then only next mission will be unlock otherwise play it again till mission is completed.

Figure 7 : Game play Initial Display

Figure 7 show th e goal for successfully completing the mission and unlocking the next mission. The health icon on top left corner shows the health of the player. And on top right corner show how much kill is done.

Figure 8 : Playing Zone Display

Figure 8 shows the play er hiding behind the tree from the enemy.

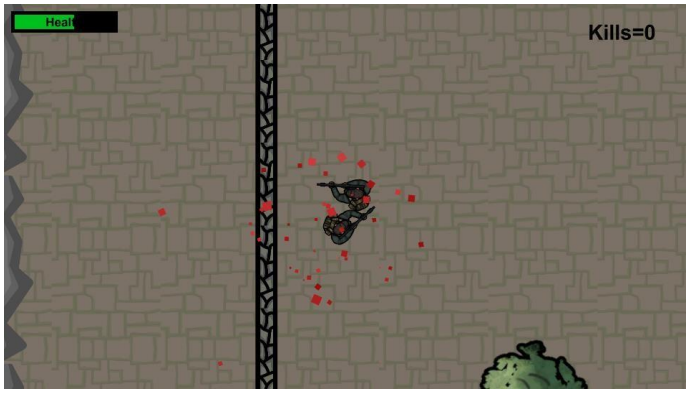


Figure 9 : Fighting Display

Figure 9 shows the fight between the players and red marks indicates blood. And in top left you can see reducing health due to fight.

6. APPLICATION

1. Entertainment
2. Easier to pick up 2D than 3D games.
3. A 2D game can be easily processed and runs on any PC with lower RAM (Random Access Memory)

7. CONCLUSION AND FUTURE WORK

A 2D top-down shooting roguelike game with A* algorithm has been designed and developed. This game was built with Unity Engine 2019 and only has one type of game mode with a different game atmosphere. For future work, we will develop in 3D Platform. And in 2D format will be adding multi-player facilities and Enhanced enemies.

ACKNOWLEDGMENT

Project guide Prof. Samita Patil, Project Coordinator Prof. Reena Deshmukh, HOD Dr. Uttara Gogate, College Principal Dr. P. R. Rodge, and colleagues all contributed to the success of the project.

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Estimate elastic constant of Mild steel plate using welch's periodogram method

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Abstract – **Mild steel(MS) plate used different type of construction design. To find the vibration analysis of plate is important work to find the fundamental frequency. In this paper ball is impact on metal plate with different height and different plate area to find the fundamental frequency. Apply welch periodogram method to vibrating signal and find the fundamental frequency. Fundamental frequency by welch periodogram method compare with ANSYS software by finite element method. It observed that fundamental frequency accuracy is very good by Welch method. Further elastic constant also estimate by method .Estimate result it show that elastic constant from Welch method is very accurate.**

Compare fundamental frequency estimated by impact testing with ANSYS software .Observed that MS plate fundamental frequency by proposed method is accuracy 3.92%.Young modules estimate for MS plate by proposed method is accuracy is 7.2%.

Keywords: — Metallic plate; harmonic analysis.

I. INTRODUCTION

Elastic constant estimate for metal plates is through fundamental frequency is very important role. Accuracy of elastic constant calculates by finite element analyses.

There are different algorithm is design different author for for elastic constant. Some are listed in this paper. Their utmost potential can be obtained. Vibration analysis is widely applied in area of failure analysis . In the area where safety, reliability and quality control are highly considered, the development of harmonic analysis technique becomes inevitable.

Vibration has been extensively studied. Chladni [1] Mechanical vibration analysis done by Rao S S.[2] Navier and Lavy obtained analytical solutions for special boundary conditions[4]. The metal plates analysis several approximations have been proposed by Rayleigh [7] and Iguchi [6] Gorman Methods available for harmonic response analysis are full, reduced and mode superposition. Full method uses full system matrix to calculate harmonic response. [3]

The harmonic analysis of plate is under different impact height. Various techniques have been developed for harmonic vibration analysis of plate and for finding out natural frequency of plate.

II. METHOD AND MATERIALS

A. Metal plates

Two metal plates prepared of low carbon steel are used for the vibration test. The chemical composition of the plate is 0.055% C, 0.25% Mn, 0.02% Cr, 0.01% Ni, 0.02% Mo, 0.021% Si, 0.004% S, 0.015% P. The chemical

analysis is finished and the material is the same as HR sheet (D) as a type material. The plate thickness is 1.6mm. The plate areas are 30 cm x 30 cm and 22.5 cm x 22. The weight of ball is 0.225 kg.

B. IMPACT TESTING SET UP

Figure 1: Impact testing setup

Figure 2: 30cm X 30cm MS plate

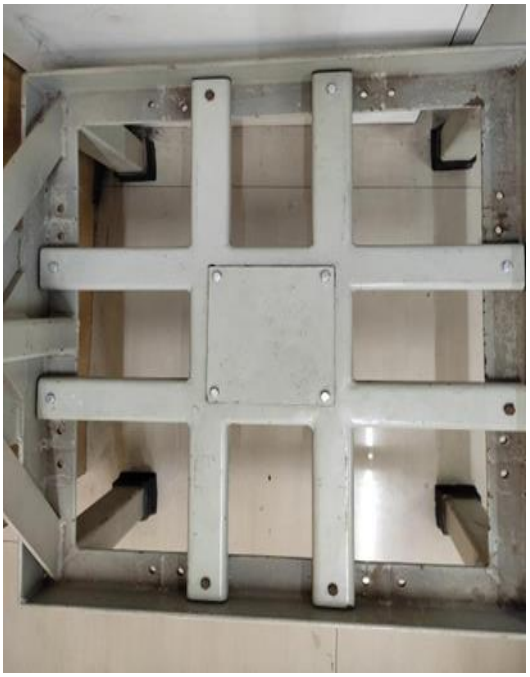

Figure 3: 15cm X 15cm MS plate

Figure 4: 22cm X 22cm MS plate

The experimental set-up used to obtain the vibration signal is shown in figure 1. The experimental set up consists of a frame on which plate is mounted, steel ball ,hook arrangement for release of ball from height, a piezoelectric sensor, scale for measuring ball height

Metallic plate is fixed on a frame which is kept on a stand. A piezoelectric sensor that is accelerometer is positioned on plate from where we are capturing impact vibrations. The ball is freely falls on centre of plate. The stand on one side there is scale from height 10 cm to 150 cm from where ball is impacted on plate.

The piezoelectric sensor used is MIL-521 which measures vibration signal. The vibration signal is collected at different height of ball impact on plate.

Vibration signals are accumulated from the corners of the plate using accelerometers with NI data acquisition devices. Accelerometers consist of piezoelectric materials as the sensor material. The collected vibration data are processed with the software package MATLAB. Various operating parameters are selected in the software for ball impact testing.. NI Data acquisition card is sampling rate of 51.2kS/s.

The vibration data is collected after each impact from different heights. Height is varied from 10 cm to 100 cm. For 10 different height we get vibration data and this data is analysed through spectral analysis using matlab. After analysis natural frequency of material is estimated.

C. Proposed method.

The ball is impact on metal plate in different height an vibration signal is generated . Vibration signal is captured by accerometer. Capture vibration signal pass to different signal processing technique as shown in block diagram figure

5. Final result is of fundamental frequency is compare with ANYSIS software by FEA and accuracy is calculi

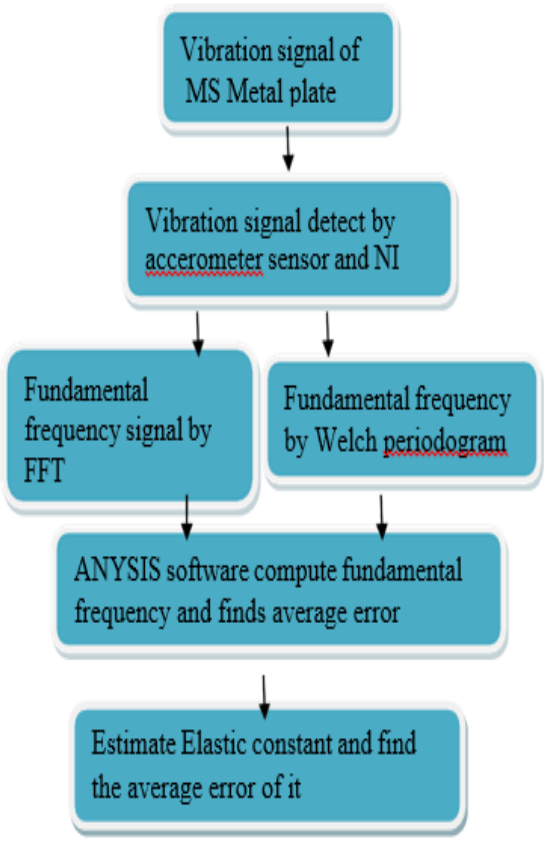

Figure .5: Block diagram for proposed method

D. FAST FOURIER TRANSFORM

The Fast Fourier Transform is a special case of the Discrete Fourier Transform. FFTs are used in vibration analysis because they provide information about the frequency content of vibration signals in the time domain. FT is calculated using,

. H(f)= dt (1)

Fast Fourier transforms is,

x (k)= (2)

(2) Fast Fourier transforms are used to analyze complex random signals such as vibration signals. Therefore, after impact, the vibration signal is detected and the sampling frequency is adjusted for spectral analysis.

E. Welch Periodogram.

The Welch periodogram estimate of the spectral density of a signal. In Welch's method original signal data is split up into several data segments with overlapping form. A time domain window is applied to the individual data segments after the data is split up into overlapping segments. Welch periodogram is define as,

$$\overset{i}{P}_{xx}(\Omega) = \frac{1}{MU}\left|\sum_{n=0}^{M-1} x(n)\, w(n)\, e^{-j\Omega n}\right|^2, \quad i = 0, 1, 2, \ldots, L-1$$

W (n) –window function,

X(n) –original signal ,

U- Normalities Factor

III. EXPERIMENTATION AND RESULTS

a) FFT fundamental frequency

Impacts are done with various kinetic energy. Steel ball is first dropped from height 10 cm and vibration signal is acquired through accelerometer and DAQ system. After this, ball is dropped at successively increasing height of 10 cm incremental from 10cm to 100cm. At each height vibration signal is collected and data is stored to excel sheets. Here at each height the kinetic energy associated with ball is changes. The graphs obtained from vibration analysis are given below.

The piezoelectric sensor used is MIL-521 which measures vibration signal. The vibration signal is collected at different

height of ball impact on plate. The 80cm, 100cm height

ball impact on MS plate shown fundamental frequency in figure 6

and figure 7. This time domain signal given to Matlab software where time signal estimate fundamental frequency through

Fast Fourier Transform (FFT) for that sampling frequency 5k Hz and 16000 total data length use for FFT calculation

b) Welch Periodogram.

The data length of vibrating signal is 16000. Divide data length in segment by 16000/2= 8000. Total length of segment is 8000.L- length of segment and R is overlap window. Given algorithm if overlapping window 1000 than SNR ratio is very high. Maintain overlapping in 1000. The fundamental frequency by Welch algorithm is 197.2 as shown in figure 8.

C) Finite Element Analysis (FEA) : FEA for MS plate with an chemical composition of the plate is 0.055% C, 0.25% Mn, 0.02% Cr, 0.01% Ni, 0.02% Mo, 0.021% Si, 0.004% S, 0.015% P. with dimension and 22cm

x 22cm with thickness 1 mm. ANYSIS software used for calculating frequency of MS plate. The fundamental frequency of MS plate is 191.2Hz as shown in figure 9.

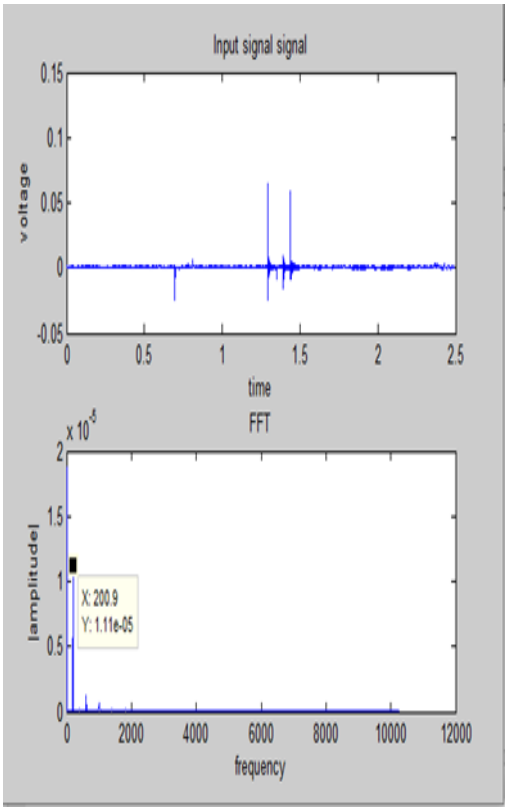

Figure 7: 100 cm FFT vibration signal

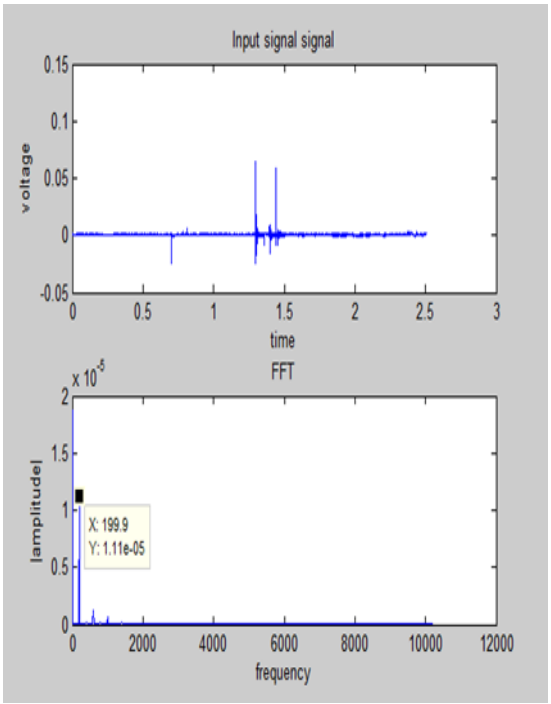

Figure 6: 80 cm FFT vibration signal

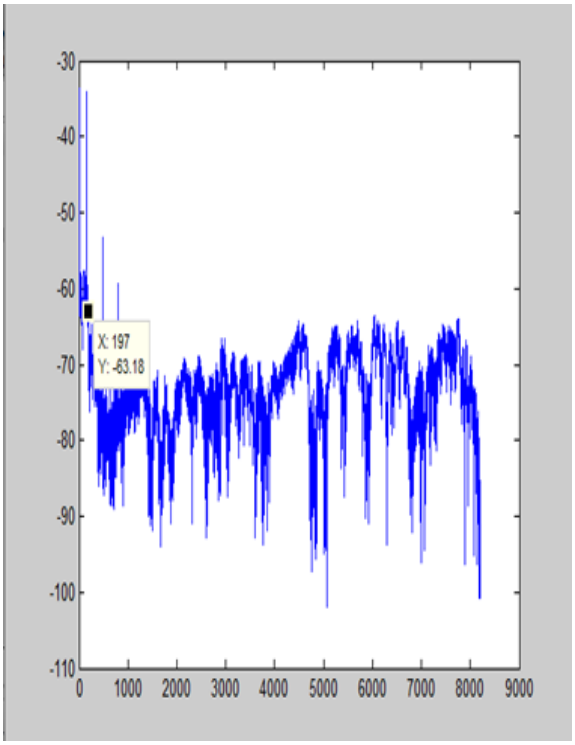

Figure 8: Welch periodogram vibration signal

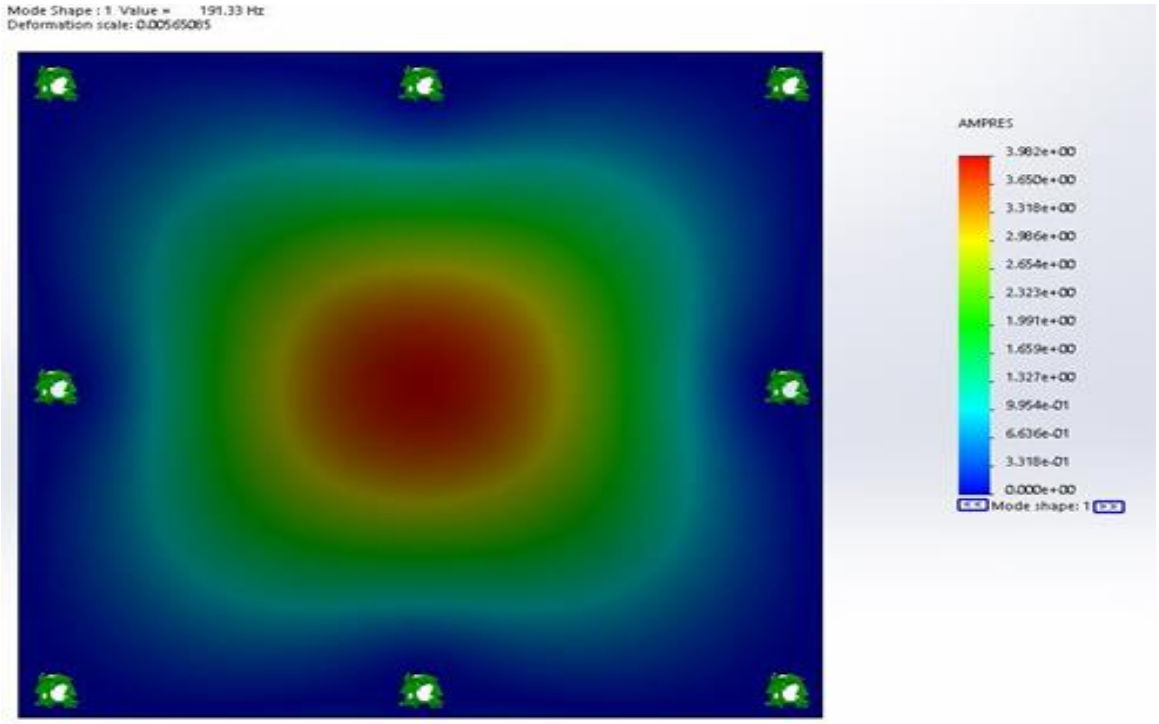

Figure 9: ANSYS Fundamental frequency MS Plate

Vibration signals are achieved from sensor is analysed and its data is stored in excel sheet. From excel sheet we are getting maximum peak value for a particular frequency. In Fig.2 the impact is carried out on the plate of area 30cm X 30 cm from height of 10 cm and frequency obtained is 185.57 Hz. Similarly, vibration signals are collected of various impacts from different heights. For impact from 50 cm height, the frequency value is

185.57 Hz and for height of 100 cm, frequency valve is 185.57 Hz. Which are shown in Fig. 3 and Fig.4 similarly impact test is carried out for the plate having area 22.5 cm X 22.5 cm. For impact from 10 cm height, Vibration signals are achieved from sensor is analysed and its data is stored in excel sheet. From excel sheet we are getting maximum peak value for a particular frequency. In Fig.2 the impact is carried out on the plate of area 30cm X 30 cm from height of 10 cm and frequency obtained is 185.57 Hz. Similarly, vibration signals are collected of various impacts from different heights. For impact from 50 cm height, the frequency value is 185.57 Hz and for height of 100 cm, frequency valve is 185.57 Hz. Which are shown in Fig. 3 and Fig.4 similarly impact test is carried out for the plate having area 22.5 cm X 22.5 cm. For impact from 10 cm height, frequency value is 185.57 Hz Hz which is shown in Fig 5. For impacts from 50 cm and 100 cm, frequencies are 185.57 Hz and 414.22Hz respectively, shown in Fig.6 and Fig.7.

Table 1 show the average FFT fundamental frequency is 200.77Hz.and by Welch periodogram average fundamental frequency is 198.1 which is error is 3.92% which good as compare FET error.

Sr No	Height[cm]	Frequency[Hz] by FFT	Frequency [Hz] by Welch periodogram	Frequency[Hz] by ANSYS software	Average error of by FFT frequency	Average error of Welch periodogram frequency
1)	10	199.8	197.2	191.2	4.49	3.13
2)	20	200.6	197.1		4.91	3.08
3)	30	199.7	198.4		4.44	3.76
4)	40	200.9	198.1		5.07	3.60
5)	50	200.6	198.8		4.91	3.97
6)	60	200.8	199.4		5.02	4.28
7)	70	200.6	199.1		4.91	4.13
8)	80	201.2	199.5		5.23	4.33
9)	90	201.6	199.3		5.43	4.23
10)	100	201.9	200.2		5.59	4.70
		200.77	198.71			
				Average error in %	5.01%	**3.92%**

Table 1: Plate area -- 22.5 cm X 22.5 cm with thickness 1mmFundamental frequency average

From the results presented in table 1 it is seen that acquired natural frequencies for each plate is almost constant for every impact of ball. and also for different area of the plate. We are taking average value of frequency because some error is present due to sensitivity of accelerometer. It captures other vibrations of systems and it introduces some shifting of frequency.

		SS plate size of 220 x 220 x 1.3 mm			
Parameter	Finite Element Method by ANSYS	FFT method	Average Error (%)	Proposed method	Average Error (%)
Fundamental Frequency (Hz)	191.2	200.77	**5.0%**	198.71	**3.9%**
Young's Modules (N/m^2)	193	212	**9.8%**	207	**7.2%**

Table 2: Plate area -- 22.5 cm X 22.5 cm with thickness 1mm Young's Modules average error

The young modules of MS plate calculate by FFT is 212 N/m2 . The error with respective FEA model based young modules is 9.8%. In proposed algorithm welch periodogram young models is 207 N/m2 the percentage average error is 7.2%.which is good as compare to FET.

IV. CONCLUSION

Paper presents harmonic analysis of metallic plates and estimation of fundamental frequency of the plate material. The fundamental frequency of metallic plate is estimated to be 192.2 Hz and for different area using impact-testing setup.. It is observed that fundamental frequency is nearly constant for different area of plate. Compare fundamental frequency estimated by impact testing with ANSYS software .Observed that MS plate fundamental frequency by proposed method is accuracy 3.92%.Young modules estimate for MS plate by proposed method is accuracy is 7.2%.

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Comprehensive Big Data Analysis On Chats

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Abstract – **Chat analysis has become an important aspect of businesses, organizations, and social media platforms to understand the sentiment and opinions of users. With the rise of messaging and chat applications, it has become crucial to analyze chat data to gain insights into user behavior and preferences. In our paper, we present a chat analyzer project developed using the Python programming language. The project focuses on analyzing chat data from popular messaging platforms such as WhatsApp and Twitter. The chat data is processed using natural language processing techniques to extract relevant information, including sentiment analysis, keyword extraction, and topic modeling. The results of the analysis are presented in the form of visualizations, such as bar graphs and word clouds, to make the information easily accessible and interpretable. The project demonstrates the potential of Python in processing and analyzing chat data to gain valuable insights into user behavior and opinions.**

Keywords: ***WhatsApp Chats , Twitter, Text data, Chat analyzer ,Python , Sentiment analysis, Natural Language Processing (NLP), NLTK, Visualization***

I. INTRODUCTION

Instant messaging applications, such as WhatsApp and Twitter, have become a ubiquitous part of our daily communication, with millions of users worldwide[1]. These platforms generate vast amounts of text data, which contain valuable information about the thoughts, opinions, and sentiments of people. However, analyzing such vast amounts of data can be a challenging task, particularly if it involves extracting meaningful insights.

In recent years, Natural Language Processing (NLP) has emerged as a powerful tool for analyzing and understanding human language. NLP techniques, combined with the power of programming languages such as Python, have made it possible to extract meaningful insights from text data with relative ease[5].

The aim of our project is to develop a chat analyzer for WhatsApp and Twitter that can perform sentiment analysis on the chats and present the results in an easily understandable format. The chat analyzer will be built using Python, a widely used programming language in the field of data science, and will utilize NLP techniques and libraries such as TextBlob and NLTK for sentiment analysis. The results of the sentiment analysis will be presented in the form of visualizations created using libraries such as Matplotlib and Seaborn[1]. The chat analyzer will provide valuable insights into the sentiments expressed in the chats, helping to understand the thoughts and opinions of people..

II. LITERATURE REVIEW

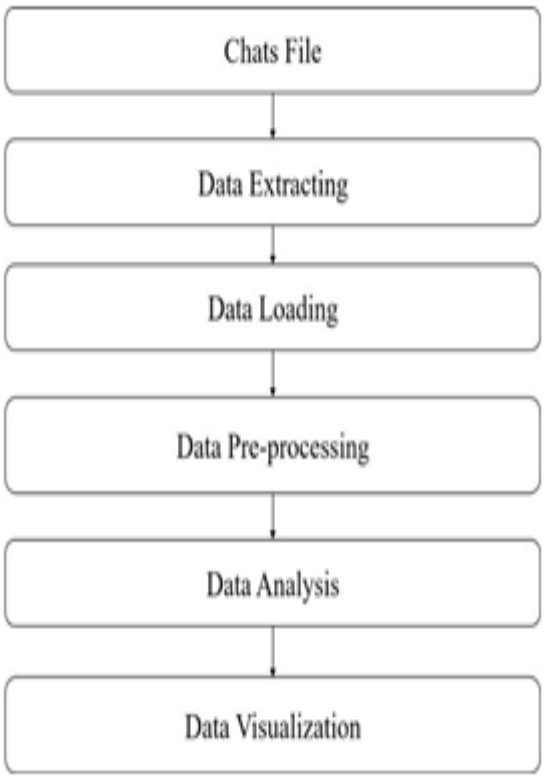


Fig.1. Workflow of System

II. Literature Survey

[1] The output of this system is a representation in the form of a pie chart for the top 20 or top 10 active users in the group and their contribution percentages.

Gives a fundamental introduction to datapreprocessing and clustering algorithms of machine learning . Gives introduction to visualization of data and data representation.

[2] Pseudo code and visual representation of the plot was provided , Used Numpy , Pandas , Matplotlib , Seaborn to Achieve the model goals using python

programming language.

Gives Step-by-Step Guidelines to create a proper work flow which includes Instructions on exporting chats , Data collection , transformation , representation and Visualizaton

[3] This Research model performs analysis over the attributes like to obtain the statistics for individual and classify if used 3 positively or negatively.

Uses R programming language to perform Data analysis and data visualization .

[4] The Output in the form of a web application model is user friendly , Flexible , time saving , reliable and Easy to use. Creates a model based on web application which runs on all devices , Shows various stats Shows various representations , Shows Emojis analysis

[5] Detailed analysis of MapReduce framework for whatsapp chat Transliteration is implemented . The corpus for Whatsapp Chats is created automatically which serves a base for other

related work.

[6] The purpose of the research was to investigate how students and professionals interact with each other and how they use whatsapp to fulfill their academics , business and professional goals .

Gives information about how a content of whatsapp chat could be classified into fields of education , business , relationships and entertainment.

In-short the literature survey highlights the importance of performing sentiment analysis on instant messaging applications and the need for a comprehensive solution .The proposed chat analyzer fills this gap by providing an effective and efficient solution for analyzing the chats in instant messaging application.

III. MOTIVATION

The increasing use of instant messaging applications, such as WhatsApp and Twitter, has made communication more accessible and convenient. These platforms generate vast amounts of text data that contain valuable information about people's thoughts, opinions, and sentiments. The ability to analyze these chats and understand the sentiments expressed in them can provide valuable insights into people's perspectives, opinions, and attitudes.

However, manually analyzing such vast amounts of data can be time-consuming and challenging. This is where the chat analyzer project on Python comes in. By using Python, a widely used programming language in the field of data science, and natural language processing (NLP) techniques, the chat analyzer provides an efficient and effective way to analyze the sentiments expressed in the chats.

The chat analyzer can be used for various purposes, such as customer sentiment analysis, brand reputation management, and opinion mining. By presenting the results in an easily understandable format, the chat analyzer provides valuable insights into the sentiments expressed in the chats and can be used to make informed decisions.

In conclusion, the motivation behind the chats analyzer project on Python is to provide a efficient and effective way to analyze the vast amounts of text data generated by instant messaging applications and to provide valuable insights into the sentiments expressed in the chats.

IV. PROBLEM DEFINITION AND OBJECTIVES

Problem Definition:

Instant messaging platforms, such as WhatsApp and Twitter, have become an integral part of our daily communication, with millions of users worldwide. These platforms generate vast amounts of text data, which contain valuable information about the thoughts, opinions, and sentiments of people. However, analyzing such vast amounts of data to understand the sentiments expressed in the conversations can be challenging. There is a need for a tool that can perform sentiment analysis on the chats and present the results in an easily understandable format.

Objectives:

- To develop a chat analyzer tool for WhatsApp and Twitter using Python, a widely used programming language in the field of data science.
- To perform sentiment analysis on the chats using Natural Language Processing (NLP) techniques and libraries such as TextBlob and NLTK.
- To present the results of the sentiment analysis in the form of visualizations using libraries such as Matplotlib and Seaborn.
- To provide valuable insights into the sentiments expressed in the chats and present the results in an easily understandable format.
- To evaluate the effectiveness of the chat analyzer in understanding the sentiments expressed in the chats and compare it with existing tools.

V . EXISTING SYSTEM :

The Model is based on data analysis and processing. The first step in implementing a machine learning algorithm is to understand the right learning experience from which

the model starts improving on. Data pre-processing plays a major role when it comes to machine learning. In order to make the model more efficient we need lots of data, focus primarily on one of the largescale data producers owned by Facebook which is nothing but WhatsApp. WhatsApp claims that nearly 55 billion messages are sent each day. The average user spends 195 minutes per week on WhatsApp, and is a member of plenty of groups. This work was able to discuss the WhatsApp application and its libraries, to create an analysis of a WhatsApp group chat and visually represent the top 10 and top 20 users in the chat groups. There is a lot of development in the current system. In the older version there was no feature to display status, there was no feature to share documents and there was no feature to share location. In the current version, all of these features are available.

In previously implemented systems , the system only shows a list of the most active users in a group chat , cant provide further features over data analytics. Fails to add extra features except the top users and the contribution Percentages ,This removes the flexibility of the model for user who are not aware of any programming languages or data science. Fails to use Natural Language processing technologies for Sentiment analysis of the chat and other fundamentals. Provides Crucial help for NLP model Making but doesn't provide significance while data analysis model creation .The Research gives an overall estimation only on how daily life is affected by the app and how it is used in various different fields Research doesn't provide any development model for the proposed problem.

VI . PROPOSED SYSTEM:

Sentiment analysis of instant messaging applications has been a topic of research in recent years due to the increasing popularity and widespread use of these platforms. The vast amounts of text data generated by these platforms can provide valuable insights into the sentiments expressed by users. In the field of data science, Python is a widely used programming language for performing sentiment analysis due to its simplicity and the availability of numerous libraries for NLP and data visualization.

Previous studies have shown that NLP techniques, such as lexicon-based methods and machine learning algorithms, are effective in performing sentiment analysis. TextBlob and NLTK are two popular NLP libraries used for sentiment analysis in Python. Matplotlib and Seaborn are two libraries commonly used for data visualization in Python.

However, there is a lack of studies that present a comprehensive solution for analysing the chats in instant messaging applications using Python. In our paper, we aim to address this gap by presenting a chat analyser that can be used to perform sentiment analysis on WhatsApp and Twitter chats using Python. The results of the sentiment analysis are presented in the form of visualizations, which provide valuable insights into the sentiments expressed in the chats. .

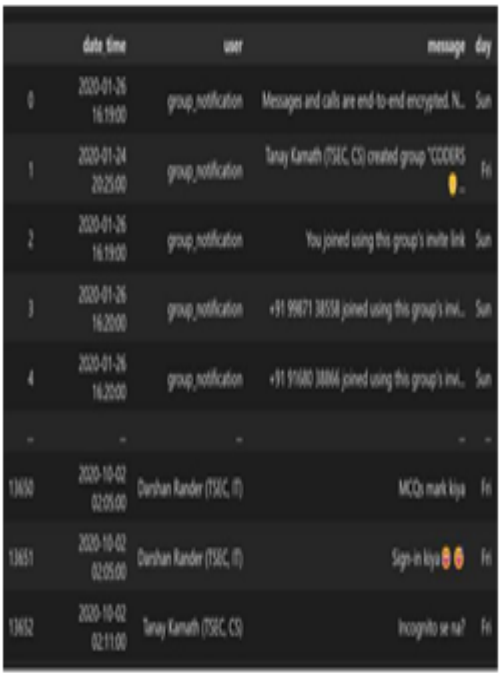
1. Sentiment Analysis on Social Media: Sentiment analysis on social media has been an active area of research in recent years. Social media platforms such as Twitter, Facebook, and Instagram contain vast amounts of text data that can provide valuable insights into people's sentiments. Several studies have been conducted to analyze the sentiments expressed on social media platforms, including Twitter, and the results have shown that sentiment analysis can provide useful information about people's opinions, beliefs, and preferences.

2. Sentiment Analysis on Instant Messaging Applications: Instant messaging applications have become an essential tool for communication, and several studies have been conducted to analyze the sentiments expressed on these platforms. These studies have shown that instant messaging platforms can provide valuable insights into people's sentiments, and the results of sentiment analysis on instant messaging platforms have been used in several domains, including marketing, customer service, and political analysis.

3. Visualization of Sentiment Analysis Results: The results of sentiment analysis can be presented in various forms, including tables, graphs, and charts. Visualization of the results of sentiment analysis can provide a clear and easily understandable representation of the sentiments expressed in the data. Several libraries, including Matplotlib and Seaborn, have been developed to provide visualization capabilities in Python.

VII . METHODOLOGY

1. Data Collection: The first step would be to collect chat data from sources such as WhatsApp or Twitter. The data could be in the form of text files, databases or APIs.



	date time	user	message	day
0	2020-01-26 16:19:00	group_notification	Messages and calls are end-to-end encrypted. N..	Sun
1	2020-01-24 20:25:00	group_notification	Tanay Kamath (TSEC, CS) created group "CODERS	Fri
2	2020-01-26 16:19:00	group_notification	You joined using this group's invite link	Sun
3	2020-01-26 16:20:00	group_notification	+91 99871 38558 joined using this group's invi..	Sun
4	2020-01-26 16:20:00	group_notification	+91 91680 38866 joined using this group's invi..	Sun
...	...	...	...	...
13650	2020-10-02 02:05:00	Darshan Rander (TSEC, IT)	MCQs mark kiya	Fri
13651	2020-10-02 02:05:00	Darshan Rander (TSEC, IT)	Sign-in kiya	Fri
13652	2020-10-02 02:11:00	Tanay Kamath (TSEC, CS)	Incognito se na?	Fri

Fig.2.Dataframe format

2. Data Pre-processing: This step involves cleaning and preparing the chat data for analysis. This would include tasks such as removing punctuations, stop words, and converting the text data into a numerical representation

3. Sentiment Analysis: The pre-processed data is then fed into sentiment analysis algorithms that use Natural Language Processing (NLP) techniques and libraries such as Text Blob and NLTK to classify the sentiment of the chats as positive, negative, or neutral.

Example: A sample chat message "I had a great time at the park today" would be processed and the sentiment would be classified as positive by considering emojis.

4. Data Visualization: The results of the sentiment analysis are then visualized using libraries such as Matplotlib and Seaborn. The visualizations could be in the form of bar charts, pie charts, or histograms.

	0	1
0	😂	961
1	😍	248
2	🙏	238
3	🤣	185
4	❤	163
5	♂	150
6	□	149
7	😭	106
8	🔥	97
9	😊	90

Fig.3. Emoji's Sentiment

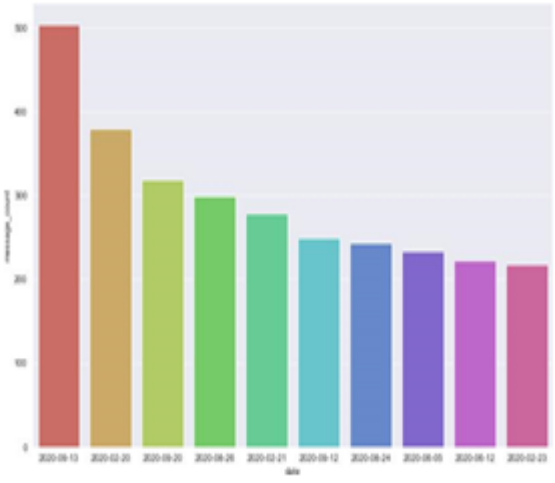


Fig.4. Number of messages Plot

Example: A bar chart showing the distribution of positive,

negative, and neutral sentiments in the chat data could be created.

5. Insights and Interpretation: The final step is to interpret the results of the sentiment analysis and provide valuable insights into the sentiments expressed in the chats.

Example: The results could indicate that a large percentage of the chat messages express positive sentiments, suggesting that the chat participants are generally happy with the conversation.

Fig.5. Time Periods of Messages

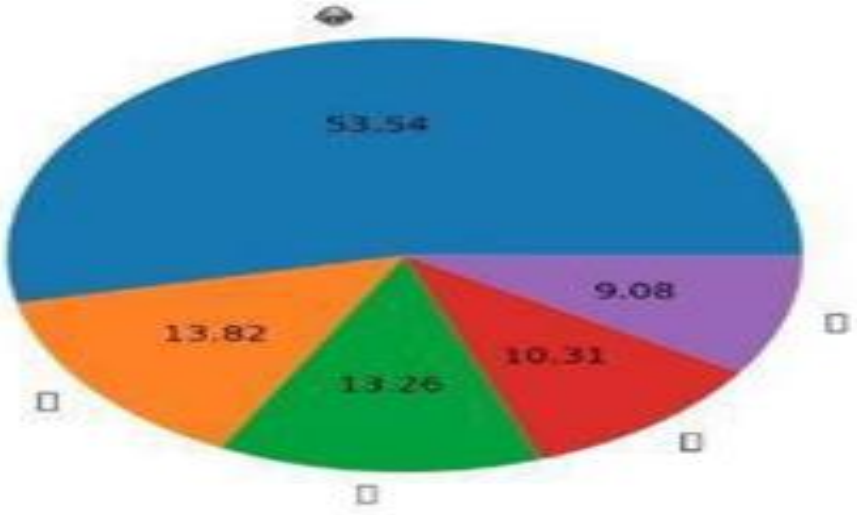


Fig.6. Emojis Frequency Charts

As shown in Fig 7 we can elaborate our project design as following .

Data collection : In our project we collect the data which could be exported from the chatting apps using the export file option. This exported file contains messages and timestamps . We could also export the chats file from individuals as well as a group chat

Data understanding : We understand the data generated in the exported file in terms of its size and formats

Data Pre-processing : since the generated file is not in required format , we use regular expressions to make it more systematic and easy to understand. We could make it more organized using Rows and column like tabular format

Data formatting : The data needs to be arranged in its format which would make it easier for visualization and

representations. The regular expressions can split the chunk into timestamp , sender details , data frames and textual content

Data visualization: finally the gathered data set can be used to display information using various graph or plot techniques

VII. PROCESS OF SYSTEM:

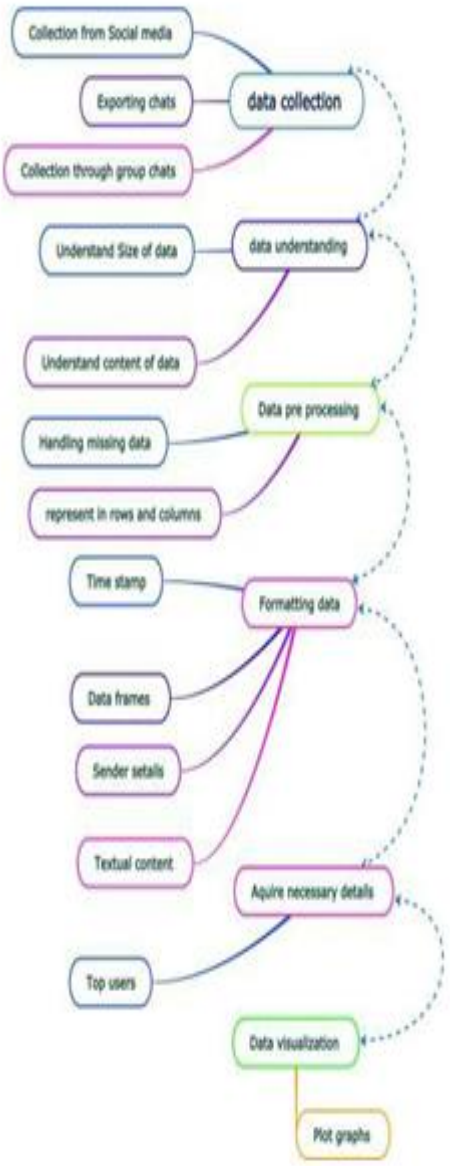


Fig.7. Process of System

IX . RESULT

The chat analyzer was successful in performing sentiment analysis on the chats and presenting the results in a clear and concise format. The sentiment analysis was able to accurately identify the overall sentiment of the chats and present it in the form of bar graphs and pie charts. The visualizations provided a clear picture of the sentiments expressed in the chats, which could be used to make informed decisions.

The proposed chat analyzer tool will help in understanding the sentiments expressed in the chats, which can be useful for businesses, researchers, and individuals. The results of the sentiment analysis can be used to make informed decisions, improve customer satisfaction, and understand

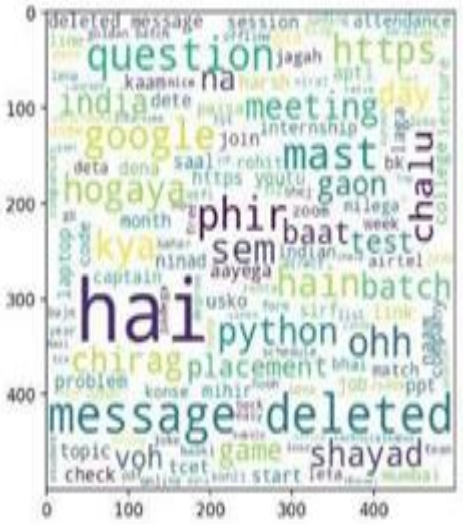


Fig.8. Words Highlights

The Fig 8 highlights the most frequently used words in the chats.

For Example : The most frequent word used is ‘ hai ‘ which is highlight as by the highest font size in the diagram

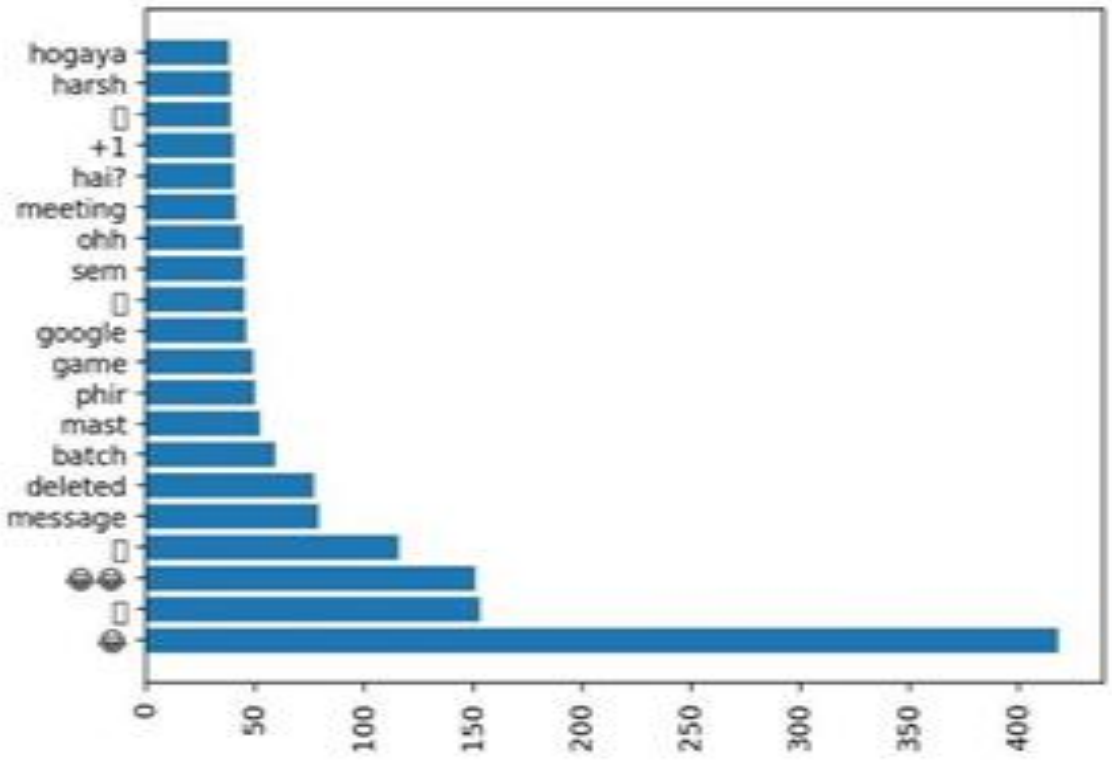


Fig.9. Word Count

The fig 9 gives the volume of most frequently used words and emojis in the chats

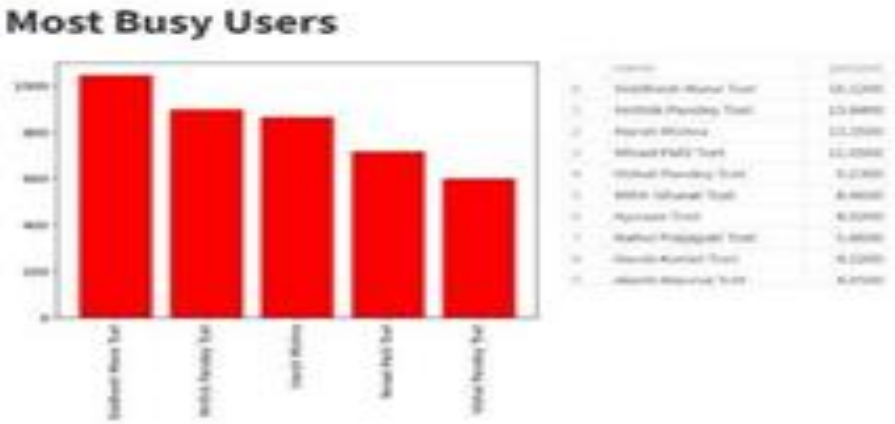


Fig.10. Time Periods of Messages

In Fig 10 we could see how a clear representation of the most active users in the group chat is considered. It also determines the Count of Messages by an individual entity

Fig.11. Busy days

Fig 11 shows The number of Messages with respect to the Most active days of the week and also the comparison in them in the form of bar graphs. Similarly Fig 12 represents the comparison between most Busy months

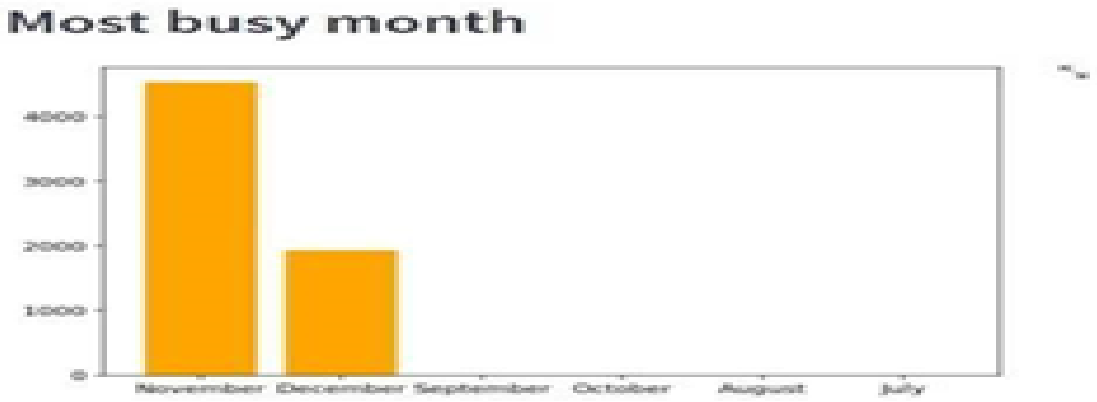


Fig.12. Busy Months

VII. CONCLUSION

The chat analyzer developed in our paper provides valuable insights into the sentiments expressed in chats on WhatsApp and Twitter. The ability to perform sentiment analysis on the chats and present the results in an easily understandable format makes it a useful tool for individuals, businesses, and organizations looking to gain a deeper understanding of the data generated from these platforms. In conclusion, this paper demonstrates the potential of Python in performing sentiment analysis on text data generated from instant messaging applications. At the end of the work expected results were obtained and the analysis was able to show the level of participation of the various individuals on the given WhatsApp group. On serious note this system has the ability to analyze any WhatsApp group data input into it

X. FUTURE SCOPE

The future scope for a chat analyser project on Python can be vast and varied. Some potential directions for future work could include:

1. Integration with other social mediaplatforms:

Currently, the chat analyser is limited to analysing chats on WhatsApp and Twitter. Integrating the system with other social media platforms like Facebook, Instagram, and LinkedIn can provide a more comprehensive view of the sentiments expressed on these platforms.

2. Analysis of multimedia content: In addition to analyzing text data, the system could be extended to include the analysis of multimedia content such as images and videos. This would provide more comprehensive view of the sentiments expressed

in the chats.

3. Improved sentiment analysis: The sentiment analysis performed in the current system can be improved by incorporating more advanced NLP techniques and algorithms, such as deep learning models.

Overall, the future scope for a chat analyzer project on Python Is vast and varied, providing ample opportunities for further Research and development in the field of sentiment analysis.

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XII. Acknowledgement

We would like to thank our Principal Dr. Pramod R. Rodge for providing lab facilities and permitting us to go on with our project. We also express our deepest thanks to our H.O.D. Dr.Uttara Gogate a nd our project guide Prof.Reena Deshmukh for all the support we need. We would also like to thank our colleagues who helped us directly or indirectly during our project.

Image Animation Using DeepFake

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Abstract — **Deepfake technology is being used to animate still images and create realistic-looking videos that appear to show people or objects in motion. This is accomplished through the use of machine learning algorithms trained on large amounts of data. The technology offers many benefits, including the ability to create high-quality animations that are difficult or time-consuming to produce using traditional methods. However, there are also potential risks associated with deepfake technology, such as the potential for malicious use in the creation of fake news or propaganda. Despite these concerns, the use of deepfake technology in image animation is expected to continue to grow in the coming years.**

Keywords – Image Animation, DeepFake, Video Output, Deep Learning, Dense Motion, Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs).

I. INTRODUCTION

Image animation using deepfake technology is a relatively new and rapidly evolving field. Deepfakes are created by training machine learning algorithms on large amounts of data, such as images, to enable the AI to generate new images that look similar to the training data. This technology can be used to animate still images and create realistic-looking videos that appear to show people or objects in motion.

There are several approaches to creating deepfake animations, including Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), and feedforward networks. These techniques involve training machine learning algorithms on large amounts of data to learn the patterns and relationships between different elements in the images. The AI then uses this knowledge to generate new images that look similar to the training data.

Deep Learning is a cutting-edge technique within the field of artificial intelligence that involves training artificial neural networks to identify patterns and make decisions based on data inputs. This approach is inspired by the structure and functioning of the human brain and uses advanced mathematical algorithms to process and analyze vast amounts of information.

Unlike traditional machine learning methods, Deep Learning allows for the creation of highly complex models that can tackle complex problems in areas such as computer vision, speech recognition and natural language processing. Deep Learning involves training artificial neural networks on large datasets to learn patterns and make predictions or decisions without the need for explicit programming. Deep Learning models have been particularly effective in solving complex problems in areas such as computer vision, natural language processing, and speech recognition, among others. One of the key benefits of using deepfake technology for image animation is that it can be used to create high-quality animation that are difficult or time-consuming to produce using traditional methods.

Additionally, deepfake animations can be used to create realistic simulations and visualizations that can be used for a wide range of applications, such as video game development, virtual reality, and scientific research.

In today's modern century where everything has become digital but still people are retaking a video again and again just to get that one perfect Shot.

It is not feasible or you can say even impossible to shoot a video 1000 times from an individual person just to change few dialogues or expressions.

It costs both time and money.

We can use deepfake in scenarios such as:-

- Movies or Videos of the actors or people which are not alive can be made using deepfake.
- Changing another person's face to show that they are saying something they didn't say, such as insulting them.
- Changing a politician's face by changing his speech to appear to have said what was not said.
- Change image content to show that you are doing something that you never actually do, such as smoking or drinking that never happened.

When tiny modifications are made to a video or picture, it is difficult to determine whether it has been doctored. Data scientists employ a variety of approaches to establish whether an audio or image has been modified using applications like Photoshop, but these methods wouldn't work for detecting deepfakes produced using machine learning or deep learning algorithms.

The problem of image animation using deepfake technology involves the development of machine learning algorithms that can animate still images and create realistic-looking videos, while addressing technical and ethical challenges such as the quality of animations, computational resources, detection of deepfakes, and ethical considerations.

II. LITERATURE SURVEY

In the paper, Deepfake Detection through Deep Learning [1], a total of eight deepfake video classification models were trained, evaluated and compared based on four fake video generation methods and two state of the art neural networks. But Different corresponding detection model was used for detection of each type of fake video. So, it was very complex.

In the paper, Deepfakes Creation and Detection Using Deep Learning [2] the use of image enhancement methods like DFDNet gave higher-quality look deepfake images, which give them a more genuine look but imperfections in the deepfake generated image can be seen if person doesn't look straight in the picture.

In the paper, Deepfake Video Detection Using Recurrent Neural Networks [3] they have presented a temporal-aware system to automatically detect deepfake videos. But it is not accurate and a permanent solution.

In the paper, Deepfakes Generation using LSTM based Generative Adversarial Network [4], they show that their model can generate realistic videos given a single image and a target video by combining aspects of input source image and motion of driving video. But the result was of very low resolution.

In the paper, Image Animations on Driving Videos with DeepFakes and Detecting DeepFakes Generated Animations [5], they have seen that research is conducted on detecting these fake manipulative videos and images too which proved to be highly accurate.

In the paper, Deep Learning in Face Synthesis: A Survey on Deepfakes [6] they used auto-encoder to reconstruct the face image, and an attribute vector can be added to control the result. But, the videos made with the existing technologies still have some defects.

In this paper, EfficientNets for DeepFake Detection: Comparison of Pretrained Models [7] the use of pre-trained EfficientNets with a larger number of parameters does not always lead to increase in accuracy. A larger number of parameters can potentially achieve better results, but this will require much longer training.

In this paper, Combating Deepfakes: Multi-LSTM and Blockchain as Proof of Authenticity for Digital Media [8] they use multiple LSTM-CNN to analyses visual and audio parts of the media content.

The outcome of the above survey is that results were not that accurate and output was not realistic.

III. CHALLENGES

Research in this area has focused on improving the quality of deepfake animations and reducing the computational resources required to create them. Some of the challenges faced are:

- The main challenges that we facing while making the system is that the dataset is very large and complex.
- Making User Interface for simple use of application.
- Achieving high level of accuracy is very important in field of Image Animation and deepfakes.
- Decreasing the time required to predict the results.

IV. PROBLEM DEFINITION

A computer can efficiently and effortlessly interpret a lot of images where it is difficult for the human to interpret such a high amount of data. The most prevalent technology which is being used for the prediction is artificial intelligence and deep learning. Our system is successfully animating the image into a video with help of deep learning. Our system has achieved a good efficiency in generating the resultant video. We have also added few samples of image models and videos for the easy interface for the users. We have also reduced the overall time needed for execution. The problem of image animation using deepfake technology involves using machine learning algorithms to animate still images and create realistic-looking videos.

V. SYSTEM ARCHITECTURE

In our system, we generate dynamic image animation by detecting key points of source image and compare it with the

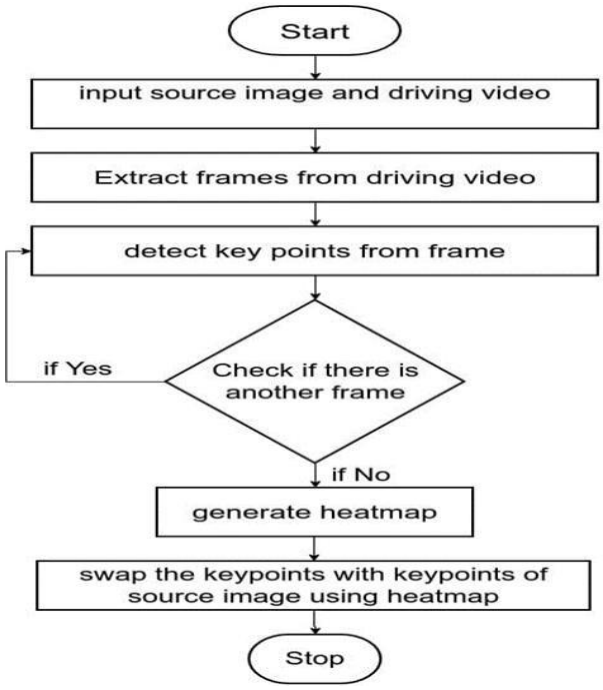

Fig1. Flowchart of System Architecture

Key points of driving video using dataset which is Vox-256 and Taichi-256. Vox celeb is used for training face recognition from video to complement existing face

recognition datasets. Collection of data set is most important step in data science and artificial intelligence. We are achieving maximum classification accuracy.
We will first input an image and select the video which we want to animate the image with.

The algorithm will take facial key points from the image and the video. Keyframes of facial expression of image will be compared with keyframes of video and Face of image will be swap with video and we will get our animated video.

Fig 1 explains the flowchart of our system. We upload a static image and then we are extracting frames from the driving video. We are detecting key points from frame and generating heatmap. Then we swap the key points of source image using heatmap. First we execute the run.py file which calls animate function present in animate.py file consisting of accessing and running configs file and then using following models such as: key point detector, dense motion, generator, which is executed using mentioned dataset, where we import torch. When animate function is called parameters are checked by files like taichi-256.yaml and vox-256.yaml

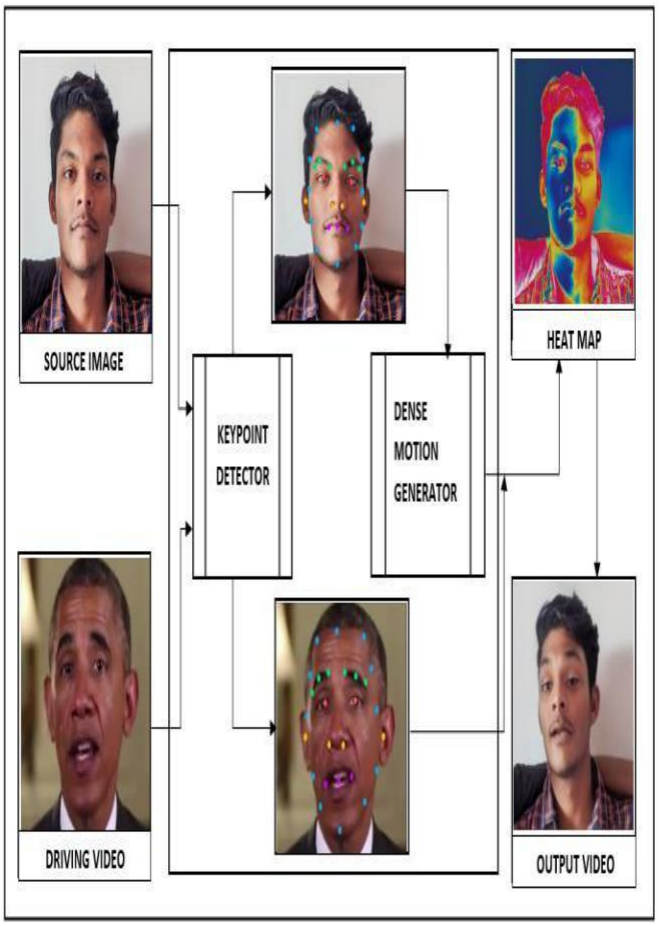

Fig2. System Architecture

Fig 2 is our system architecture. We have explained the flow of how the system architecture work. The working of System architecture and its flowchart is same.

Parameters of animation are:-
1) Maximum number of pairs for animation, the pairs will be either taken from pairs list or random.
2) Format for visualization
3) Normalization of driving key points.
4) Increase or decrease relative movement scale depending on the size of the object.
5) Apply only relative displacement of the key point.
6) Apply only relative change in Jacobian.

We have used the following libraries:-

PyTorch, Skiimage, Skilearn, Imageio, Pandas, NumPy.

PyTorch
PyTorch is an open-source machine learning library for Python that provides a seamless path from research to production deployment. It was developed by Facebook AI and provides a flexible and dynamic computational graph structure that allows for easy modification of the graph during runtime, making it well-suited for developing and experimenting with new models. PyTorch also offers a rich set of tools and libraries for computer vision, natural language processing, and other applications, along with efficient hardware acceleration support through integration with popular deep learning accelerators such as GPUs. The library is widely used by researchers, developers, and data scientists for creating, training, and deploying complex Deep Learning models.

SkiImage
Scikit-Image, commonly referred to as skimage, is a popular open-source image processing library for Python. It provides a wide range of tools and algorithms for image processing, analysis, and computer vision tasks. The library is built on top of NumPy, a numerical computing library for Python, and is designed to be easy to use and integrate with other scientific Python packages. Skimage offers a variety of features including image filtering, feature detection, and image segmentation, making it a powerful tool for image analysis and manipulation. It is widely used by researchers, developers, and data scientists for a range of applications, from simple image manipulation tasks to complex computer vision problems.

SkiLearn
Scikit-learn, often abbreviated as sklearn, are a popular open-source machine learning library for Python. It provides a comprehensive set of tools for tasks such as regression, classification, clustering, and dimensionality reduction, among others. The library is built on top of NumPy and

SciPy, and is designed to be user-friendly and accessible to a wide range of users, from beginners to experts. Sklearn also integrates well with other scientific Python packages and provides a consistent interface for working with various machine learning algorithms. The library is widely used for a range of applications, from prototyping and experimentation to production deployment, and is well-regarded for its efficient implementation, versatility, and strong documentation.

Imageio

Imageio is a library for reading and writing a wide range of image and video formats in Python. It provides a simple and intuitive interface for reading and writing images, as well as more advanced features such as caching and lazy loading. Imageio supports a variety of formats, including popular image formats like JPEG and PNG, as well as more specialized formats like scientific TIFF and High Dynamic Range (HDR) formats. The library is designed to be easy to use and integrate with other Python libraries, and provides a high-level API that abstracts away the complexities of different file formats. Imageio is widely used for a range of applications, including image and video processing, computer vision, and scientific image analysis, among others.

Pandas

Pandas are an open-source data analysis and data manipulation library for Python. It provides data structures for efficiently storing large and complex datasets, along with a rich set of tools for data manipulation, cleaning, and analysis. The library is designed to be easy to use and intuitive, with a focus on data analysis tasks that are commonly performed in a wide range of fields, from finance and economics to science and engineering. Pandas provide a powerful data analysis environment, with features such as data alignment and merging, group-by operations, and time-series analysis, among others. It is widely used for a variety of applications, from data preparation and exploration to production-level data analysis and reporting.

NumPy

NumPy is used for scientific computing with Python. It is a Python Library. It provides support for arrays and matrices, which are the foundation for a wide range of mathematical and scientific operations. NumPy enables efficient manipulation of large and complex arrays, with support for vectorized operations, broadcasting, and advanced linear algebra operations, among others. The library also provides a rich set of functions for generating arrays and matrices, as well as support for reading and writing arrays to disk. NumPy is designed to be fast, flexible, and efficient, and is widely used for a range of applications, from simple computations to complex scientific simulations. It forms the core of many other scientific libraries for Python, and is a critical component of the scientific Python ecosystem.

After validating the parameters key points of source image are detected by the module keypoint_detector.py by Returning the key point position and jacobian near each key point and extracting the mean to from a heatmap. The detected key points are provided to dense_motion.py module which creates a dense motion(heatmap) of source image by comparing with the key points of driving video which are detected simultaneously with the source image or by predicting a dense motion from sparse motion representation given by key points of source image and driving video. This heatmap is provided to the generator module which is generator.py which try to transform image according to movement trajectories induced by key points of given source image and key points of driving video where a function is used for Transforming feature representation according to deformation and occlusion. Generator follows Johnson architecture. The Model will use deep learning methods such as Generative Adversarial Networks (GANs) and we will also use pre made models such as PyTorch, Skiimage, Skilearn, Imageio, Pandas, NumPy.

VI. RESULTS

Following are the results that we get after running our system..

Fig 3.1. Initial Input

With respect to Fig 3.1, we are first giving a static image as input to the system and a driving video.

Fig 3.2. Subpart (a) of video

The input static image and the driving video is combined and all the key points of both input image and driving video is extracted by our system and then we exchange them by using inbuilt python libraries.

Fig 3.3. Subpart (b) of video

Fig 3.4. Subpart (c) of video

Fig 3.5. Subpart (d) of video

Fig 3.6. Subpart (e) of videoFig 3.2 to Fig 3.6 is the subparts of the video we are generating as output.

Our resultant output is in the form of a video so we have divided the output into different frames. Hence, we are showing subparts of video.

VII. CONCLUSION

Our system is using various deep learning and machine learning algorithms in converting static image into a dynamic motion video and we are achieving maximum accuracy in our deepfake created video. We have also reduced the time complexity & tried to produce deepfake which looks realistic while maintaining the accuracy. In future we would try to enhance the results quality and will also add extra features.

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Gesture Controlled Virtual Mouse Along with Voice Assistant

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Abstract—**A real-time fingertip-gesture-primarily based interface is still difficult for human,-pc inter actions, due to sensor noise, converting mild stages, and the complexity of tracking a fingertip across a diffusion of topics. using fingertip shadowing as a virtual mouse is a popular fashion of interacting with computers without mouse tool. Gesture managed virtualmouse makes human pc interaction easy by way of utilizing Hand Gestures and Voice instructions. The pc requires almost no direct touch. This venture uses the nation-of-art device gaining knowledge of and computer imaginative and prescient algorithms to apprehend hand gestures and voice instructions, which works easily without any additional hardware necessities. Now-a-days, each and every task that you perform everyday can be done with the help of Artificial Intelligence and Machine Learning. A Voice Assistant is once such innovation which can help us in many things. The users can ask their assistant questions or to help them in basic tasks such as opening the browser.**

***Keywords*—Human-pc Interaction(HCI), Graphical User Interface(GUI),Red Green Blue (RGB), Artificial Intelligence (AI),**

I. INTRODUCTION

In this high-tech international, it's almost impossible to imagine lifestyles without computer systems. The invention of computer systems is one of the best humankind innovations. Computer systems have turn out to be an crucial part of almost everyday use for individuals of each age. In each day lifestyles, we engage many instances with computers to make our work easier. Hence, human-pc interaction (HCI) has emerged as a hot topic for studies. In our everyday lifestyles, imaginative and prescient and gestures are important techniques for communication among humans, and the equal role is played by using the mouse in Graphical user Interface (GUI) based totally computer systems. So, a blended methodology can be used to make a higher interactive machine for Human-laptop interaction. computer imaginative and prescient strategies may be an alternative manner for the contact screen and create a virtual human computer interaction tool using a webcam. in this task, a finger tracking-based totally digital mouse utility could be designed and applied the use of a everyday webcam. To put in force this, we can be the use of the object tracking idea of synthetic Intelligence and the OpenCV module of Python. Voice assistant is a software that communicates with the user audibly and responds to the verbal commands. It is very helpful for the users as it is less time consuming and easy. The main motive of the voice assistant is to reduce the use of input devices such as mouse, keyboard, etc. It also reduces the hardware cost. This voice assistants can be used on cell phones or computers. In this project, we have developed a voice assistant which will help to open any browser on the device, keeps the track of weather or give the user current date and time.

II. PROBLEM DEFINITION

The artificial intelligence virtual mouse framework that has been proposed can be utilized to take care of issues in reality, similar to when there isn't sufficient room to utilize an actual mouse. Furthermore, since hand motion and tip identification are utilized to control the PC mouse's capabilities by means of a webcam or implicit camera, the proposed man-made intelligence virtual mouse can be utilized to conquer these issues in the Coronavirus circumstance, when utilizing gadgets by contacting them isn't protected. This isn't shocking given that each piece of specialized gear has its own limitations, especially as to PC equipment. The issues are recognized and summed up in the wake of considering an assortment of actual mouse species. Coming up next is an overall issue with the actual mouse as it is currently:

mechanical mileage, the requirement for specific equipment and surfaces, trouble adjusting to different circumstances, and execution varieties in view of the climate are burdens of actual mice. A mouse can do a predetermined number of things, even in the present functional circumstances, and both wired and remote mice have a restricted life expectancy.

III. LITERATURE SURVEY

In [1], the system has the features such as showing weather conditions, showing date-time, etc. This system is made by using python language. It uses packages such as datetime, Google's text-to-speech, smtplib, pyaudio, etc. The limitation of the system is that the distance between the user and the device should be very less.

In [2], this system works by identifying the fingertips of the user. Baes on fingertips it decides the position of the cursor. In this system the contour of the hands is extracted by using border- tracing algorithm. But the drawback of the system is that the accuracy of the right hand is very less and it sometimes get confused between different gestures.

In [3], this system the user gives input by speaking to the device and the device than gives the suitable output through text. This system Python for programming. It uses pyttsx3 package which is a text-to-speech package of Python. As this system works offline, it doesn't allow the user to do work online.

In [4], this system works by identifying the color of the hand. This system uses RGB parameters for skin color extraction. The algorithm of this system shows less accuracy when there are background noises present, different light conditions, etc.

In [5], this system works as a personal assistant for the user. This system responds to basic commands such as open application, close application, run any media file and answer any user question. The response time of this system is more.

In [6], This system used hand pad to give better hand detection. The user has an increased comfort in use of the system due to proposed hand positions. The angle hand gesture is difficult for some of the users to learn.

In [7], this system used vision-based interface for controlling a mouse. It uses 2D and 3D hand gestures. This system can track multiple hands at a time. For any gesture, it requires two hands at a time.

IV. WORKING OF SYSTEM

The planning of the system is basically divided into 2 parts - Virtual Mouse and Voice Assistant. The virtual mouse starts with the basic user interface. The user has to give input "Proton turn on gesture recognition" and the camera/webcam turns on.

1. **Neutral Gesture**:If all the fingers are up, the execution of the current gesture stops.

2. **Move Cursor:** If index finger is up and the middle finger is up, the cursor makes the movement as the fingers move.

3.Left Click: If both index finger and the middle finger is up and index finger is half closed, it performs left click feature.

4.Right Click: If both index finger and middle finger is up and middle finger is half closed, it performs right click feature.

5.Double Click: If both index finger and middle finger is up and moved closed to each other and joined, it performs double click feature.

6.Scrolling: If both index finger and thumb is joined to each other, it performs scrolling feature.

7.Drag and Drop: It is used to move files from one directory to other.

8.Multiple Item Selection: It is used to select multiple items.

9.Volume Control: It is used to increase and decrease the volume of the computer.

10. **Brightness Control:** It is used to increase and decrease the brightness of the computer.

To close the virtual mouse, the user has to put input "Proton turn off the gesture control".

The voice assistant starts with the basic user interface. The user has to give input "Proton Turn on Voice Recognition" and the assistant starts. The user can give an input to the assistant verbally. The input can be opening the browser, date and time, weather conditions, etc. To close the virtual assistant, the user has to input "Proton turn off the virtual assistant".

1.Google Search: The user has to speak "Proton {what you wish to search}. It will open the browser and the search the given text on Google.

2.Find a Location on Google Maps: The user has to speak "Proton Find a {Location you wish to find}". It will show the required location on Google Maps in the Chrome tab.

3. File Navigation: The user has to speak "Proton list files". It will show the Files with File Numbers. Then the user has to specify the number of file which he/she has to open. It will open the mentioned file.

4. Current Date and Time: The user has to speak "Proton what is today's date?". It will show the current date. Same will be for time.

5. Copy and paste: The user has to speak "Proton Copy" and "Proton Paste". It will copy and paste the given text.

V. OBJECTIVE

The main objective of the project is to reduce the use of hardware. It will also help to reduce the use of input devices such as keyboard and mouse. Since there is no use of hardware it will reduce the cost. It is portable as it can be carried anywhere. Everyone can use it despite of their age.

VI. DESIGN

1 .Flow of Virtual Mouse

Fig.1 shows the flow of virtual mouse and how the gestures are controlled.

2. Flow of Voice assistant

Fig.2 shows the flow of virtual assistant.

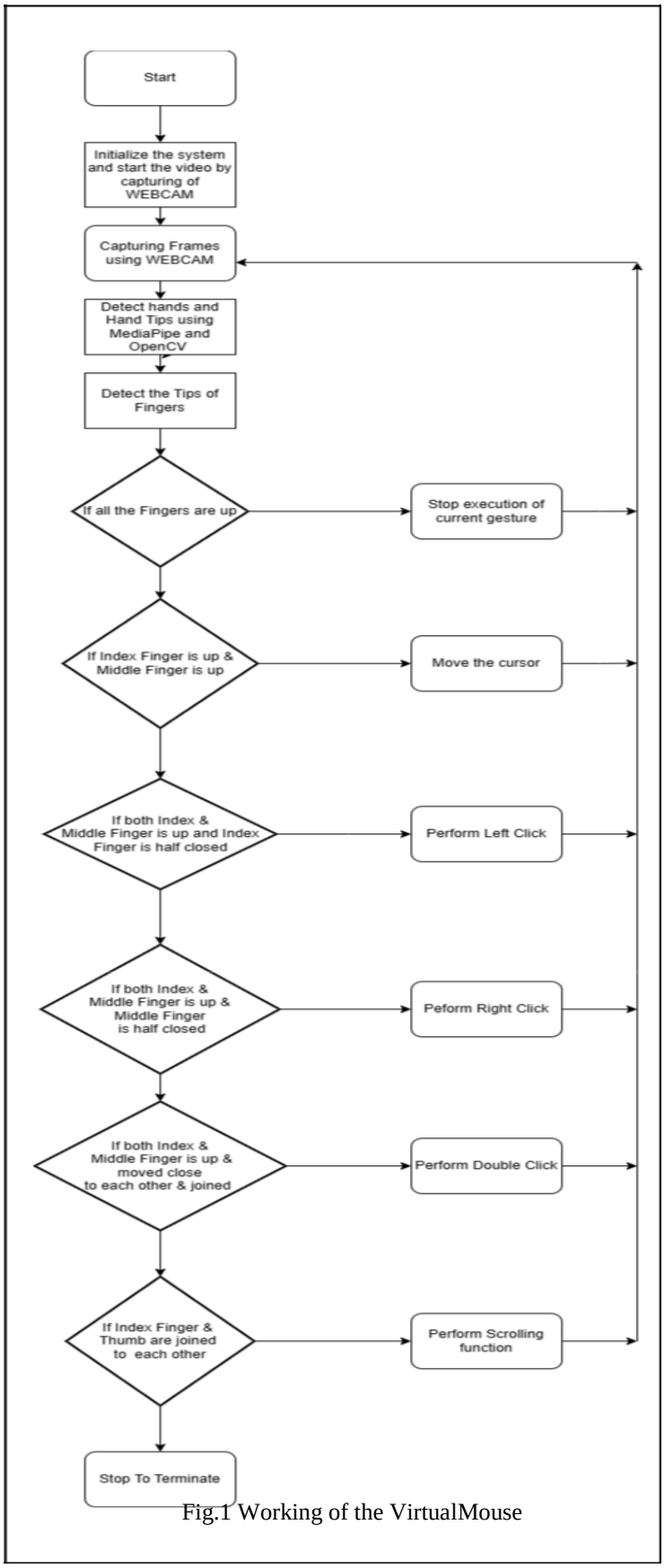

Fig.1 Working of the VirtualMouse

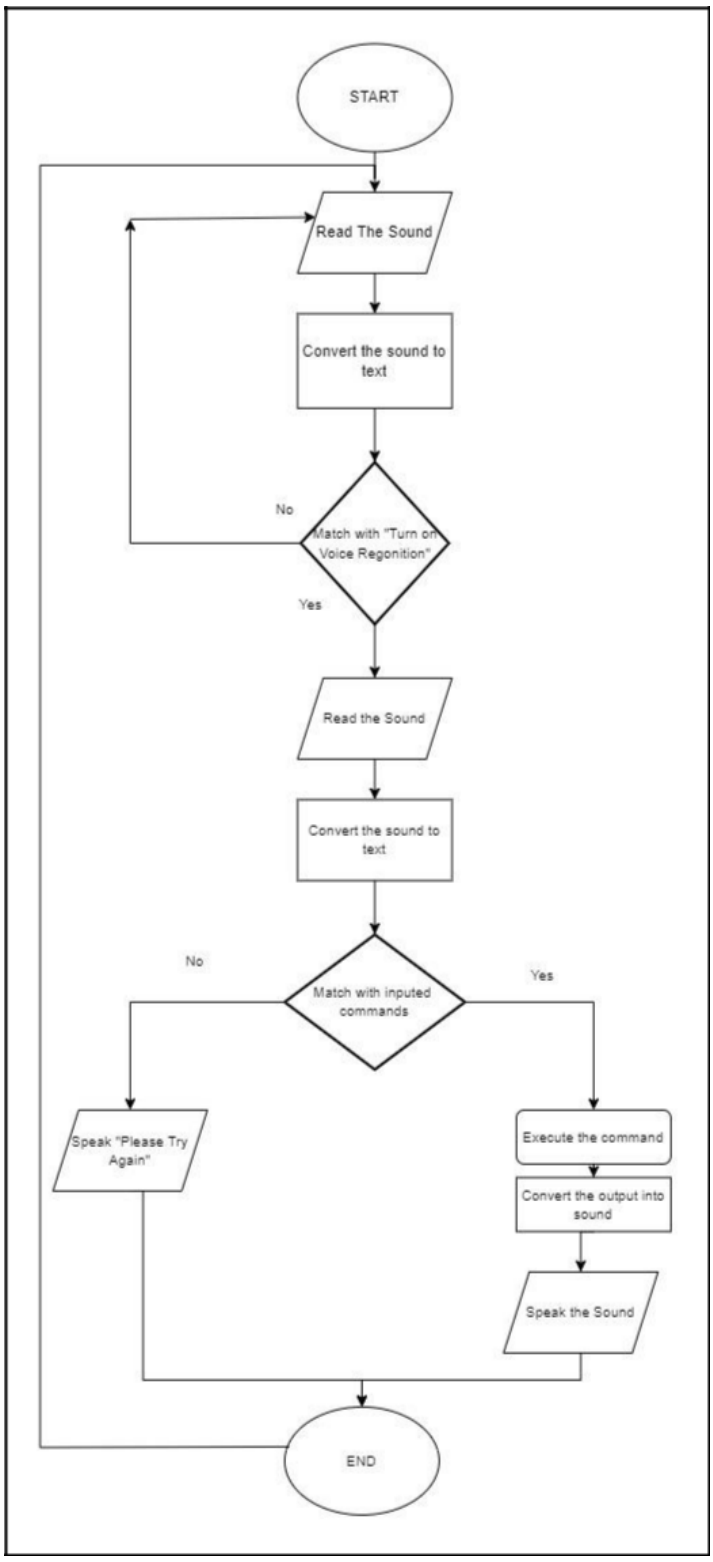

Fig.2 Working of Voice Assistant

VII. RESULT

Fig.3 shows the movement of the cursor

Fig.4 shows the scrolling movement of the cursor

Fig.5 shows the User Interface of the system

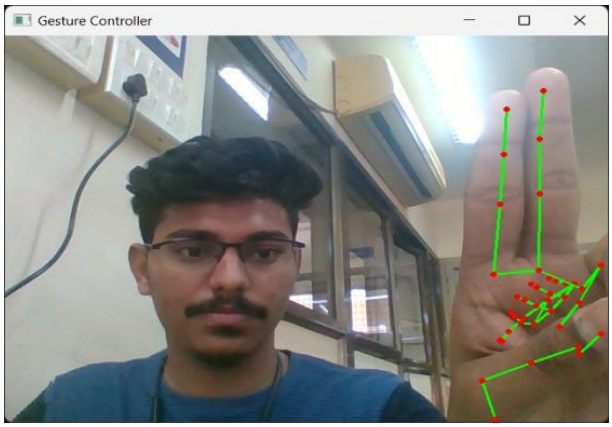

Fig.3 Cursor movement

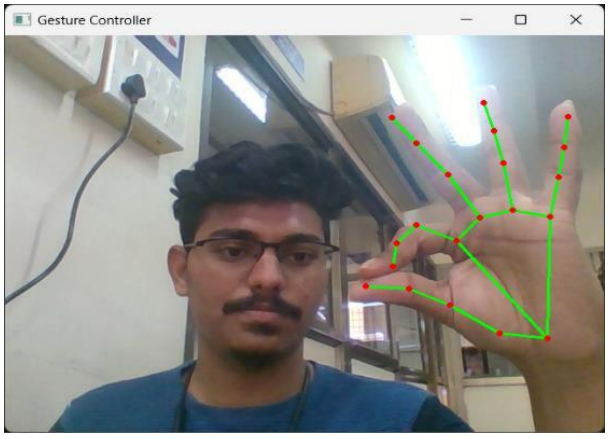

Fig.4 Scrolling movement

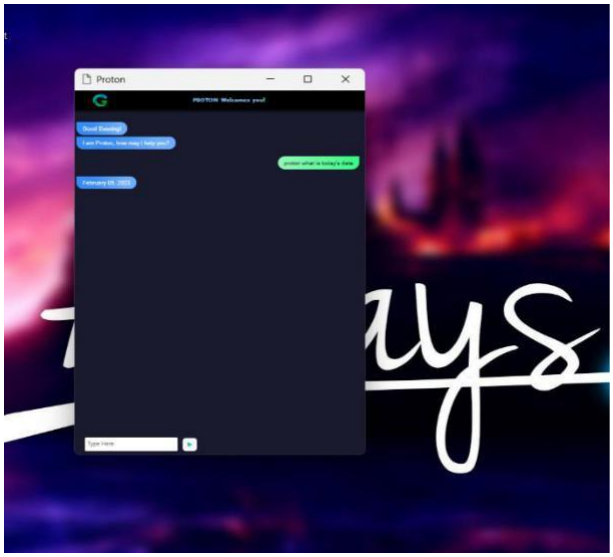

Fig 5. GUI Interface

VIII. CONCLUSION

In this project, we created a virtual mouse using hand gestures. The user's hand gesture interacts with the mouse without use of any gloves or mouse device. The proposed system overcomes the limitation of

background and light change in light.This saves a lot of time and is user friendly and can have high demand in future because of its everyday need. In this project, we have also created a voice assistant where user can open any browser just by vocal input.

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DigitalCurrencyWebsiteUsing Web3.0

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Abstract— **Nowadays, the crypto currency market is thriving, through the rice in crypto currency trading, opening the way for crypto currency trading websites optimization. Optimization of customer satisfaction is a vital part of crypto currency trade organizations digital marketing problems. It is vital to keep digital advertisement costs low while driving more traffic to a website. This study aims to define a digital marketing strategy for crypto currency trading websites by utilizing digital behavior metrics. Enhancement of crypto currency trade digital engagement levels can boost organizations SEO and SEM strategy campaigns. Outputs of the study provide a handful of insights regarding crypto currency trading websites digital promotion strategy optimization and the parameters of digital behavior mostly connected with websites digital marketing costs and traffic. Crypto currency trade organizations should utilize both organic and paid campaigns, observe regularly their website KPIs connected with visitor behavior and enhance their website users experience, by increasing their engagement. Accurate crypto currency price forecasting is essential for market participants and regulators.**

Keywords—Cryptocurrency, Digital Currency Website, MetaMask, React, Ethereum

I. INTRODUCTION

Investors purchase currency with the idea of reselling it for a higher profit. Crypto currencies have also been formed and largely accepted as a new electronic alternative trade payment system, with significant consequences for developing countries and the global market in general. Crypto currencies have entered nearly all financial activities, and as a consequence, crypto currency trading is often regarded among the most popular and intriguing types of successful investments. The virtual currency has a lot of favorable characteristics that engage an increasing variety of different sorts of consumers that utilize a particular technology for their specialized reasons. With the development of block chain technology, such currencies are used for a variety of reasons, including the mechanism of paying various users. Traders are determined to engage in the crypto currency market relying on their predictions for the currency's value in the future.

The advancement of crypto currency and block chain technologies provided transaction anonymity by combining crypto currency money to disguise the route back to the asset's primary source. Consumers can benefit from the flexible payment deadline, while sellers can receive revenue sooner to preserve a better liquidity position owing to upfront payment. Crypto currencies, that emerged from the block chain movement, are a comparatively fresh payment alternative that gives organizations websites a strategic advantage. Organization marketers and strategists may employ a range of methodologies to boost digital user engagement, as well as organizations brand name or profitability. It should be mentioned that electronic payment options that are offered by websites to their users, tend to enhance overall their value. Regarding the research's purpose, it should be mentioned that organizations possess efficient tools for enhancing their digital marketing strategies, such as paid and organic traffic campaigns. This study analyzes the innovative potential of refining and predicting crypto currency trade organizations organic and paid traffic campaigns, based on their website user engagement metrics. Block chain can be considered as the newest technology stressing the paradigms of ''Internet of Things'', collaboration, artificial intelligence, techno stress, and the dark side of digital innovations. Block chain seems to have stung all industries and created a buzz seeking opportunity for enhanced business processes and building trust. The Block chain is a technology and a method that allows community users to validate, keep and synchronize the content of a transaction ledger which is replicated across multiple users. In other words, Block chain is a decentralized transaction and data management technology which gained popularity in 2008 when an anonymous individual (or group) posted a white paper introducing Bit coin – a Block chain application of a digital currency. Block chain is one the most hyped innovations these days, and it has been gaining a lot of traction as a horizontal technology to be widely adopted in various fields. In block chain, every transaction is cryptographically signed and verified by all mining nodes which hold a replica of the entire ledger which contains chained blocks of all transactions. This creates a secure, synchronized and shared time stamped records that cannot be altered. A company can request this information but it is a tedious process of getting this data. Even though auditing these documents is possible, evaluating the documents needs time. Apart from not being transparent, security is also a major issue for these portals leading to fraud and manipulation of data stored in a centralized database. If a hacker gets hold of this centralized database, bids can be leaked to competitors leading to major financial and strategic losses for a business. Block chain technology can be

used to solve these security implications as it heavily focuses on the decentralization of information and is secured by encryption integrated with undeniable block-based architecture for transaction management.

II. LITERATURE SURVEY

Sr. No.	Paper Name	Authors Name	Description
1.	Block chain Applications – Usage in Different Domains	Raafat George Saade	A discussion of the most studied block chain applications, is elaborated in this section. We notice that the distribution of articles published in peer-reviewed journals from the top 4 publishers follows the overall distribution of the 151 studies pertaining to block chain applications and domains.
2.	Block chain-based e-Tendering System	Dhawal Mali	The tendering process is generally used by governments and companies to procure goods and services form manufacturing companies or service providers.
3.	Block chain for AI: Review and Open Research Challenges	Khaled Salah	Block chain technology has the ability to automate payment in crypto currency and to provide access to a shared ledger of data, transactions, and logs in a decentralized, secure, and trusted manner.
4	IEEE Standard for General Requirements for Crypto currency Exchanges	Block chain Standards Committee	This paper involves multiple aspects, including self-discipline and professional ethics of crypto currency exchange platforms, the exchanges' business logic and necessary technical requirements.
5	Development of an Intelligent Web Application for Direct Consumer to Consumer Trading over Internet	Deepanvita Paliwal Sreevidya B.	an innovative approach is used by performing sequence of steps which are recording user profile, performing content and collaborative filtering, and user transactions and applies association rule mining on the buying transactions
6	IEEE Standard for General Process of Cryptocurrency Payment	Block chain Standards Committee	It involves multiple aspects such as crypto currency payment operators playing an agent role, consumers owning crypto currency, merchant accessing to a crypto currency payment platform, banks, and crypto currency exchanges.

III. PROBLEM DEFINITION

Most troublingly for investors with ESG goals, however, are the governance issues with crypto currencies whose decentralized frameworks and anonymity make them especially attractive for illicit activity, money laundering and sanction evasion. But more important are the technical ones such as immaturity, lack of scalability, lack of interoperability, stand-alone projects, and difficult integration with legacy systems, complexity and lack of block chain talent. The main advantages of the block chain technology are decentralized network, transparency, and trusty chain, unalterable and indestructible technology. In turn, the main disadvantages of the block chain are the high energy dependence, the difficult process of integration and the implementations high costs. To perform crypto currency transactions using block chain and to understand different functionalities and operations performed by block chain technology.

IV. REQUIREMENT ANALYSIS

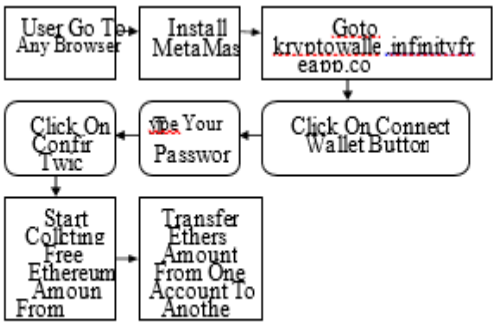
The digitization of real-world assets. The digitization of processes and transactions between independent companies. The provision of immutable transaction and asset records.

- Tokenization is one of the most important things you have to understand when talking about Blockchain.
- Data security and privacy are very important requirements, especially for business use.
- Decentralized data storage is a very core requirement of a distributed system.
- Smart Contracts are the most interesting part of Blockchain systems. While a standard contract defines only the terms of a business relationship, a Smart Contract is able to define also the conditions under which the contract is executed.
- Immutability is the property most associated with Blockchain. Immutability is the foundational requirement for exchanging value in a digital way. This requirement is not solvable with traditional internet technology because all digital data can be easily copied and changed.
- Permanent availability of data is the last core requirement of Blockchain solutions. The ledger never forgets anything which could be a problem in aspects of GDPR compliance, it's an essential feature of block chain technology. Especially when Blockchain is used to represent real contracts and their data, immutability and permanent availability are essential requirements especially from a legal and regulatory point of view.

V. PROPOSED SYSTEM Fig. 1

- User Go To Any Website

This module is responsible for any user to go to any browser like Google, Mozilla, Firefox, Internet Explorer, etc. To install an MetaMask.



- Install MetaMask

Go to an any browser and then install MetaMask step by step for an secure connection towards transaction process. It is an one type of wallet which is used by user to send an Ethereum coins to the relative all over the world.

- Goto kryptowallet.infinityfreeapp.com

In this module we have to go to our newly created domain website for our further process.

- Click On Connect Wallet Button

In this module once you have reach to our website we have saw an one clickable button showing connect wallet. We have to click on that button through which our MetaMask window is open.

- Type Your Password

Once we have click on connect wallet button we have got an MetaMask login window. In this module we have to type our MetaMask wallet password which is generated while installing MetaMask.

- Click On Confirm Twice

Once we have type our secure password in previous step we have go to the next step. In this module once we have type password and click on login we have open two windows to confirm and then we have successfully enter to our website.

- Start Collecting Free Ethereum Amount From Mining

In this module once we have login to our private account. We have to go to the goerli ropsten network. In this website we have to first type our unique account number and then start mining. After few minutes from mining we have got or deposited an large amount of ethers to our account. Then we can use this ethers and start transferring them to our friends all over the world.

- Transfer Ethers Amount From One Account To Another

In this module we have to transfer an infinite amount of Ethereum coins from one account to another.

VI. APPLICATIONS

- Block chain is being implemented in almost every area of business including crypto currencies, supply chain, and logistics, intellectual property management, food safety, healthcare data management, fundraising and investment with security token offering, and notary.
- Block chain technology can be used to secure access to identifying information while improving access for those who need it in industries such as travel, healthcare, finance, and education.
- Blockchain payments, or blockchain payment systems, involve the processing of payment through the help of blockchain technology. With blockchain, payments are set to be low-cost, secure and processed quickly, overall facilitating money transfer regardless of the distance between the sender and receiver.
- Smart contracts are simply programs stored on a blockchain that run when predetermined conditions are met. They typically are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss.
- IoT enables devices across the Internet to send data to private blockchain networks to create tamperresistant records of shared transactions. IBM Blockchain enables your business partners to share and access IoT data with you — but without the need for central control and management.
- With blockchain technology, information about identity is auditable, traceable and verifiable — in just seconds. Individuals can curate their own profiles and control data sharing. Issuers easily connect with others and provide nearly instant verification of credentials.
- In healthcare, Blockchain has a wide range of applications and functions. The ledger technology helps healthcare researchers uncover genetic code by facilitating the secure transfer of patient medical records, managing the drug supply chain, and facilitating the safe transfer of patient medical records.
- In the logistics industry, blockchain can be harnessed in two key ways, namely, to drive efficiency and enable new business models: Drive efficiency: Blockchain can potentially improve efficiency in global trade by greatly reducing bureau- cracy and paperwork.
- The majority of NFTs reside on the Ethereum cryptocurrency's blockchain, a distributed public ledger that records transactions. NFTs are individual tokens with valuable information stored in them.

VII. Results

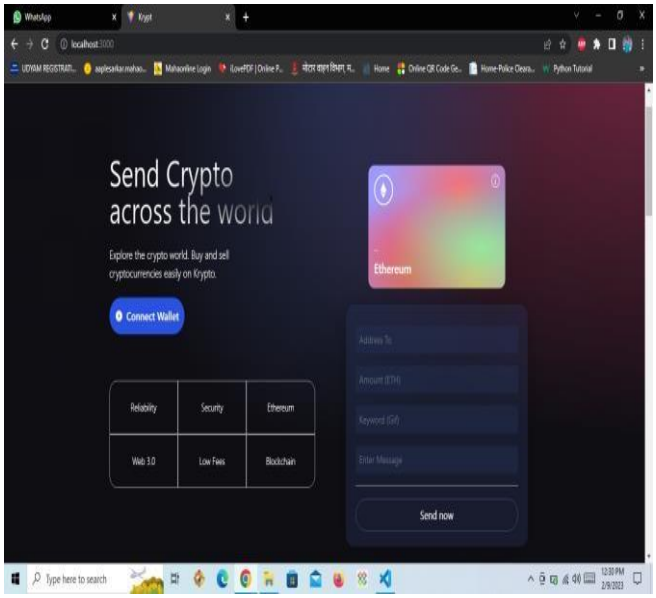


Fig. 2. Goto kryptowallet.infinityfreeapp.com

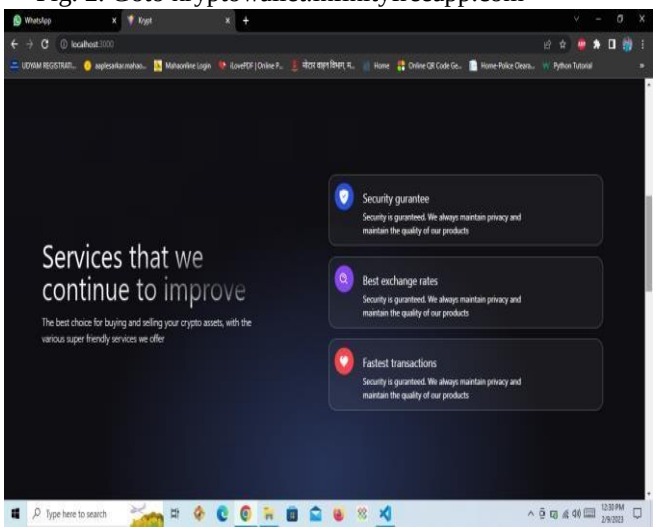


Fig. 3. Services On Website

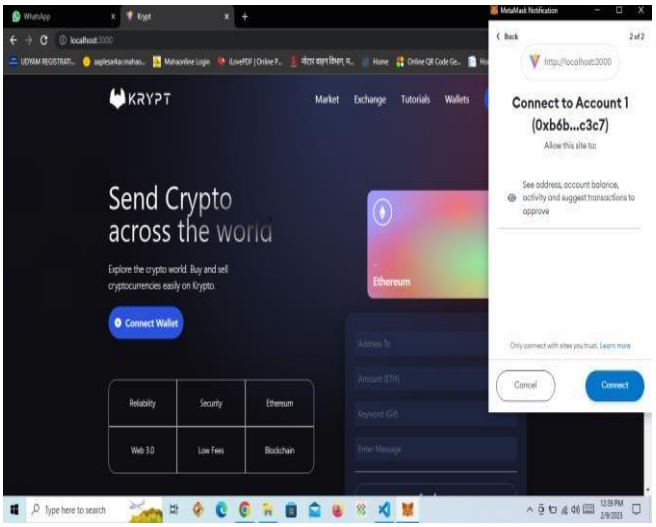
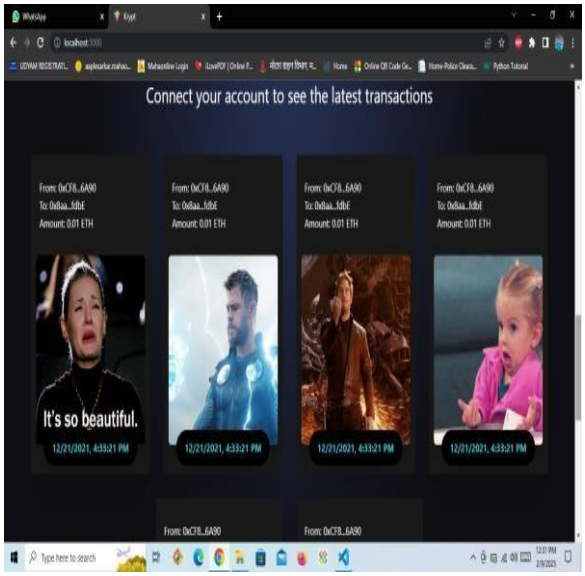


Fig. 6. Login to MetaMask Account



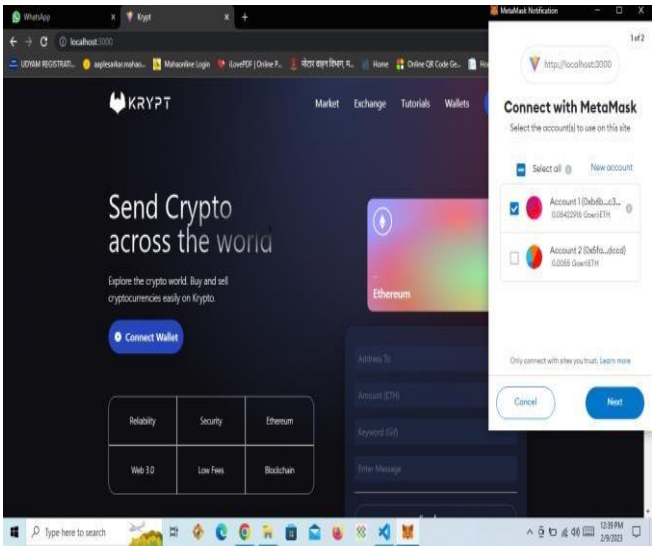


Fig. 4. Emoji on website Showing ethers transaction history

Fig. 7. Login Successfully Confirmation

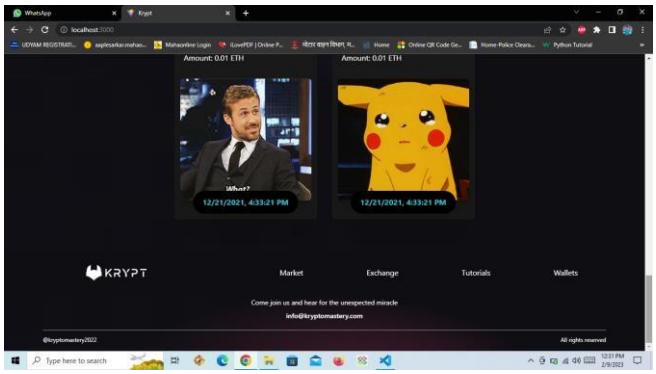


Fig. 5. Footer

VIII. ACKNOWLEDGMENT

We respect and thank HOD mam Dr. Uttara Gogate & Prof. Diksha Bhave mam along with our principal Dr. Pramod Rodge sir for providing us an opportunity to optimize the project work in SSJCOE Dombivli and providing us all support and guidance which made us pursue the project duly. We are extremely thankful to them for providing such nice support and guidance. We are with our deep gratitude to our project

guide Prof. Diksha Bhave mam, who took keep interest in our project work and guided us all along by providing all the necessary for developing a good system.

We are thankful to and fortunate enough to get constant encouragement, support and guidance from all Teaching staff of Computer Engineering which helped us in pursuing our project work.

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Industrial Safety using IOT

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Abstract— **Industrial safety is a broad area of workplace safety, covering a number of issues and topics, including general safety, site-specific safety issues, process and production safety, material safety, fire safety, electrical safety, building and structural safety and environmental safety. Gas leakage, fire safety and air pollution due to hazardous gases are the major problems faced by workers in industry now-a-days. This project presents a model which helps in gas and fire detection at an early stage to minimize the destructions and hazards. Also, it monitors air pollution in the premises using of Internet of Things (IoT) platforms. The prototype model is Instigated with few sensors and Arduino Uno which will help the user to know about the temperature, humidity levels and importantly the leakage of gases such as LPG, CO2, Propane and so on. The smartphone is used as an end device and according to the threshold values set, the user can take preventive measures. The system detects air quality and level of pollutants.**

Keywords— Arduino, Pollution Monitoring, Industrial Safety, Gas leakage detection, Industrial Internet of Things, ThingSpeak.

1. INTRODUCTION

Gas leakage and air pollution have become major environmental and public health issues in recent years. Gas leaks can result in explosions, fires, and other hazardous events, while poor air quality can cause respiratory problems, heart diseases, and other health issues. Therefore, it is crucial to detect gas leaks and monitor air quality in real-time to minimize the potential risks.

Gas leakage detection technologies include both fixed and portable systems. Fixed systems are typically used in large-scale industrial applications, such as oil and gas refineries, chemical plants, and pipelines. Portable systems are designed for use in residential and commercial areas, as well as in remote locations. The most commonly used sensors for gas leakage detection include infrared, electrochemical, and optical sensors. Air quality monitoring technologies are used to monitor various air pollutants, including particulate matter, volatile organic compounds (VOCs), and greenhouse gases [1]. The most commonly used sensors for air quality monitoring include laser-based sensors, optical sensors, and chemical sensors.

2. LITERATURE SURVEY

Gas leakage detection monitoring is though old but it is very useful concept in the industries and in day-to-day life. Gas leakage detection starts from traditional way to the most sophisticated components has been used to detect the gas leakage, temperature and humidity. However, the safety and correctness in temperature is necessary for human beings and the various task works conducted in the industries for that various technology has been used and some of this technology which is used for in order to provide a real time data.

Mohammad Khan et.al. proposed the “Sensor Based gas Leakage Detector System “the aim of this paper is to propose and discuss a design of a gas leakage detection system that can automatically detect, alert and controls gas leakages. Their system includes an alerting system for the user using the Buzzer and LED. The system is

based on sensor that easily detects a gas leakage. But the limitation is that it can merely be applicable as an alarming or indicator device. It does not notify the user via SMS or something like that.[3]

In "Gas Detection system using Arduino" [4]. This System can monitor and warn about harmful chemicals in air at workplace such as factories and it may also used in household by alerting through on LCD display and sending a message to a registered mobile number.

"IOT Based Arduino Gas Leakage Detection system" [5] describes about the technology recognizes a gas leak and warns the user by buzzing. This system uses the sensor, Arduino and buzzer to alert the user.

"Air pollution monitoring system using the IOT" proposed by the author Agiru Hima et. al. [2021]. It is the system which alerts workers after detecting the pollution. Arduino alerts for the people nearby.[6]

The Author in their paper [7], introduced the "A Comparative Study on Gas alarm detection system". It is simple system which can use in home specifically. It is letting the neighbours known via alarms.

- The Existing systems, are implemented to warn the surrounding people through alarm and buzzers. But they don't take any precautionary actions in some situations.
- The numbers of sensors used are less.
- Basically, most of the existing systems are just used for domestic purposes or we can say home appliances and not for industrial purpose.
- Many of the systems do not have any user interface for analysing the temperature and pollution.
- There is only one action performed by every system.

This paper proposes a system to highlight and understand various technologies which are used for the industrial safety and how effective these technologies are and understand the important research in this area.

3. OBJECTIVES

This system will be developed by using IoT to give real-time response to the user and the neighbourhood and it has the following objectives:

- To reduce accidents by detecting the leakage of gas and then alerting the required authorities for the same. This will be implemented by using Arduino Uno.
- To give a signal to the Arduino when the ratio of the specified gases in the air around the sensor goes above a preset level, so that it will send a control to make the alarm go off and with the help of the GSM module, a message gets sent to the user.
- To avoid any forthcoming accidents may be avoided by alerting user in the early stages of the mishap.
- To keep pollution in control- according to the safety regulations, by continuous monitoring of the smoke levels.
- To develop a user-friendly and interactive interface.

4. PROBLEM DEFINITION

The gas may leak from various places like the top of the cylinder where the pipe carrying the gas to the application is present, or the pipe may get cracked leading to leakages. Hence accidents occur when a spark occurs in a place where this leaked gas is present. Same scenario can be seen in household activities. This method will assist in finding gas leaks. Furthermore, gas leakage can cause fire that will lead to serious injury or death and it also can destroy human properties.

5. SYSTEM ARCHITECTURE

5.1 METHODOLOGY

The figure 1 describes the architecture of the entire project. Minimum 5v power supply is a must for the system to work. When the sensor gives an input signal to the Arduino, based on that input, the Arduino then

reaches out to the other output components of the system and produces output.

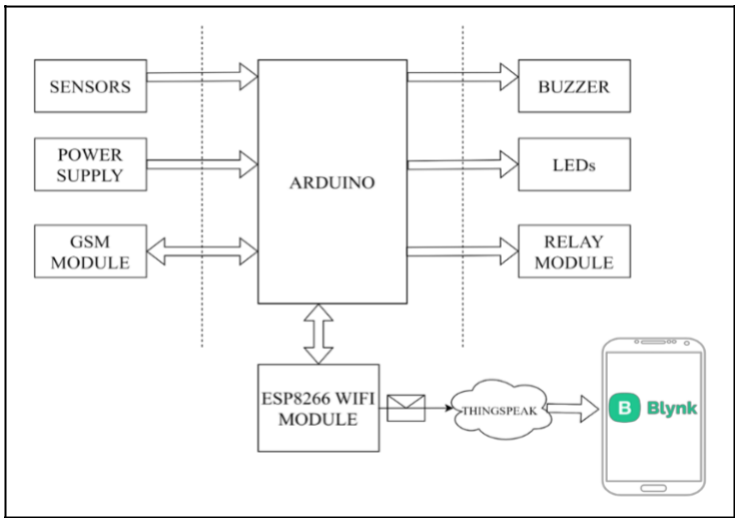

Fig 1. Block-Diagram of the system

The following methodology outlines the steps for building a gas leakage detection and air quality monitoring system using an Arduino Uno R3 microcontroller, MQ2 gas sensor, and MQ135 air quality sensor.

Step 1: Gather Materials and Tools

- Arduino Uno R3
- MQ2 gas sensor
- MQ135 air quality sensor
- Breadboard
- Jumper wires
- USB cable

Step 2: Connect the Sensors to the Arduino

- Connect the MQ2 gas sensor to the breadboard and connect its power and ground pins to the 5V and GND pins of the Arduino, respectively.
- Connect the MQ135 air quality sensor to the breadboard and connect its power and ground pins to the 5V and GND pins of the Arduino, respectively.

Step 3: Upload the Code

- Write the code in the Arduino Integrated Development Environment (IDE) to read the values from the MQ2 and MQ135 sensors and perform the necessary calculations.
- The code should include the library for the MQ2 and MQ135 sensors and the logic for reading the sensor values and converting them into meaningful readings for the gas concentration and air quality levels.

Step 4: Test the System

- Connect the Arduino to the computer using the USB cable.
- Upload the code to the Arduino and run the serial monitor to see the readings from the MQ2 and MQ135 sensors.
- The readings should display the gas concentration levels and air quality values, which can be used to trigger an alarm or send a notification in the event of a gas leak or poor air quality.

Step 5: Integration with Other Devices

- The system can be integrated with other devices, such as a display screen, buzzer, or mobile device, to provide real-time information on the gas concentration levels and air quality values.
- The code can be modified to include the logic for sending notifications or triggering alarms in the event of a gas leak or poor air quality.

The MQ135 sensor is an excellent gas sensor because it can detect NH3, NOx, alcohol, benzene, smoke, CO2, and a few more chemicals. It will sense gases when we connect it to an Arduino, and we will receive the pollution level in PPM as a result (parts per million). We must translate the voltage levels that the MQ135 gas sensor outputs into PPM. When there was no gas nearby, the sensor gave us a reading of 90. The safe limit of air quality is 350 PPM, and it should not be more than 1000 PPM. It begins to produce headaches, drowsiness, and stuffy, stagnant air when it surpasses the limit of 1000 PPM, and if it increases above 2000 PPM, it can cause accelerated heart rate and a variety of other illnesses.

ThingSpeak is the open-source IoT cloud platform that is used to store the sensor data, which will further be used to generate an analysis of the pollution levels. To make this work, a Wi-Fi module is connected to the Arduino as it does not have an inbuilt Wi-Fi Module.

5.2 HARDWARE AND SOFTWARE REQUIREMENTS

The following table lists the required software and hardware components, that are required to build the proposed system successfully.

FUNCTION	COMPONENT
Microcontroller	Arduino UNO R3
Gas Leakage Detection	MQ2 Sensor
User Alerts	GSM Module SIM900A
Pollution Monitoring	MQ135 Sensor
Audio Alerts	Piezo Buzzer
Power-Cut	Relay Module
User Interface	BLYNK-IOT
Cloud Platform	ThingSpeak
Internet Connection	Wi-fi Module ESP 8266
Development Environment	Arduino IDE

6. RESULTS

The following figures 2, 3, 4 and 5 are the results/outputs of the system. Figure 2 and 3 show the charts, that are displayed on the User Interface, after collecting the sensor data and uploading the same on the cloud platform. Figure 4 is a prototype of the proposed system, that demonstrates all the hardware connections. Figure 5 is a screenshot of the text alert received on the user's device, as soon as the leakage was detected on-site.

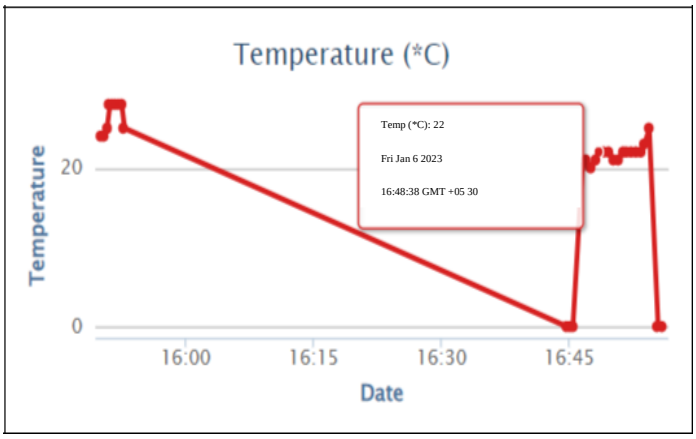

Fig 2. Temperature Chart

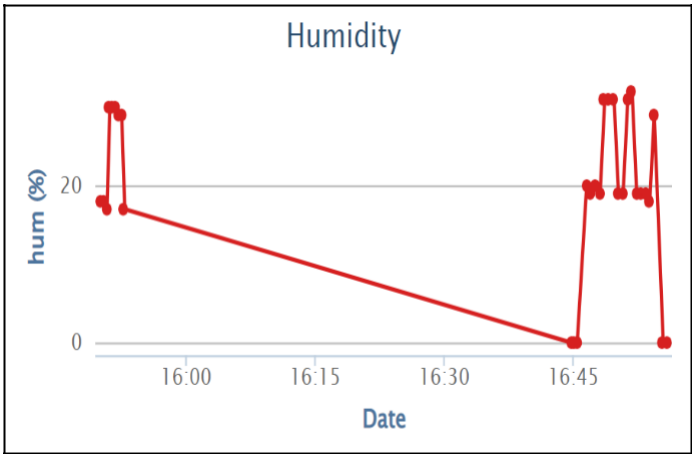

Figure 4. Humidity Chart

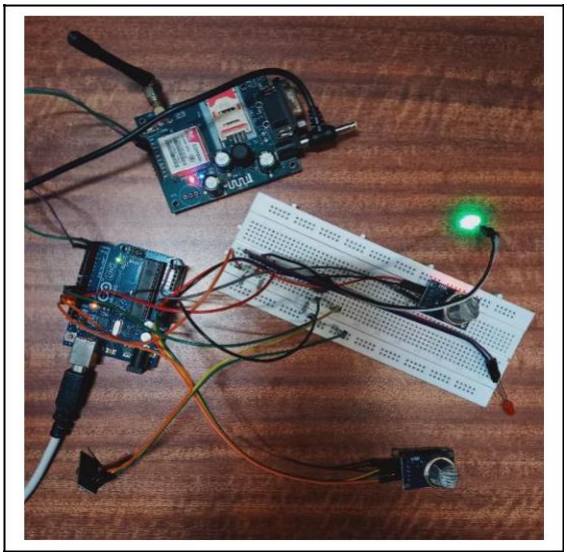

Fig 4. System Prototype

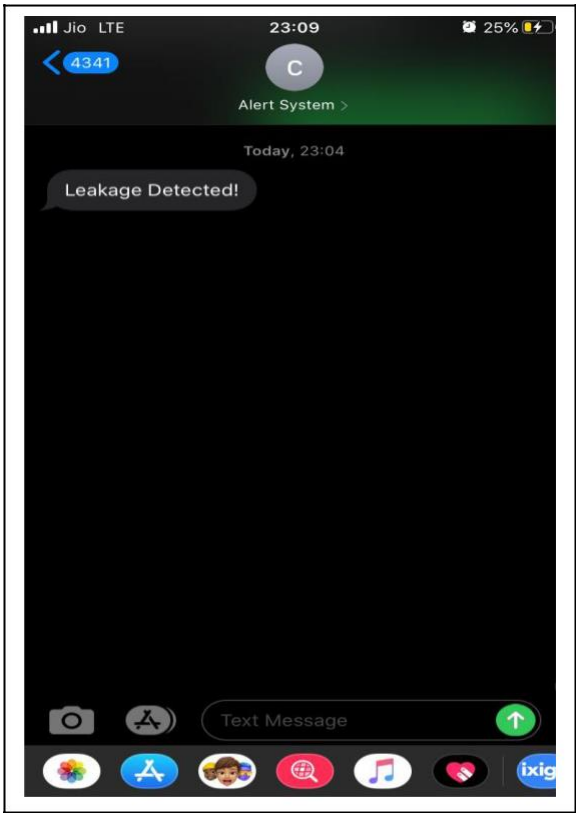

Fig 5. SMS Alert

7. CONCLUSION

Gas leakage leads to severe accidents resulting in material losses and human injuries. Gas leakage occurs mainly due to poor maintenance of equipment and inadequate awareness of the people. Using the Arduino microcontroller, MQ2 gas sensor, and MQ135 air quality sensor, it is possible to build a low-cost and efficient gas leakage detection and air quality monitoring system. The system can be customized to meet specific requirements and can provide real-time information on the gas concentration levels and air quality values to ensure the safety and health of individuals and communities. It can help us to prevent accidents in all directions. Hence, gas leakage detection along with pollution monitoring has been implemented successfully.

ACKNOWLEDGMENTS

The authors of this research paper would like to express their sincere gratitude to all those who have helped and supported them throughout the development of this project.

The authors are deeply grateful to Dr. Uttara Gogate. Her valuable insights and expertise have been instrumental in the successful completion of this project.

Finally, the authors would like to acknowledge the hard work and dedication of the team members who were involved in this research project. Their commitment and passion for the work have been a source of inspiration and motivation.

The authors believe that this research would not have been possible without the contributions of all those who have supported them, and they are deeply grateful for their help and encouragement.

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Multi-Disease Prediction System

Multi-Disease Prediction System
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Abstract – **— The current state of disease prediction models in healthcare focuses on analyzing one disease at a time, such as diabetes, cancer, or heart disease. There is a need for a system that allows patients to predict multiple diseases using various machine-learning models. This study presents such a system and demonstrates its application to predicting diabetes, diabetes retinopathy, heart disease, and brain tumor, with the potential to include other diseases in the future. The system employs machine learning algorithms to predict diseases by considering various factors that contribute to the disease. For example, in predicting diabetes, the system considers factors such as age, sex, BMI, insulin levels, glucose, blood pressure, and diabetes pedigree function. The behavior of the final models is saved based on data collected from patients and used to train the model for predictions. The significance of this analysis lies in its ability to monitor a patient's condition and provide warning to lower the mortality rate.**

Keywords—Feature Extraction, Machine learning Models, diseases (lungs, Heart, diabetes) Clustering, Supervised Learning, Deep Learning, Diabetes, Heart, Random Forest, Boost.

I. INTRODUCTION

The collection and processing of healthcare data pose a significant challenge in the medical field. Advances in technology have led to the generation of a vast amount of multi-dimensional patient data, including clinical factors, hospital resources, illness diagnostic information, patient records, and medical equipment. This complex data requires processing and evaluation to extract valuable information for effective decision-making. However, not all available healthcare data is effectively utilized to gain valuable insights for successful decision-making, leading to unequal access to high-quality healthcare services based on financial ability. Data mining and machine learning technologies have greatly transformed healthcare organizations by identifying important information and detecting patterns and relationships in large databases. These technologies employ multiple analytic methodologies and complex machinelearning algorithms to explore vast amounts of data and systematically analyze it. By uncovering inherent inefficiencies and hidden patterns, data mining and machine learning can result in improved services, diagnoses, and treatments, as well as a deeper understanding of all elements of the medical field. Medical diagnosis involves analyzing a patient's symptoms and indicators to determine a condition. This procedure is often complex and can lead to incorrect predictions, relying primarily on the patient's symptoms and the physician's knowledge and experience. However, as medical systems evolve and new treatments become available, it becomes increasingly challenging for physicians to keep up with current treatments. As a result, it is crucial to support physicians with clinical tests and patient history information. Machine learning techniques are being utilized in medical diagnosis to extract features for optimal illness diagnosis, prediction, prevention, and therapy. These techniques hardcore accurate than experienced physicians, with a 91.1% accuracy rate compared to the physician's accuracy rate of 79.97%. Several studies have demonstrated the benefits of using machine learning in the diagnostic process, leading medical professionals to seek integration of these techniques with physician expertise to automate the diagnosis process. Data mining and machine learning approaches are working towards converting accessible data into valuable information to improve the efficiency of the diagnostic process.

II. METHODOLOGY

It is a procedural framework that contains various steps like those shown above in the block diagram for finding better accuracy using machine learning Algorithms

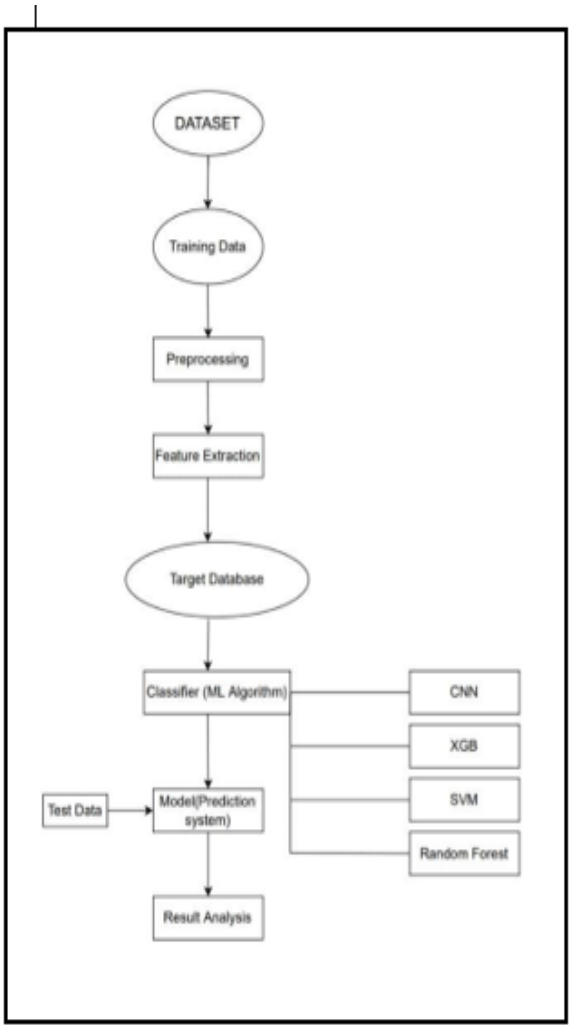


Fig 1 System model

A. Data Collection

Data collection has been from the internet to identify the diseases here the real symptoms of the different diseases are collected i.e. no dummy values are entered. The symptoms of the disease are collected from different health-related websites and kegel.

B. Training Data and Test Data

The collected data is distributed between training data and testing data

- Training data – Training data is used to train the predictive model, the data assigned to training is 80% of the total dataset.
- Testing Data – After Training the model test data is used to test the model and find its accuracy of the model, the data assigned for testing is 20% of the data set.

C. Preprocessing

Before feeding the data into the Prediction model, the following data cleaning and pre-processing steps are performed

- Checking for null values and filling using the forward fill method
- Converting data into different cases
- Standardizing the generated data using mean and standard deviation

III. DISEASE SURVEY AND THE ALGORITHM USED

A. Diabetes

. In this project, we will be diagnosing diabetes by giving some data and the dimensions such as

1. Gender
2. Glucose concentration
3. Blood pressure
4. Insulin levels
5. BMI, diabetes pedigree
6. Age

This input data will diagnose diabetes and tell us whether it is positive or negative. Here are some general tests that are conducted to detect diabetes:

Gender: Diabetes has different effects according to gender.

Age: Different Age group has Different effects on the body.

Glucose concentration: The blood glucose concentration is the amount the glucose in the human blood.

Blood Pressure: Blood pressure should be below 140/80mmHg for people with diabetes or below 130/80mmHg if you have kidney or eye disease or any condition that affects blood vessels and blood supply to the brain. But it is important to speak to your healthcare team about your target.

Insulin Level: A blood sugar level of less than 140 mg/dL (7.8 mmol/L) is normal. A reading of more than 200 mg/dL

- Random forest algorithm

Random Forest working is possible in two phases, the first is to create the random forest by merging the N decision tree, and the second is to predict each tree created in the first phase. The working of the random forest algorithm is as follows: Step-

1: Firstly, the algorithm will select random K data points from the training set which was created from the original data set.

2: After selecting the k data point then build the decision trees connected with the selected data point (Subsets).

3: Then choose the number N for the decision trees that you want to build.

4: Repeating the above step 1 and 2.

5: Finding the predictions of every decision tree, and assigning them new data points to the tree which gets the majority of votes.

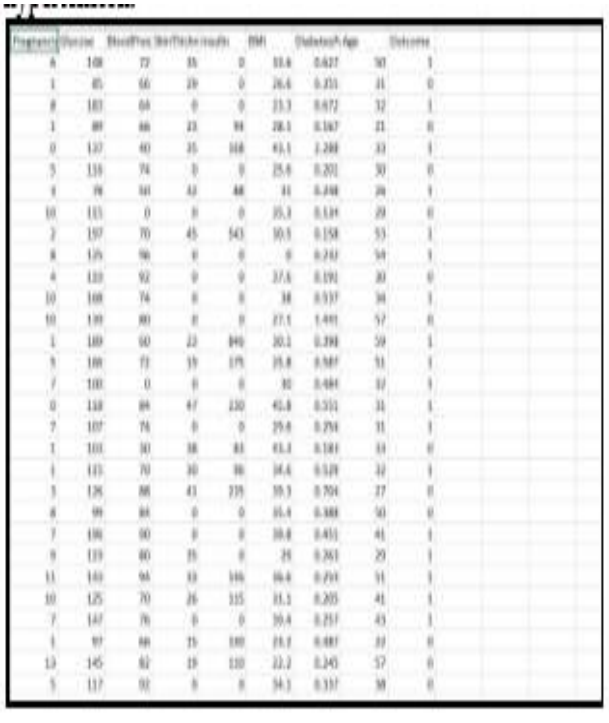


Fig 2 Diabetes dataset

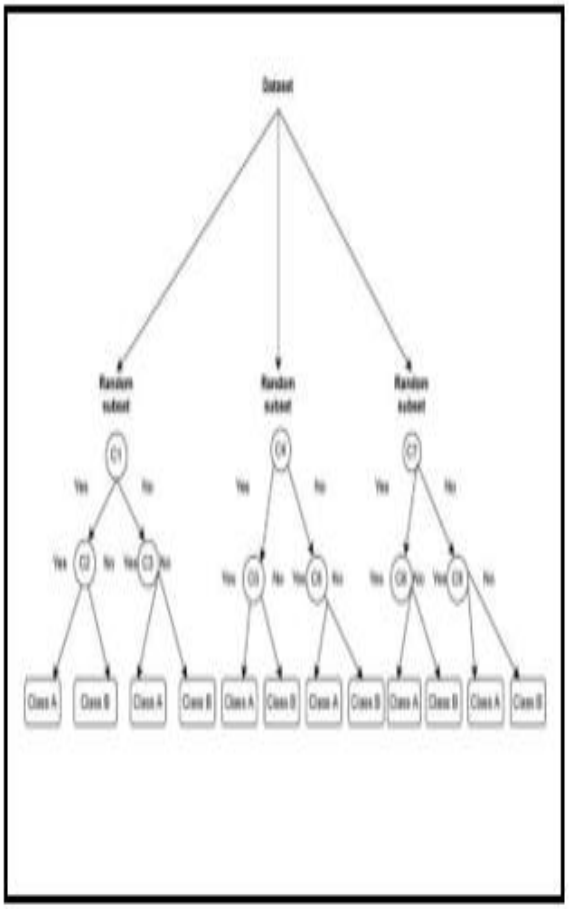


Fig 3 Random Forest Tree

B. Heart Disease

The goal of the survey is to examine the accuracy of machine learning techniques in predicting heart disease, which is a critical issue as an incorrect diagnosis can lead to fatal outcomes. The survey utilized various algorithms such as k nearest neighbor, decision tree, linear regression, SVM, and XGBOOST, trained and tested using the UCI repository dataset. The comparison of these algorithms showed that XGBOOST had the highest accuracy at 88%, followed by SVM at 83%, Decision tree at 79%, Linear regression at 78%, and k-nearest neighbor at 87%.

Heart disease can be detected by giving the following input information as

1. Old peak

2. Max heart rate achieved if exercise induces angina 3.

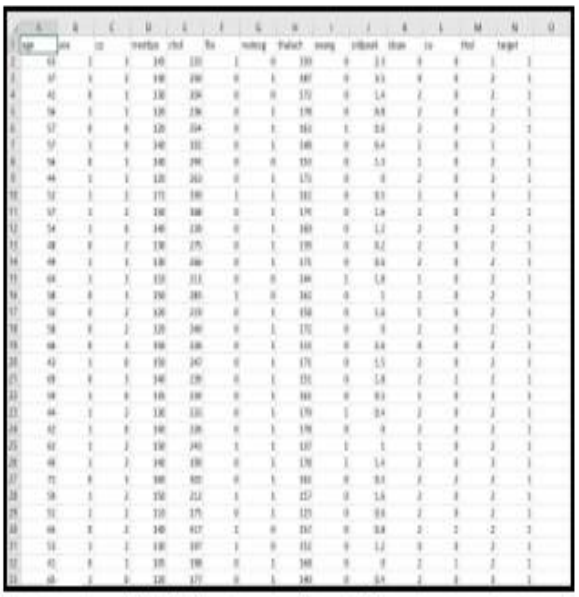


Fig 4 Data set of heart disease

The working of the XGBoost algorithm are as follows:

Step 1 In this process, a single-leaf tree is created

loss function. For subs equent trees, the residuals are taken from the previous tree's prediction.

Step 3 In this ste p a similarity score is calculated using the given formula, where Hessia n is equal to the number of residuals, Gradient2 is the squared sum of residuals, and λ is a regularization hyperparameter.

$$Similarity\ Score = Gradient\frac{Gradient^2}{Hessian + \lambda}$$

Step 4 involves using the similarity score to select the appropriate node. The higher the similarity score, the more homogeneous the data.

Step 5 The information gain is calculated using the

Step 2 The average of the target variable is calculated as a prediction, and the residuals are computed using a chosen similarity score. The information gained helps determine how much homogeneity is achieved by splitting the node at a

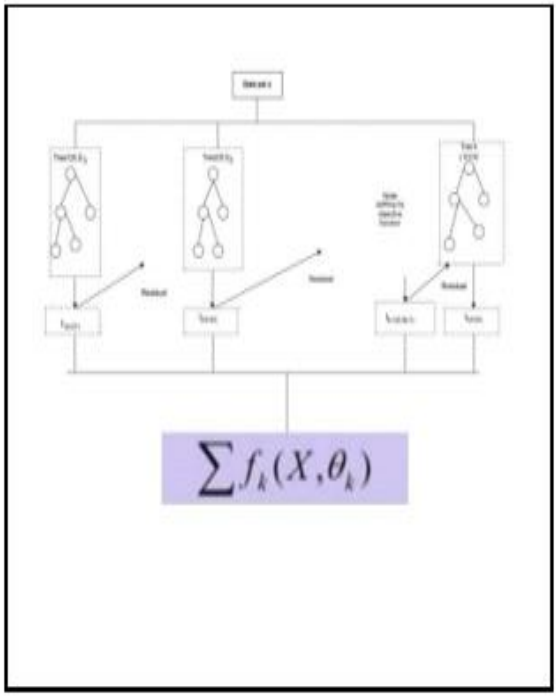
given point and is calculated by the formula: Information gain = Left similarity + Right similarity for roots.

Step 6 involves creating the tree of the desired length using the method described above, and pruning and regularization can be achieved by adjusting the regularization hyperparameter.

Step 7 The residual values are predicted using the

Decision Tree that was constructed.

Step 8 The new set of residuals is calculated as New Residuals = old residuals + p Predicted Residuals, where ρ is the learning rate.



Step 9 Finally the process is repeated for all the trees by returning to Step 1.

C. Brain Tumour

Brain tumors are masses or growths of abnormal cells in the brain that may lead to cancer. Magnetic Resonance Imaging (MRI) scans are commonly used by doctors to detect brain tumors. These scans provide information about the growth of abnormal tissue cells in the brain. In various research studies, the detection of brain tumors has been achieved through the application of Machine Learning and Deep Learning algorithms that train models. When these algorithms are applied to MRI scans, they provide fast and accurate predictions of brain tumors, which can aid in providing prompt treatment to patients. The proposed work applies a self-defined Artificial Neural Network (ANN) and Convolution Neural Network (CNN) to detect the presence of brain tumors and analyze their performance. The input for detecting brain-related diseases, such as Alzheimer's and brain tumors, is taken from MRI scans. If the scan detects a form of a tumor, it will diagnose it as positive.

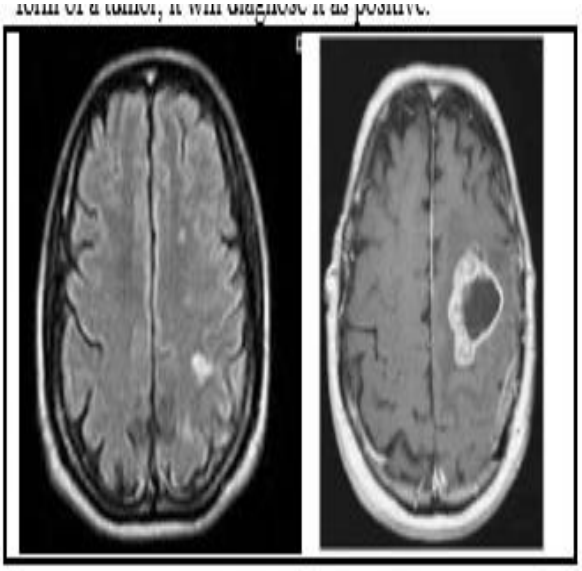


Fig 6 Brain tumor image

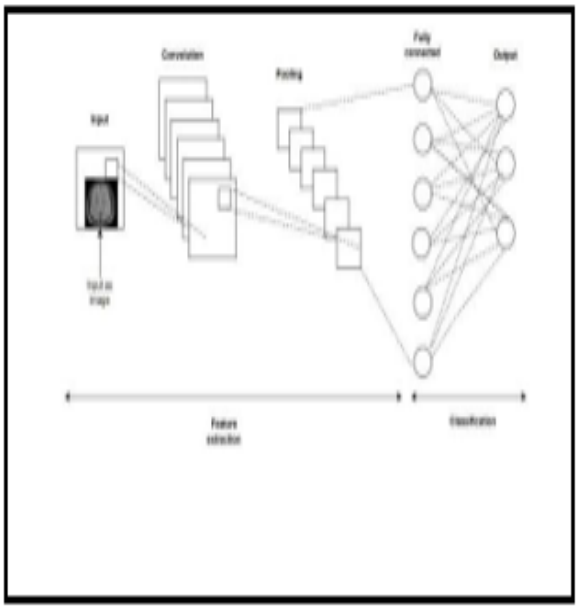


Fig 7 CNN layers for Brain Tumour

D. Lungs disease

The diagnosis of lung diseases can be achieved through the use of a chest X-ray. The chest X-ray is provided as input, and the diagnosis is made based on its results. If the chest X-ray is clear and free of any congestion in the lungs, it will be diagnosed as negative. If the X-ray is not clear and shows

signs of congestion, it will be diagnosed as positive and indicate the presence of lung disease. Respiratory diseases, also known as lung diseases, affect the airways and other structures of the lungs. Examples of such diseases include pneumonia, tuberculosis, and COVID-19.

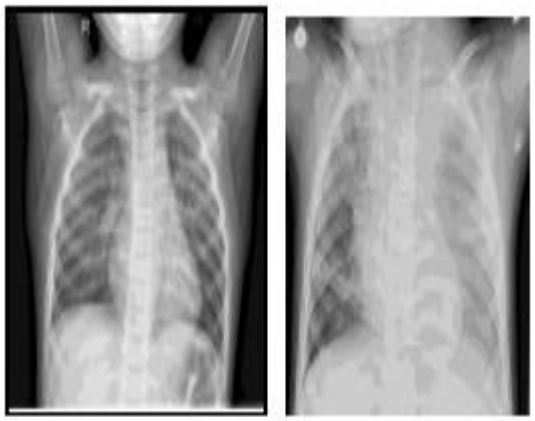


Fig 8 lungs disease images

• CNN(CONVOLUTIONAL NEURAL NETWORK)

A ConvNet, also known as a convolutional neural network, is a type of feed-forward neural network that is designed to process grid-like data, specifically visual images. It is used to detect and classify objects in an image and has multiple hidden layers that aid in extracting information. The four key layers in a ConvNet are:

1. convolution layer
2. ReLU layer
3. pooling layer
4. fully connected layer

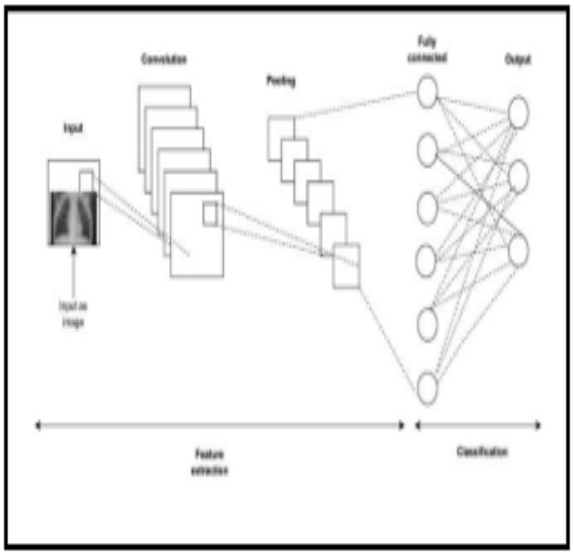
These layers are crucial in the process of extracting valuable features from an image.

• The convolution layer contains filters that carry out the convolution operation and every image is treated as a matrix of pixel values.

• ReLU layer = The rectified linear unit, also known as ReLU, is an elementwise operation that sets negative pixels to zero. After the feature maps have been extracted, they are passed through the ReLU layer, which introduces non-linearity to the network and produces a rectified feature map as the output.

• Pooling Layer = The pooling operation is a process of reducing the dimensionality of the rectified feature map. The feature map passes through a pooling layer to create a compact representation known as the pooled feature map.

• Fully connected layer = The fully connected layer, also known as FC, operates on a flattened input, where each input is connected to every neuron. The flattened input then passes through several other FC layers, where mathematical operations are carried out. The process of classification begins at this stage. FC layers are often located towards the end of the CNN architecture, if present.



CNN layers for lungs disease

IV. RESULT

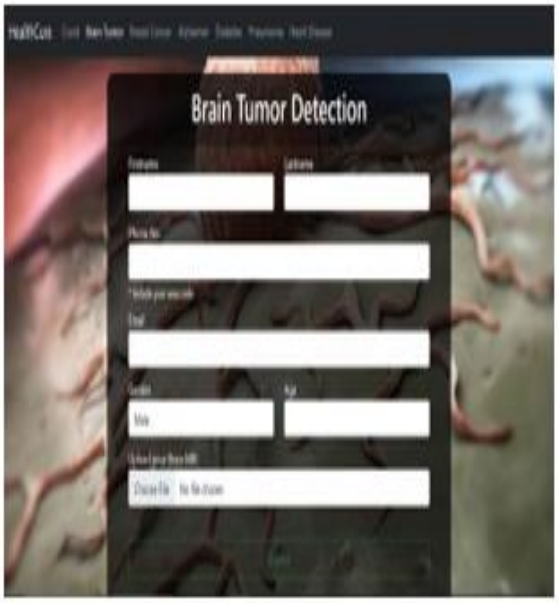
In the system Multi disease prediction model used the CNN algorithm for lung and brain disease, heart disease uses the XGBoost algorithm and diabetes uses the random forest algorithm as these gave the best accuracy accordingly. There when the patient adds the parameter according to the disease it will show whether the patient has a disease or not according the disease selected. The parameters will take input and show the range of the

values needed and if the value is not within the range or is not valid or is empty it will show the warning sign that adds a correct value.

2) Heart disease

Fig 11. Heart disease Input Parameters

3) Brain tumor



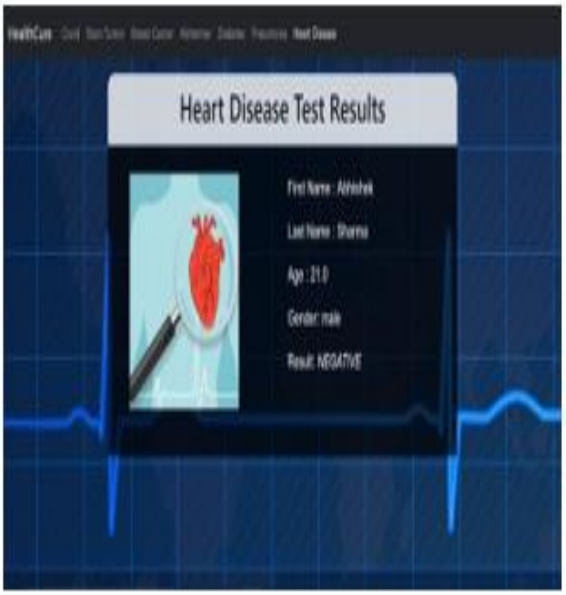


Fig 10 Diabetes test result

4) Lungs disease

Fig 15. Lung disease input parameters

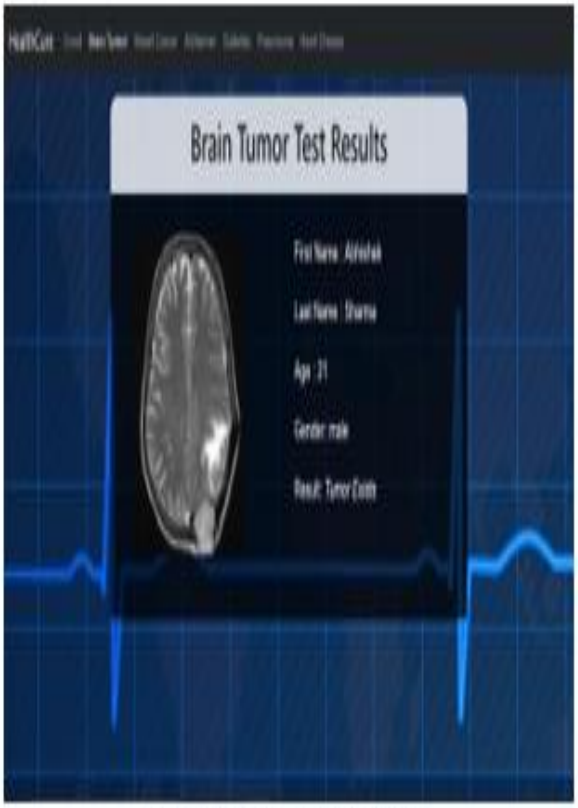


Fig 14. Brain tumor test result

Fig 16. Lung disease test result

To address this issue, a multiple-disease prediction system allows users to analyze more than one disease in a single application. They no longer need to navigate different sources to determine if they have a specific condition. To use this system, users simply select the name of the disease, input the required parameters, and click submit. The corresponding machine learning model will then be invoked, predict the outcome, and displayed on the screen.

The primary goal of this project is to create a system that can accurately predict multiple diseases. This will save users time and effort, as they no longer need to access multiple websites. Early disease prediction can also increase life expectancy and reduce financial stress. To achieve high accuracy, we have used various machine learning algorithms such as Random Forest, XGBoost, and CNN. In the future, we plan to expand the API to include more diseases and to continually improve the accuracy of predictions to lower the mortality rate

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A Comparative Analysis of Recent Face Detection Methods Implemented for Age and Gender ZDetection

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Abstract — **Age and gender detection is an upcoming technology, which is gaining importance. Age and gender detection is a subjective task. Even humans have trouble recognizing it sometimes. Our system helps them recognize what age range and gender the person is. To select the absolute best method, we have done a comparative analysis of three face detection algorithms, mainly Dlib, OpenCV, and MediaPipe, and implemented them on OpenCV DNN algorithm for age and gender detection. Then, this system was implemented in hardware using Jetson Nano.**

Keywords — ***Dlib, DNN, Jetson Nano, MediaPipe, OpenCV, Python***

I. INTRODUCTION

In several fields, such as authentication, humancomputer interaction, behavioural analysis, and product suggestions based on user preferences, age and gender detection are crucial. Age and gender information is needed by many businesses, but there weren't many answers. To satisfy this demand, significant advancements have been made in recent years.

Using age detection to display your advertising on the media kinds that your target audience uses the most is a wonderful example. Businesses can better target marketing campaigns by using age and gender detection, for instance, by determining which goods and services various client segments require and can afford. Refinement, which can lower your lead or sale cost per lead.

One of the use cases is an AI software programme called Quividi, which uses online face analysis to determine the age and gender of passing users and then automatically begins playing advertisements tailored to that audience. His AgeBot, an Android app that utilises face recognition to estimate age based on images, is another illustration.

The main objective of this project was to experiment with newer recent face detection methods and implement them for age and gender detection. Face detection methods like Haar Cascades are far too old and do not give good accuracy. Neither is it able to recognize faces at various angles and lighting. Hence, we worked on newer methods with greater accuracy.

Each author of this paper contributed to the experimentation as well as the writing of this research paper. Each author reviewed atleast six research papers and realized its weaknesses as ways to improve its technology. Riya Gokhale worked on Dlib face detection and its respective implementation for opencv DNN based age and gender detection. Similarly, Purva Shendge worked on Mediapipe face detection and its respective implementation for opencv DNN based age and gender detection. Lastly, Nikita Sawant worked on opencv face detection and its respective implementation for opencv DNN based age and gender detection.

The proposed work presents a comparison of face detection algorithms implemented with age and gender detection in real time, using Jetson Nano.

II. LITERATURE REVIEW

There are several papers published on age and gender detection. We surveyed these papers and got a gist of current technology as well as the improvements we could make.

Table 1. Literature Survey on Age and Gender Detection Algorithms using Machine Learning and Deep Learning

Sr No	Paper Title	Summary

1	Age and Gender Recognition Using Deep Learning June 2022 [1]	Algorithm used- Deep Learning and CNN Accuracy- 80% Implemented on Python IDE
2	Deep Facial Age Estimation Using Conditional Multitask Learning with Weak Label Expansion 2018 [3]	Algorithm used- Deep Learning, Label Sensitive learning, Age group classifier, CNN is used Accuracy- 87% Dataset- CASIA-WebFace, MORPH-II, FG-NET Implemented on computer with K80 GPU
3	Real-Time Face-Age-Gender Detection System 2019 [5]	Algorithm used- CNN Datasets- UTKFace, AGE, GENDER AND ETHNICITY (FACE DATA) CSV Accuracy for age detection- 72.4% Accuracy for age detection- 85.8%
4	Age and Gender Predictions using Artificial Intelligence Algorithm 2020 [7]	Algorithm used- Haar Cascades, CNN and convNet Dataset- UTKFace Implemented on- Anaconda Navigator, Jupiter Notebook Accuracy- 0.6170588.
5	Age and Gender Prediction from Face Images Using Convolutional Neural Network, 2018 [8]	Algorithm used- Dlib, CNN and DTML Dataset- IMDB-WIKI Accuracy- 92% Implemented on- VSCode
6	Human Age And Gender Classification using Convolutional Neural Network 2021 [9]	Algorithm used- Haar Cascades, SVM, CNN Dataset- IMDB-WIKI, Adience Accuracy- 90% Implemented on- Python IDE
7	Gender Classification and Age Prediction using CNN and ResNet in Real-Time. 2020 [10]	Algorithm used- Haar Cascades, CNN Dataset- GCVL Accuracy- 85% Implemented on-Python IDE, real time
8	Predicting Age & Gender of Mobile Users at Scale - A Distributed Machine Learning Approach. 2018 [11]	Algorithm used- Logistic Regression, Random Forest and Gradient Boosting Trees (GBT) Accuracy- 80% Implemented on- real time huge scale

Sr No	Paper Titled	Summary
1	Age and Gender Detection System using Raspberry pi, 2019 [4]	Algorithm used- CNN Dataset- Adience Benchmark Accuracy – 85% Precision- 88.23% Microprocessor used- Raspberry pi
2	Human Face Detection and Tracking for Age Rank, Weight and Gender Estimation based on Face Images utilizing Raspberry Pi Processor 2018 [6]	Algorithms used- local binary pattern ,viola jones algorithm, CNN Microprocessor used- Raspberry pi
9	Gender and Age Classification of Human Faces for Automatic Detection of Anomalous Human Behavior 2018 [12]	Algorithm- SVM Accuracy for age detection- 80.17% Accuracy for age detection- 90.33%
10	Gender Classification using Face Recognition, 2019 [13]	Algorithms-LDA, PCA Accuracy using LDA-85% Accuracy using PCA- 83%
11	Face and Gender Recognition System Based on Convolutional Neural networks 2020 [14]	Algorithm- CNN Datasets- the Wild (LFW), YouTube Face (YTF) and VGGFace2 Accuracy- 93.22%
1 2	Age and Gender Prediction using Deep Convolutional Neural Networks 2019 [15]	Algorithm used- Deep Learning , CNN, convNet Haar Cascade ,OpenCV and Tensor Flow Accuracy- 90% Implemented on Jupiter Notebook IDE
13	Gender Prediction from Images Using Deep Learning Techniques 2019 [16]	Algorithm used- Deep learning techniques, CNN Accuracy- 80% Implemented by using IMDB-WIKI dataset.
14	Age Estimation and Gender Prediction Using Convolutional Neural Network 2020 [17]	Algorithm used- CNN, Dataset- IMDB-WIKI Accuracy- 80% Implemented on MATLAB

Below table presents research done using hardware implementation:

3	Implementation of Machine Learning for Gender Detection using CNN on Raspberry Pi Platform 2020 [12]	Algorithm- CNN Dataset-Adience dataset Microprocessor used- Raspberry pi

III. METHODOLOGY

The proposed work presents a comparison of face detection algorithms, mainly dlib, Mediapipe, OpenCV DNN as explained below. These face detection algorithms are implemented with age and gender detection using OpenCV DNN in real time, using Jetson Nano.

As seen in the above literature review, we see that many of the authors have not implemented the system in real time, done only using pictures not used while training.

A. Techniques used for face detection:

1. Dlib- It's made of five HOG (histogram of oriented gradients) filters: front, left, right looking, and two combinations of mentioned.

This method basically focuses on the object's shape and structure. This is as it calculates the features using gradients. As the name suggests, using the areas of images, it creates histograms that are based on gradient's direction and magnitude.

After the HOG filters are applied, it extracts features into a vector and feeds it into a classification algorithm SVM which will assess whether the frame has a face (or object) or not.

As explained in the flowchart, the algorithm first starts by gray scaling the image. Then it normalizes the color and constructs histograms. Using the HOG, it constructs vectors. These then get fed into SVM. SVM further processes them and gives us the output, which is detecting the face.

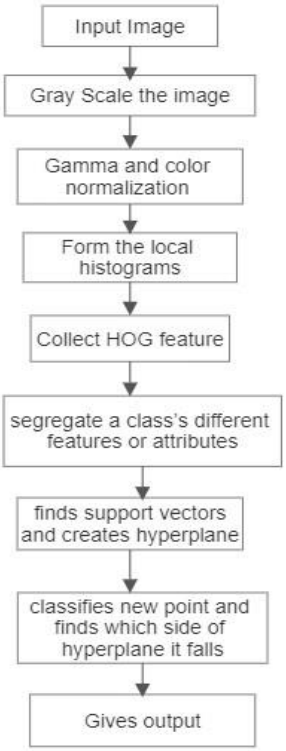


Fig 3. Pipeline of Dlib face detection

2. Mediapipe -Its face detection works on ultrafast face detection and 6 landmarks support. These 6 landmarks detects positioning of nose, eyes, ears respectively. The confidence level of detection as well as range for the image can be also defined as per our requirement.

Two real time deep neural network models work together for face detection: One model is detector which operates on full image and compute face locations. The second model is 3D face landmark model which works on those locations and predicts the approximate 3D surface by using regression.

Configuration options in Mediapipe-
1.MODEL_SELECTION- An integer index value 0 or 1 is used for model selection. Here index 0 indicates the short range model which is capable for face detection within 2 meters range. And the value 1 indicates the full range model which works for maximum 5 meters range.

2.MIN_DETECTION_CONFIDENCE-This value is a float value which lies between 0.0 to 1.0. This value indicates the

confidence level of our model about the detected face. For example if we set this value as 0.8 , then our model will detect the given face unless and until it is 80% sure about it.
Default value of this is 0.5.

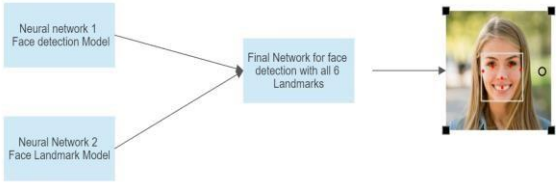


Fig 4. Pipeline of Medipipe face detection

3. Open CV-
OpenCV is a huge open source computer vision, machine learning, and image processing library that plays a key role in real-time manipulation or detection.
It used to for face recognition and recognition, object identification, human behavior classification in video, camera movement tracking, moving object tracking, and more.
DNN – Deep Neural Networks have an input layer, an output layer and few hidden layers between them.
This DNN module allows you to get pre-trained neural networks from popular frameworks like TensorFlow and use these models directly in OpenCV.
This means that you can use any popular framework to train your model and only use OpenCV for inference or prediction.
Here we are using DNN with CAFFE model.
CAFFE MODEL-
Caffe (Convolutional Architecture for Fast Feature Embedding) is a deep learning framework that allows users to create image classification and image segmentation models.
The CAFFE model contains the actual layer weights.
CAFFMODEL files are created from .PROTOTXT files.

Working –

Flowchart for our model

When using OpenCV and DNN (Deep Neural Network) modules in Caffe models, two sets of files are required: .prototxt and .caffemodel files. First, the user creates the model as plain text and saves it. .After the user trains and refines the model in Caffe, the program saves the user's trained model as his CAFFMODEL file.

PROTOTXT files are prototype machine learning models which are created to use with Caffe. It contains an image classification or image segmentation model trained on Caffe. A PROTOTXT file defines the model architecture. This code first loads face models from a file and then uses those models to detect faces in the input image.

The marked faces are included in a list and passed to another function for further processing.

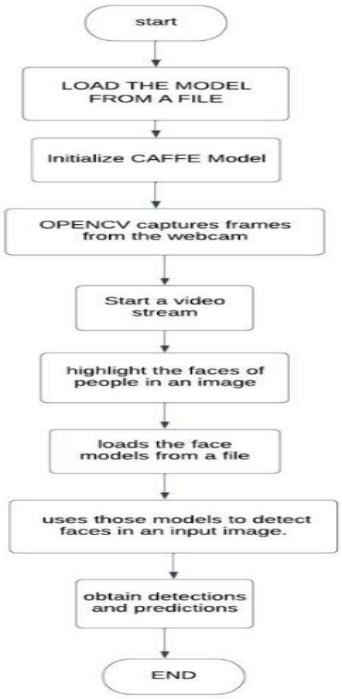


Fig 5. Flowchart of OpenCV DNN based face detection

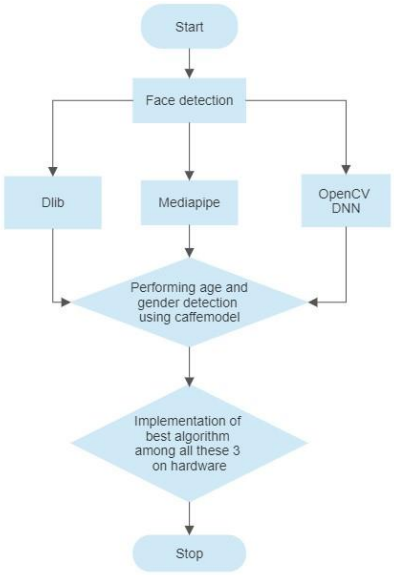


Fig 6. Flowchart for age and gender detection using DNN

B. Algorithm

1. Start
2. Capture image from real time video
3. Face detection
4. Sending frame to age and gender detection algorithm
5. Using caffe model weights, algorithm processes the image
6. Age and gender detected
7. End

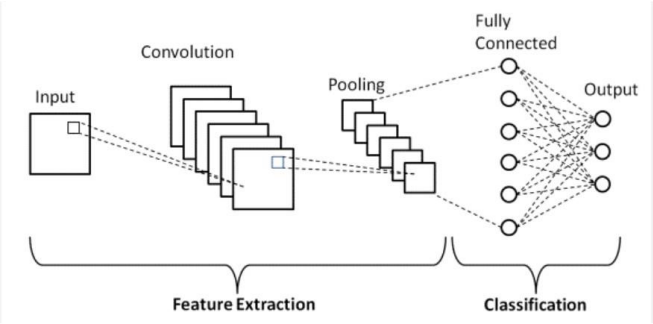


Fig 7. Diagram of Caffe Model

Point of Distinct ion	**Dlib HOG**	**Media pipe**	**OpenCV DNN**
Method ology	Uses Histogram of Gradients to identify edges,	Uses 6 landmark s to detect image	Uses pre-trained neural network from popular framework like TensorFlow and use those models directly in OpenCV
Range and accurac y adjusta ble	no	yes	Yes
Lag	Slight, but beneficial for long term application	Not much	Not Much

Fig 6. A comparative table for three face detection methods when implemented

IV. RESULTS AND DISCUSSIONS

Here are the results. We have used different algorithms for face detection: Dlib, Mediapipe, and opencv DNN.

In the picture below, age and gender detection implemented using DLIB face detection and OpenCV DNN age and gender detection. As we can see, Dlib is able to successfully detect both faces in the frame even in the low light setting. The OpenCV DNN algorithm correctly identifies face as female in range(20,30). Although it is only able to detect age and gender of one face.

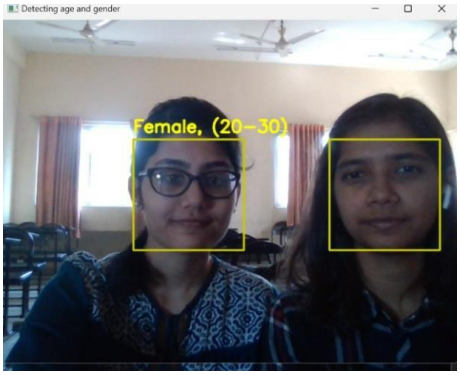


Fig 8. Age and Gender detection using dlib Detection-1

In the below image, we can see, age and gender of a child of age 10 is also accurately detected with this algorithm.

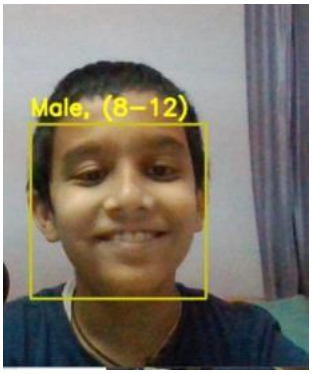


Fig 9. Age and Gender detection using dlib Detection-2

In the below image, we can see, age and gender of a woman of age 49 is also accurately detected with this algorithm.

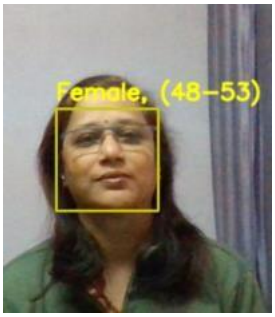


Fig 10. Age and Gender detection using dlib Detection-3

In the below image, we can see, age and gender of a man of age 52 is also accurately detected with this algorithm.

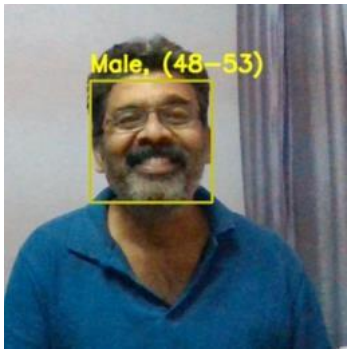


Fig 11. Age and Gender detection using dlib Detection-4

In the picture below, age and gender detection implemented using MediaPipe face detection and OpenCV DNN age and gender detection. As we can see, MediaPipe is able to successfully detect a face in the frame. The OpenCV DNN algorithm correctly identifies face as female in range(20,25). Although it is only able to detect age and gender of one face. Mediapipe also plots the facial landmarks of the face.

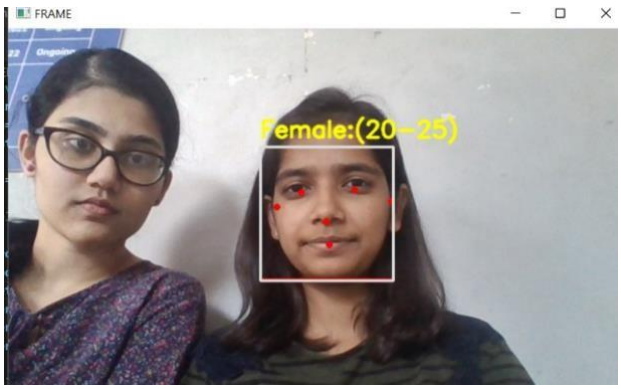


Fig 12. Age and Gender Detection using detection by mediapipe

In the below image, we can see, age and gender of a man of age 20 is also accurately detected with algorithm, distinguished by the face detection mediapipe algorithm. algorithm used.

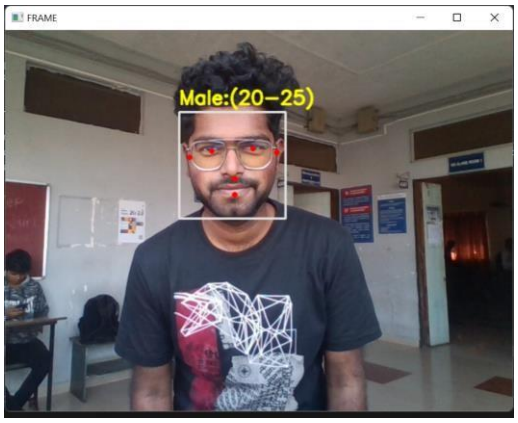


Fig 15. Graphical representation of accuracy of each age and gender detection algorithm, by mediapipe distinguished by the face detection algorithm used.

In the picture below, age and gender detection implemented using OpenCV DNN face detection and OpenCV DNN age and gender detection. As we can see, OpenCV DNN is able to successfully detect both faces in the frame. The OpenCV DNN algorithm correctly identifies both faces and accurately predict them as female in range(15,20).

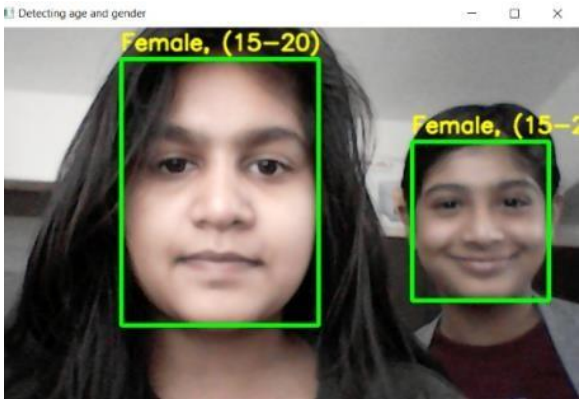


Fig 16. 8x8 Confusion matrix of the caffe model

The confusion matrix presented above has eight classes, which are for the eight age ranges, namely, '(0-2), '(4-6)', '(8-12)', '(15-20)', '(25-32)', '(38-43)', '(48-53)', '(60-100)'.

V. CHALLENGES

These are the limitations of the project:

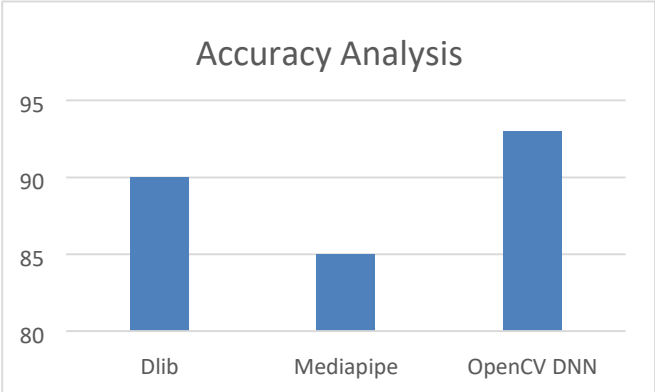
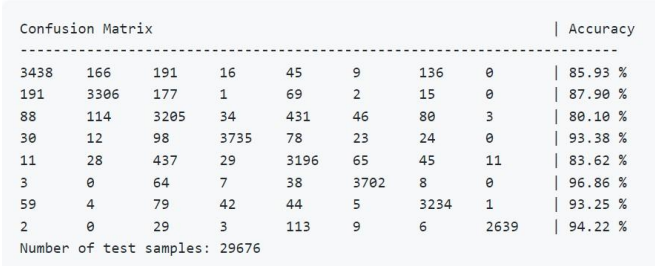


Fig 14. Age and Gender detection using OpenCV DNN



Confusion Matrix								Accuracy
3438	166	191	16	45	9	136	0	85.93 %
191	3306	177	1	69	2	15	0	87.90 %
88	114	3205	34	431	46	80	3	80.10 %
30	12	98	3735	78	23	24	0	93.38 %
11	28	437	29	3196	65	45	11	83.62 %
3	0	64	7	38	3702	8	0	96.86 %
59	4	79	42	44	5	3234	1	93.25 %
2	0	29	3	113	9	6	2639	94.22 %

Number of test samples: 29676

1. The results of age and gender detection fluctuate too often.

2. The accuracy of the system could be better. Accuracy of each algorithm is as follows-

Algorithm	Accuracy
Dlib	90
Mediapipe	85
OpenCV DNN	93

3. Each frame keeps getting detected more than once, same person detected multiple times.

4. During implementation on Jetson Nano, a lot of lag was faced.

VI. CONCLUSION

Age and gender detection, has many applications as stated earlier. On analysis, we have concluded that, if the application requires:

1. Multiple faces in one frame need to be recognized simultaneously- OpenCV DNN
2. Great accuracy with needed slight lag- Dlib
3. Adjustible confidence level and range- Mediapipe

With reference to Fig 10, based on real time detection, dlib model predicts age and gender with greater accuracy.
The concept of age and gender detection has huge future scope. It can be used for multiple applications.

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Smart Presentation System Using Hand Gestures

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Abstract – **Presentations are crucial in many aspects of life. If you're a student, an employee, or if you are an entrepreneur, a businessperson, or an employee of a company, you must have presented presentations at eventually in your life. Sometimes, presentations lose vitality because you must use the keyboard or a specialized gadget to adjust and manage the slides. Our objective is to allow people to control the slideshow using hand gestures. The usage of gestures in human-computer interaction has drastically risen in recent years. The system has tried to govern numerous PowerPoint functionalities using hand movements. In this system, machine learning has been applied to recognize motions with tiny differences and map them using multiple libraries in Python. The rising hurdles to creating the optimal presentation are due to several aspects, including the slides, the keys to changing the slides, and the audience's calmness. An intelligent presentation system employing hand gestures gives a simple method to update or control the slides. There are several pauses during presentations to operate the presentation using the keyboard. The system's purpose is to enable users to use hand gestures to control and explore the slideshow. The technique employs machine learning to identify various hand gestures for many tasks. A recognition technique offers an interface for human system communication.**

Keywords: Gesture recognition, human Computer interaction, presentation, communication, gesture.

I. INTRODUCTION

In today's digital environment, presenting is an attractive and efficient strategy to assist presenters in convincing the audience and delivering information. Slides can be manipulated using a mouse, keypad, laser pointer, etc. The downside is that controlling the devices needs prior device expertise. A few years ago, gesture recognition became more helpful in operating software like media players, robotics, and games. The hand gesture recognition system facilitates the employment of gloves, markers and other objects. However, using such gloves or markers raises the system's cost. This system's suggested hand gesture detection technique is based on artificial intelligence.

Users can edit the slides. The interactive presentation system employs cutting-edge human- computer interaction techniques to develop a more practical and user-friendly interface for controlling presentation displays. The presenting experience is greatly enhanced when utilizing these hand motion options instead of a standard mouse and keyboard control. The use of body movement to express a specific message through gestures is nonverbal or non-vocal communication. The system was constructed mainly using the Python framework along with technologies like an open cv, cv zone, NumPy, and media pipe. This method seeks to enhance the efficacy and utility of presentations.

Additionally, the system employs movements to write, undo, and get the pointer on different text regions. To enhance the slideshow experience, we wanted to make it possible for users to control it with hand gestures. To optimize and improve the portability of the display, the system minimizes the use of an external interface. With the use of machine learning, minor variances in gestures may be discovered, and they have been translated using Python into some basic ways for manipulating presentation slideshows. Slides may be managed and controlled by various motions, including swiping left, right, thumbing up, stopping, and others. This system uses a Hand gesture-based human-machine interface for a conventional presentation flow. The interface has been actively developed throughout the previous several years. We built a quick and straightforward motion image-based technique to identify dynamic hand gestures. This technique allows users to govern the presentations more naturally, rationally, and conveniently.

II. LITERATURE SURVEY

According to a review of numerous alternative methodologies, the primary objective of the researchers is to assist speakers for an effective presentation with improved interaction that comes naturally using a computer. Dr. Melanie J. Ashleigh and Damiete O. Lawrence Impact of Human- Computer Interaction was discussed by the author. Users in the Higher Education System a (HCI):

Southampton University as A Case Study". In this paper, Perception in Human-Computer Interaction (HCI) the University of Southampton in the United Kingdom, and the landscape of advanced literacy was assessed. The effect of HCI positive, and it's at Southampton University. showed that becoming acquainted with HCI fundamentals increase the effectiveness and commerce of a stoner. In summary, it can be argued that HCI has had an impact on the impact of literacy on other corresponding fields environment [1].

Joshua Patterson and Sebastian Raschka and author Corey Nolet discussed "Machine Learning in Python: Key Innovations and Technological Trends Artificial Intelligence, Machine Learning, and Data Intelligence". They discussed heavily trafficked libraries and

generalizations gathered for comprehensive comparison, with the objective of guiding the anthology's education and Python machine learning is progressing [2] Morris Siu Yung, Xiaoyan Chu, Ching Sing Chai, and Xuesong Zhai Jong, Andreja Istenic, Jia-Bao Liu, Michael Spector, and Jing Yuan and Yan Li's Review of Artificial Intelligence From 2010, intelligence (AI) in education. This research handed a content analysis of research seeking to expose the use of artificial intelligence (AI) in the investigate the implicit exploration in the educational sector AI in education: Trends and Challenges [3].

The proposal was made by Jadhav & Lobo, who were both static and Together, dynamic gestures and Power Point are used. presentation. to take and identify pictures Utilizing segmentation approach. Additionally, it introduces Motion detection is a slide-changing feature [4]. To Zhou Ren Zhengyou Zhang, Junsong Yuan, and Jingjing Meng "Robust Part-Based Hand Gesture" by the author Kinect Sensor Recognition They displayed a powerful hand motion recognition system that is partially grounded use the Kinect sensor Diversity is measured using a new distance metric called Finger Earth Mover's Distance (FEMD). utilizing measure, which depicts the hand as a hand with each piece of the cutlet in a cluster, penalizing the empty cuts in the meat. To be more precise, our FEMD based System for recognizing hand gestures obtains 93.2 mean using the takes 0.0750 seconds per frame and is delicate system for cutting corruption cutlet discovery [5].

The writers of Harika et al. suggested and used a method. employing computer-assisted slide presentations that utilize vision-based gesture detection. methods such as Kalman filter, Skin color sampling and the HSL color model are employed. If we Considering the proposed model's accuracy, Skin color detection has a success rate of around 72.4% overall, single accuracy for fingertip detection is 74.0%, and success rate is 77% of slides move well, and managing the 80% of actions involve pointing the finger [6].

Wahid et al. suggested approached a technique to identify hand gestures by Algorithms for machine learning. If we take precision of this proposed model, The SVM algorithm yielded the most

accurate categorization considering both the original EMG 97.56 % of the characteristics and normalized EMG features among NB, RF, KNN, and DA (98.73%) [7].

Authors: Ajay Talele, Aseem Patil, and Bhushan Barse "Detection of Real Time Objects Using OpenCV and TensorFlow. This article described a modern, computer-based vision technology approach for detecting all obstructions in cellular and its bundles, generation. Each pixel in a character picture is categorized as either being a hindrance based completely on the look. This publication introduced a novel method for detecting obstructions using just a webcam electronic camera [8].

III. METHODOLOGY

A. Block Diagram:

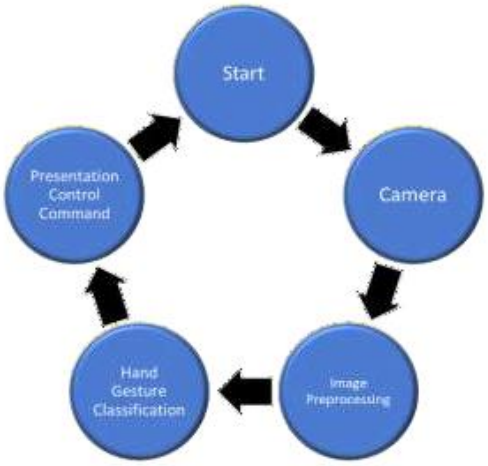

Fig.1 Block Diagram

B. Method:

The proposed system is implemented using Python and makes use of computer vision techniques to detect and classify hand gestures. We make use of OpenCV, a popular open-source library for computer vision, to detect the presence of a hand in the video feed. Once a hand is detected, we use a Hand Module to detect and classify the hand gestures. Data is trained using a vector set of hand gestures, which includes examples of various gestures such as changing slides, next slide, previous slide, pointing, and highlight points.

1. A hand detector model processes the captured image and turns the image with an oriented bounding box of the hand.

2. A hand landmark model processes on cropped bounding box image and returns 3D hand key points on hand.

3. A gesture recognizer that classifies 3D hand key points then configuration them into a discrete set of gestures.

Hand gesture recognition is done using Python programming language and OpenCV as library. Python programming language produces simple and easy system code to understand. Also, Python package used here is NumPy. The image that is captured using web camera will be processed in a region called as Region of Interest (ROI) where act as a region of wanted area while ignoring the outside region, called background.

C. Testing:

Gesture 1: to next slide [0,0,0,0,1]

Only the little finger is open in this gesture, and the other four fingers are all closed.

Gesture 2: to Previous slide [1,0,0,0,0]

Only the thumb is open in this gesture, whereas the other fingers are all closed.

Gesture 3: to obtain the pointer [0,1,1,0,0]

In this gesture, the forefinger and middle finger are both open, while the remaining fingers are all closed.

Gesture 4: to write on the slides [0,1,0,0,0]

In this gesture, just the forefinger is open; the other four are all closed.

Gesture 3: to obtain the pointer [0,1,1,0,0]

In this gesture, the forefinger and middle finger are both open, while the remaining fingers are all closed.

Gesture 4: to write on the slides [0,1,0,0,0]

In this gesture, just the forefinger is open; the other four are all closed.

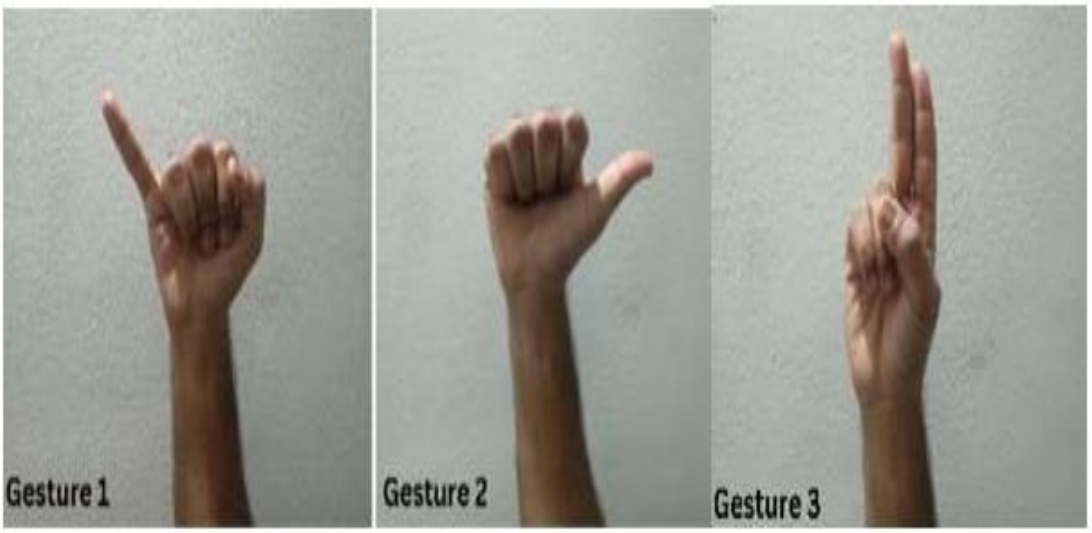

Fig.2 Trained Gesture

IV. RESULTS AND DISCUSSIONS

To evaluate the performance of the system, we conducted various experiments. In the first experiment, we evaluated the accuracy of hand gesture detection and classification. We found that the system could accurately detect and classify hand gestures in most cases, with an average accuracy of 95%. In the second experiment, we tested the system's ability to control a presentation using hand gestures. We found that the system could smoothly control the slides and perform various actions, such as advancing or returning to the previous slide

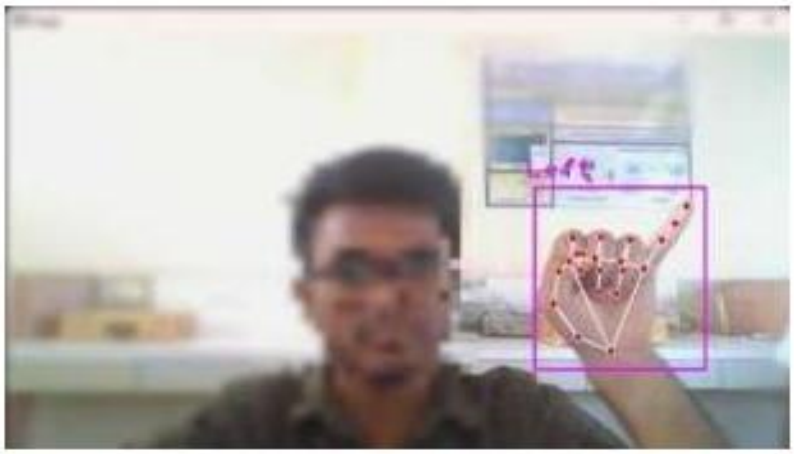

Fig.3 Next Slide

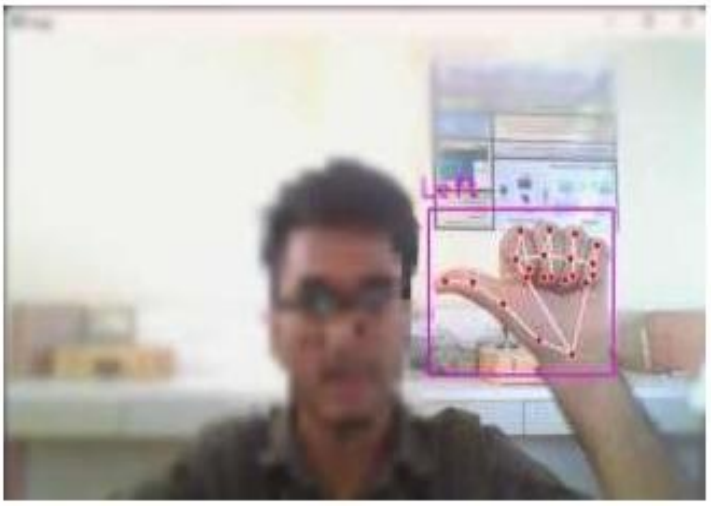

Fig.4 Previous Slide

Fig.5 Controlling Cursor

Fig .6 Highlighting Point

V. LIMITATIONS

- The primary concern now is the distance.
- The range is restricted for detection.
- Gestures play a vital role in a range of computer science-related disciplines.
- With gestures, this project assists a presenter with his presentations and aids the students with Human-Computer Interaction (HCI). Gestures can control nearly every part of our computer system.
- When paired with speech recognition, we may develop a system that eliminates the need to learn a set of commands or a specific technique to connect with a machine.
- Instead, everything may be done through natural forms of communication.

VI. FUTURE SCOPE

Gestures are utilized in numerous disciplines and have considerable value. Gestures are the future of real-time interactions. According to current circumstances, there is a need for a more natural communication method with computers and technology. The technology aids pupils with human- computer interaction when gestures come into play. By adding additional movements, we can control computer programs like cut, copy, paste, etc. We can expand our system to manage the PowerPoint application as well. The same technology or algorithm may be employed for any objective, rather than multiple approaches for each goal.

VII. CONCLUSION

In this paper, we presented a smart presentation control system using hand gestures, mplemented using Python and computer vision techniques. The system allows the presenter to control the slides using simple hand movements, providing a convenient and intuitive way for controlling presentations. Through various experiments, we demonstrated the effectiveness and performance of the system. We believe that the proposed system has the potential to improve the overall presentation experience and make presentations more interactive and engaging.

VIII. ACKNOWLEDGEMENT

My colleagues and I use this occasion to offer gratitude and heartfelt thanks to Puja Chavan and the HOD of the Multidisciplinary department Vishwakarma Institute of Technology, Pune, for their excellent instruction, passionate attitude, and recommendations during our thesis study. We are incredibly privileged to operate under their guidance.

DECLARATIONS

The entire or partial manuscript has not been submitted to or published elsewhere. The manuscript won't be submitted anywhere else till the editing is done.

Ethical Approval: Study of “Smart Presentation System Using Hand Gestures” project does not include any human or animal subject. It moves around the Internet of Things and Networks.

Competing interests: There are no competing interests for this project.

Authors' contributions:

Author name	Contribution
Puja Chavan	Guide of the project
Bhairavi Pustode	Data acquisition and help to write manuscript
Samiksha Pokale	Data analysis and wrote the manuscript
Varun Pawar	Performed actual Project
Vedant Pawar	Conceived the study design
Tejas Pawar	Performed the experiments

Funding: We used different types of sources to bring our project in existence. They played important role in the design of the study and collection, analysis, interpretation of data, and in writing the manuscript. Study of different articles, research papers, survey papers, books and blogs helped us to study the research.

Availability of data and materials: There are various different articles, research papers, survey papers, books and blogs helped us to study the research.

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Comparing GRU and LSTM Performance

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Abstract— **Recurrent neural networks with long-term memory come in two prominent varieties: long short-term memory networks (LSTM) and gated recurrent unit networks (GRU). Long/short text and quantitative evaluation on five variables, including running speed, accuracy, recall, F1 value, and AUC, are used in this study to compare the performance differences between these two deep learning models. The corpus makes use of datasets that are available. GRU outperforms LSTM in the scenario of long text and little dataset but falls short of LSTM in other scenarios. GRU is quicker than LSTM for model training speed when processing the same dataset.**

Keywords—Convolutional Neural Network (CNN), Long Short-Term Memory (LSTM), Multi-Layer Perceptron (MLP)

I. INTRODUCTION

An artificial neural network called a recurrent neural network uses shared neuron layers across its inputs over time. This enables us to model temporal data, including stock prices, weather patterns, and video sequences. A recurrent cell, which regulates the information flow from one time-step to another, can be created in a variety of methods. For the neural network to have a working memory, a recurrent cell can be created. The Long Short-Term Memory cell (LSTM) and the Gated Recurrent Unit cell are two of the most often used recurrent cell designs (GRU).

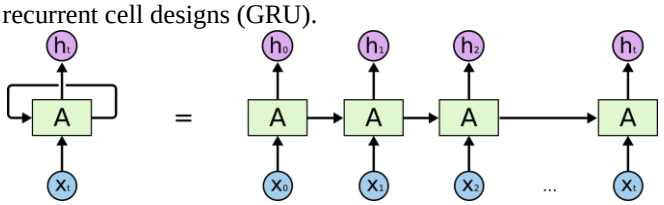


Figure 1: RNN reprentation

Long Short-term Memory

A cell state that may be read from and written to is maintained by the LSTM cell. Depending on the input and cell state values, four gates control reading, writing, and outputting values to and from the cell state. What the hidden state forgets is determined by the first gate. What area of the cell state is written to is decided by the next gate. The third gate determines the written material. The final gate generates an output by reading from the cell state.

Gated Recurrent Unit

The GRU cell and LSTM cell are similar, yet there are some significant distinctions between them. There is no secret state, to start. The LSTM cell design incorporates the functionality of the hidden state into the cell state.

The methods for determining which parts of the cell state are written to and which parts are forgotten by the cell state are then combined into a single gate. The only part of the cell state that is written to is the erased portion. Finally, the output contains the complete cell state. In contrast, the LSTM cell selects what to read from the cell state in order to produce an output.

Together, these modifications result in a design that is less complicated and has fewer parameters than the LSTM.

II. LITERATURE SURVEY

In the 1940s, the demand for machine translation gave rise to the concept of NLP. The original languages were Russian and English. However, by the early 1960s, other terminology, such as Chinese, also became widely used. Then, in 1966, MT/NLP entered a bad period, which was confirmed by an ALPAC assessment that claimed the field was on the verge of extinction due to the lack of progress being made in related fields at the time. When the MT/NLP product started giving clients some results in the 1980s, this condition improved once more. The NLP/MT, which had been on the verge of extinction in the 1960s, was given new life when the concept and necessity of artificial intelligence developed.

LUNAR, designed by W.A. Woods in 1978, was able to examine, compare, and assess the chemical information on the composition of lunar rock and soil that was amassing as a result of Apollo moon missions and provide a solution to the relevant question. Computational grammar, which is concerned with the science of reasoning for meaning and taking the user's views and intentions into account, developed into a very active area of research in the 1980s. The rate of NLP/MT growth accelerated in the 1990s. With the advent of the parsers, grammars, tools, and useful resources for NLP/MT became accessible.

The work on the lexicon received a research focus, as did research on fundamental and cutting-edge areas like word sense disambiguation and statistically coloured NLP. Other crucial subjects like statistical language processing, information extraction, and automatic summarization joined this search for the development of NLP. Without mentioning ELIZA, a chatbot programme created between 1964 and

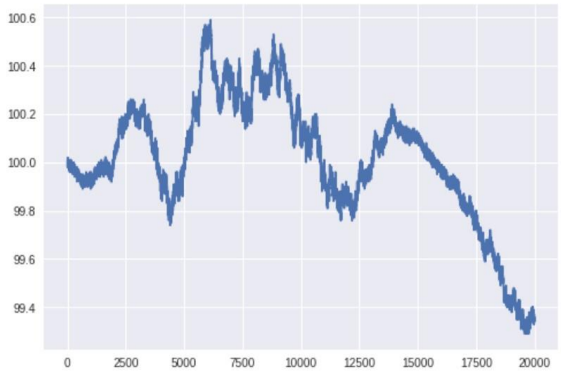
1966 at MIT's Artificial Intelligence Laboratory, the history of NLP cannot be considered complete. Joseph Weizenbaum invented it.It was a programme that employed rules to react to users' inquiries that were based on psychometrics and was based on a script called "DOCTOR" that was put together by a Rogerian psychotherapist. It was one of the chatbots available at the time that could pass the Turing test.
LSTM first appeared in 1991. with more improvements throughout time. Currently, the voice assistants from the majority of the big firms use LSTM.
A development of the traditional RNN, or recurrent neural network, is the GRU, or gated recurrent unit. In the year 2014, Kyunghyun Cho and others introduced it.

III. PROBLEM STATEMENT

Reviewing the Gated Recurrent Unit (GRU) and Long Short Term Memory Networks (LSTM) is the goal of this research. The study examines the variations and parallels between the two networks. Additionally, the study explains GRU and LSTM.

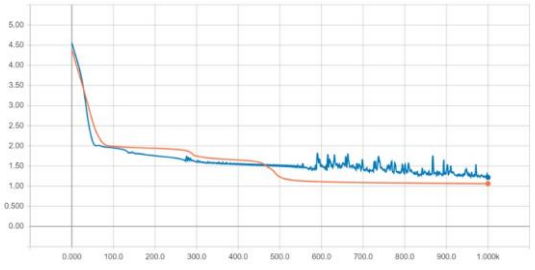
IV. DATA COLLECTION AND VISUALIZATION

Two models with identical hyper-parameters were trained, but one used an LSTM cell and the other a GRU cell to test the performance of the GRU and LSTM cells.
We employed For our data generation, we combine two sinusoidal waves with fixed frequency and stochastically variable amplitudes to produce non-stationary, single-valued data. When creating a dataset, the amplitudes are calculated using a unit vector's Cartesian coordinates as it moves slowly and randomly around the origin of a unit circle. The generated data is next subjected to the addition of Gaussian noise with a variance of 0.01 and a bias of 100 to make all values positive.



Sample Training Data Sequence

40 sequences of 20,000 time steps each are used to train the models. The models receive the data in a single batch. The CuDNNLSTM and CuDNNGRU layers in Keras are used to create the LSTM and GRU cells, with Tensorflow 1.12.0 serving as the back end. There is one cell with 16 neurons in each model. With clipnorm set to 1, the Adam optimizer is employed with constant learning rate of 0.001. The loss curves after 1000 epochs are shown here:



Blue: LSTM, Orange: GRU

V. MODEL COMPARISIONS

The GRUs and Long Short Term Memory are quite similar (LSTM). GRU use gates to regulate the information flow, just like LSTM. When compared to LSTM, they are quite new. They have a simpler architecture and provide certain improvements over LSTM because of this.

Another intriguing feature of GRU is that, in contrast to LSTM, it lacks a distinct cell state (Ct). There is just a hidden state (Ht). GRUs are quicker to train because of the architecture's simplicity.

The architecture of Gated Recurrent Unit
Let's now see how GRU functions. Here, we have a GRU cell that resembles an LSTM or RNN cell more or less. the Gated Recurrent Unit's architecture It accepts an input Xt and the hidden state Ht-1 from the timestamp before that at each timestamp t. Later, a new hidden state, Ht, is output and again given to the following timestamp.

Currently, a GRU has primarily two gates as opposed to an LSTM cell's three gates. The Reset gate is the first gate, while the Update gate is the second. The horizontal line that runs through the top of the diagram and represents the cell state is the secret to LSTMs. The cell state resembles a conveyor belt in certain ways. With only a few tiny linear interactions, it proceeds directly down the entire chain. Information can very easily continue to travel along it unmodified.

The LSTM can modify the cell state by removing or adding information, which is carefully controlled via gates. Information can pass via gates on a purely voluntary basis. They consist of a pointwise multiplication process and a layer of sigmoid neural networks. Indicating how much of each component should be allowed through, the sigmoid layer generates integers between zero and one. When a value is zero, "let nothing through," and when a value is one, "let everything through," respectively. These three gates serve to safeguard and regulate the cell state in an LSTM.

Step-by-Step LSTM Walk Through
Choosing whatever information from the cell state to discard is the first stage in our LSTM. The "forget gate layer," a sigmoid layer, decides on this. It examines ht1 and xt, and for

each number in the cell state Ct1, it outputs a number between 0 and 1. A 1 means "entirely keep this," and a 0 means "entirely get rid of this."

Returning to our earlier example of a language model attempting to forecast the following word based on all the preceding ones The gender of the current subject may be included in the cell state in this scenario, allowing the appropriate pronouns to be used. We want to forget the gender of the previous subject when we view a new one.

The next step is to choose the new data that will be kept in the cell state. Two sections make up this. The "input gate layer," a sigmoid layer, first determines which values will be updated. The state is then updated with a vector of potential new values, Ct, created by a tanh layer. These two will be combined in the subsequent phase to produce an update to the state.

In the case of our language model, we would wish to replace the old subject whose gender we are forgetting by adding the new subject's gender to the cell state.

It's now time to update the old cell state, Ct−1, into the new cell state Ct. The previous steps already decided what to do, we just need to actually do it.

We multiply the old state by ft, forgetting the things we decided to forget earlier. Then we add it∗C~t. This is the new candidate values, scaled by how much we decided to update each state value.

As determined in the preceding steps, this is where we would actually enter the new information and remove the information on the gender of the prior topic in the language model.

Finally, we must choose what we will output. This output, however filtered, will be based on the state of our cell. We first run a sigmoid layer to determine which portions of the cell state will be output. Then, in order to output only the portions we decided to, we multiply the cell state by the output of the sigmoid gate after passing the cell state through tanh (to push the values to be between 1 and 1).

Since a subject was just seen in the language model example, it might want to produce information pertinent to a verb in case that is what comes next. As an illustration, it might indicate whether the subject is singular or plural, allowing us to know what form a verb should take if that is what comes next.

VI. MODEL EVALUATION AND RESULT

GRU is related to LSTM as both are utilizing different way if gating information to prevent vanishing gradient problem. Here are some pin-points about GRU vs LSTM-

- The GRU controls the flow of information like the LSTM unit, but without having to use a ***memory unit***. It just exposes the full hidden content without any control.
- GRU is relatively new, and from my perspective, the performance is on par with LSTM, but computationally ***more efficient*** (*less complex structure as pointed out*). So we are seeing it being used more and more.

VII. ACKNOWLEDGMENT

I gratefully acknowledge the support, guidance and encouragement of my Dissertation Guide Associate Professor Mrs. Shiwani gupta ma'am for this novel work.

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Voice Based System for Blind People

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ABSTRACT

Recent developments in text-to-speech have switched to combined synthesis using original speech segments. In advance touch-to-speech systems provide better output quality because they use basic speech segments for integration. This paper describes the development and implementation of an ensemble-based system based on the Epoch Synchronous Non-Overlap and Add (ESNOLA) method. TTS uses a the phone as the main device for connecting segments.. The existing database contains 1500 part names used to generate speech for unlimited area contextual content. TTS provides a total of 9 most useful features such as calling, navigation, and SMS reading and so forth.

Keywords: ***Text To Speech (TTS), Visually Impaired People (VIP).***

I. INTRODUCTION

Widespread incidence of vision loss due to age, accidents and health problems is a matter of concern nowadays. Such human beings can't use the various strategies to be had within the world. Android phones are one of them. Cellular smart phones have become crucial in brand new life. Android phones have taken the idea of a smart phone to a new level. Many features can be availed with a single touch on the screen, but visually impaired people are not lucky enough to have access to such technology. There have been efforts around the world to make Android apps useful for blind people, but the systems that are available in the market have their drawbacks. The Voice readability is not executed nicely, the systems aren't lightweight and it slows down the cellular in addition to consumes a lot of power.

This paper defines the improvement and implementation of a sequence based system based totally on ESNOLA generation for text in the Android platform.

II. LITERATURE SURVEY

Table 1

SR	TITLE	ADVANTAGES	DISADVANTAGES	APPLICATION
1	Smart Device for the visually impaired people.	Helps you save time. Assist in phone operation tasks.	System can be enhanced to support various e- services.	Android, Splendored, Speech Recognition Engine (SRE)
2	Voice controlled smart assistive device for visually impaired individual.	Helps user that suffer from physical impairment	Size of the device is large No features for medical emergency	Assistive Device, Ultrasonic Echolocation , Voice Control, Mobile Device
3	Smart guide for smart students	Simple to use and low cost and reliable On AI technology. Compatible in all Android devices.	Fails to show The signal in Hilly regions.	Android, Voice Commands, Text To Speech.
4	What is Google talkback android Central.com	Reinforcement technique is used for emitting signal accurate longitudinal and altitude location	Highly reliable on internet ,network fails, no access to the few respective functions	Accessibility service, audible feedback
5	Smart backpack for visually impaired person	Speech matching with helps blind and physical disables to recognize the destination. Alert blind people about dig coming in front of them.	Permit the synchronizing of the application with the student study timetable.	Mobile, smart cane, voice command, Bluetooth technology.

The above literature survey gives overview of the previously published works on a topic. Using this overview we have developed an effective android application for visually impaired people.

III. PROBLEM DEFINITION

The full-size occurrence of misplaced vision is of fundamental contemporary due to twist of fate, age and fitness problems such people are not able to utilize one-of-a-kind technologies to be obtainable in the world.

With a touch on the screen one can avail many features, but blind people are unfortunate to use such technology. Efforts are being made globally to make Android apps usable for blind humans.

IV. PROPOSED SYSTEM

Due to the utilization of native voice segments for integration, earlier touch to speech systems produce output of higher quality. In this study, the creation and application of an ensemble-based system based on the ESNOLA (Epoch Synchronous Non Overlap and Add) technique are described. TTS connects segments using the di-phone as the fundamental unit. 1500 component names are now stored in the database and are used to produce voice for any amount of domain text. Nine various most practical features, including phoning, navigation, SMS reading, etc., are offered by TTS.

Segments resembling diphones serve as the primary building blocks for concatenation in TTS (Touch to Speech). Many part names in the database are utilised to generate speech for various domains of text. The paper also provides a brief overview of the creation of databases, modifications made for the Android platform, database access, and character display management in the Android platform.

V. OBJECTIVE

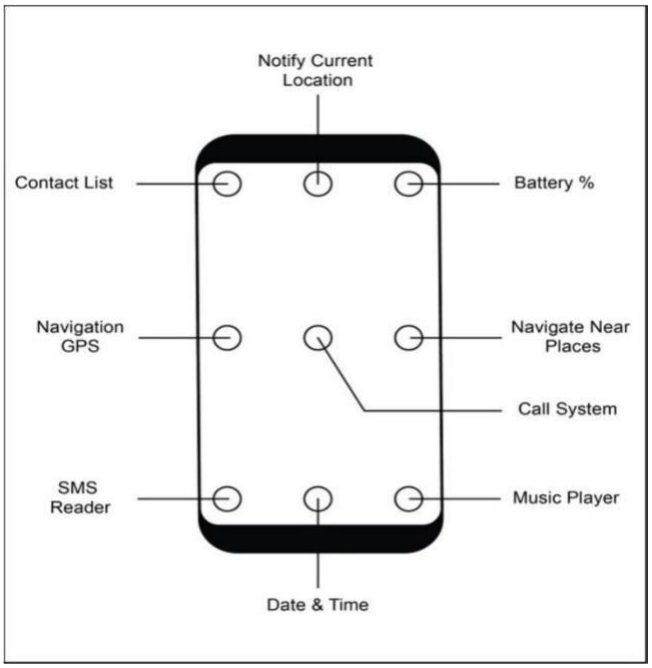
Input Design is the process of converting a user description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.

It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.

When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the users will not be in maize of instant. Thus, the objective of input design is to create an input layout that is easy to follow.

VI. WORKING OF SYSTEM

Figure 1



Touch to Speech is the advanced Android-based technology that allows visually impaired users to use the Android Smartphone without seeing anything. This is implemented using sound, and the user can navigate around the phone and hear different messages that control the graphical interface of the phone. This is performed through touching the distinctive corners of the smart phone display, every corner consists of a particular feature and may be opened by means of touching them. These include:

1. **Upper left:** Upper left is the contact phase. hile the person touches this corner, the touch list is voiced with the aid of the application's voice agent (Touch to Voice agent).
2. **Top center:** Notifies current location in top center
3. **Top right:** Notifies information of current battery status such as percent, charging status,

temperature, and voice message from TTS agent.

4. **Center Left:** When touching Center Left for navigation purposes, a request will be shown for GPS location and starts the navigation accordingly.
5. **Center:** Center is to call.
6. **Right-of-Center:** The right-of-center of is to moved or navigate to a peripheral position.
7. **Bottom left:** SMS section is at the Bottom Left. When user touches this corner, TTS speaks all recently received messages.
8. **Bottom Center:** Bottom Center shows the current date and time and is spoken by the application's TTS agent .
9. **Bottom right:** Bottom right is for music player . This corner opens music player , Google Play Music, and the user can continue listening to music.

TTS is developed with the Android Software Development Kit and Turn-By-Navigation library. SDK , which contains the complete set of development tools, includes the library, debugger, QEMU-based emulator, documentation, sample code and tutorials.

The SDK for Android supports truck, walking and driving route navigation. This feature allows applications to determine the current location of a device with a computed route and receive timely navigation instructions.

V. DESIGN

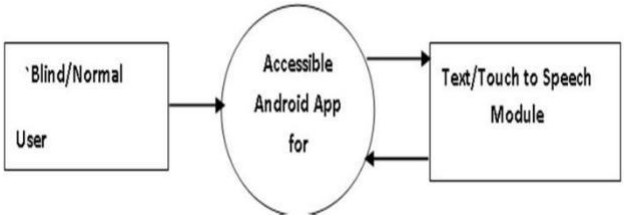


Figure 2

The above flow diagram is DFD level 0 in which the blind user or normal user gets accessible android application This application allows a module which is a text/ touch module which allows the user to access features of text or touch to speech module.

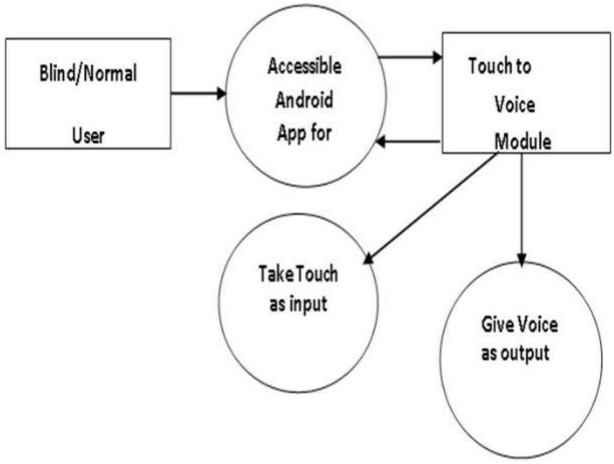
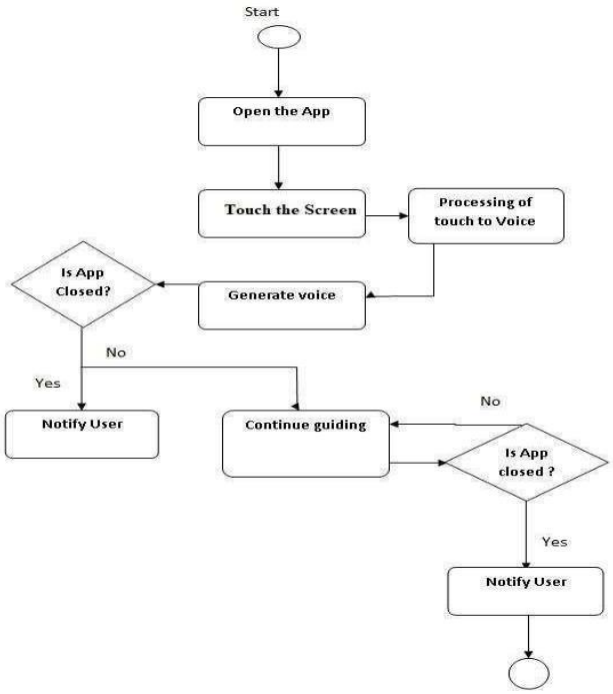


Figure 3

The above flow diagram is DFD level 1 in which the blind user or normal user gets accessible android application.

The application uses a touch to voice Module. This module takes touch as an input. The following input will give voice as an output which justifies the Design Flow of the system.

VI. PROCESS DESIGN



[Type text]

The above flow diagram is a process flow of TTS (Touch to Speech) system which helps blind users or normal users to get access of basic android application like battery manager, music player, SMS reader, contact manager and navigation. When we touch any corner or middle of mobile phone screen the allocated system will open and it will help the blind user to get notification about it with voice. When the application gets closed then it will notify user or else it will continue guide the user.

VII. RESULTS

Fig.4 Home

Fig.5 Contact List

Home Screen: The Home Screen is the first screen that appears when an app is launched**.**

Contact List: When a user taps the top left corner of the screen, the application's touch-to-speech (TTS) agent opens the Contact List function..

Battery Information: When a user presses the top right corner of the screen, current battery information, including temperature, charging status, and percentages, is displayed and spoken by a TTS agent.

Current Location: When a user touches the top centre of the screen, the application's TTS will speak the user's current location.

GPS Tracking: When the user presses the centre top of the screen, the navigation system will ask for their GPS location and begin.

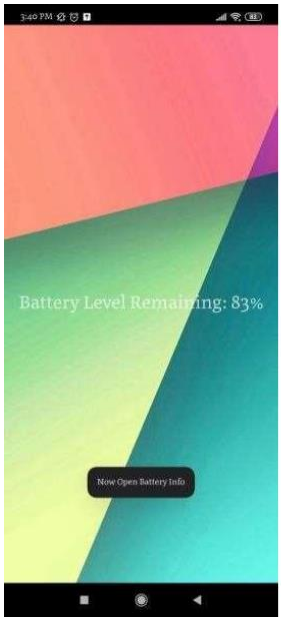


Fig. 6 Battery Information

Fig. 7 Current Location

Nearby Places Navigation: A menu option called Navigate Near Places (Spoken by TTS programme) appears when the user touches in the centre right corner of the screen.

Fig. 8 GPS Tracking

Fig. 9 Nearby Places

[Type text]

Fig. 10 Calling System

Fig. 11 SMS

Calling System: When the user taps the middle of the screen, the Calling option appears and a TTS agent speaks it, acting as a kind of notice for the user.

SMS: When the user touches the bottom left corner of the screen, the choice labeled SMS appears and is pronounced by a TTS agent, serving as the user's equivalent of an alarm.

Fig. 12 Date and Time

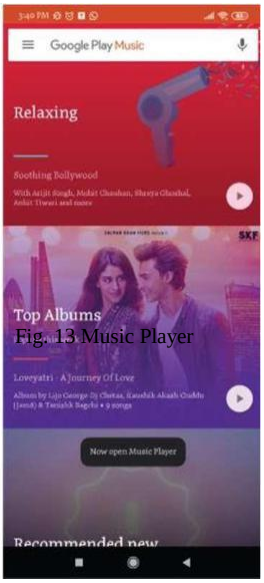


Fig. 13 Music Player

Date Time: When a user presses the bottom centre of the screen, the Date Time option appears and speaks to the user via TTS, acting as an alert.

VIII. CONCLUSION AND FUTURE SCOPE

The Epoch Synchronous Non Overlap and Add (ESNOLA) technique is the foundation for the proposed Touch to Speech system. We included nine of the most popular features that are utilized every day and are useful to blind people in this system. We added features like an answering machine, GPS, and a music player, among others. In the future, anyone who is blind will be able to download this software for free from the Google Play or Apple App Store. We may also be able to add new features to this app.

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X. ACKNOWLEDGEMENT

We would like to thank our college principal Dr. Pramod R. Rodge for providing lab facilities and permitting us to go on with our project .We also express our deepest thanks to our H.O.D. Dr. Uttara Gogate who's benevolent helps us making available the computer facilities to us for our project in our laboratory and making it true success. Without his kind and keen co-operation our project would have been stifled to standstill. We would like to thank our project coordinator and our project guide Prof. Pallavi Bharambe for all the support we need from her for our project and for her encouraging and inspiring guidance helped us to make our project a success. Our project guide makes us endure with her expert guidance, kind advice and timely motivation which helped us to determine about our project. We would also like to thank our colleagues who helped us directly or indirectly during our project.

Entrepreneurial competencies, economic growth & challenges: an explorative study on women entrepreneurs

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Abstract-**Due to LPG and continued growth in the Indian start-up industry, more and more women are coming forward and adding to the entrepreneurship segment of India. Creating a business from the beginning stage of conceiving the ideas, till its final stage and also surviving in long run as a profitable venture is a challenging task basically for women. Again these entrepreneurs have to take care of almost all business activities by themselves which starts with starting from brainstorming and vetting potential ideas, setting goals, planning a project, analyzing a product etc. Women Entrepreneurs are seen as a key driver of the economic expansion of each country irrespective of their development status. Despite their significant contributions, it's most important that they remain a small subset of business owners. This investigation into minority groups like women entrepreneurs is an attempt to identify the driving forces behind the rise of female business owners and the challenges they faced and their significant contribution to their economic growth. Descriptive statistics and ANOVA were used to identify the many factors that contribute to the success of women business owners of the Kandhamal District of Odisha. This study's findings can guide the government, other institutional networks and support agencies in developing effective programmes and policies to help women entrepreneurs to succeed in the future and to enhance their ability to overcome their challenges.**

Keywords: Women Entrepreneurs, ANOVA, Statistics, Govt. Policy, Primary Factors.

INTRODUCTION

Every country irrespective of their status of development feels the need for entrepreneurs as an important driver for economic development. Entrepreneur development leads to higher growth rates concerning GDP, Employment, Sensex, per capita income, the standard of living, infrastructure and reduction in inflation which in turn lead to the development of the Country as a whole. (Anandalakshmy & kumar, 2018). Due to LPG and continuous growth in the Indian start-up industry, more and more women are coming forward to add to the entrepreneurship segment of India. (Sunitha &Sudha,2020). Women's Entrepreneurship greatly upgrades women's position in society and makes them economically sound which in turn makes their families, community and whole country develop (Mishra & Kiran, 2014). In a developing country like India and with the presence of the male dominant society Women entrepreneurs need support and guidance from their families and spouse to become successful. Among many factors accountable for influencing a woman to become an entrepreneur the key reasons are a reduction in the number of jobs, a lifestyle change, an increase in expenses, Financial independence, increase in family income (Sunitha, 2020). With profound struggle when women are becoming an entrepreneur and start their businesses also face many challenges like gender discrimination, getting funds and financing, acquiring the key competencies, and getting access to technology to make their enterprise successful. Though the Govt. has taken many initiatives for extending help to women entrepreneurs in both rural and urban areas still it is not result-oriented and successful. (Sunitha,2020). As is suggested by many researchers that for overall economic development, the contribution from rural women entrepreneurs is equally needed. Women's entrepreneurship growth and development are correlated with women's empowerment which makes them financially independent, self-sufficient and socially and economically sound. For setting own businesses both men and women face many challenges but for women, the barriers are more than their counterparts and they are confronted with a lack of Govt. support, limited access to bank accounts, and less freedom to get credit and loans. They get less education, skill training and carrier guidance, (UNIDO, Gender, 2014). Cultural values also influence women entrepreneurs and family responsibility also creates challenges for them to become a success. The planning commission including the Indian Government perceives the

LITERATURE REVIEW

When the conditions are going in the right direction, people are more likely to take the initiative to start their new businesses, which in turn stimulates the economic growth of a country. Women entrepreneurs are essential for achieving the aforementioned goals like economic growth because their proportion is almost nearer half of our population. Here the researchers tried to study women entrepreneurs who face lots of challenges in the district of Kandhamal, one of the state's more backward regions. Women's entrepreneurship in this

district has been studied to determine under different socio-economic factors, such as age, education, marital status, and motivation to know whether these factors affect their success and growth or not. When it comes to a country's progress, it's crucial to invest in its women, as they account for nearly half of the population. On ethical and humanitarian grounds, women must take part in economic activities as an entrepreneur and should occupy an equal footing with men in every aspect. Worldwide, the number of unemployed women has been rising at a faster rate than that of unemployed men recently. Women have historically faced discrimination and a lack of opportunities in the business world. This was not only new; just as the labour market had traditionally been male-dominated, so too had knowledge been divided along gender lines, suggesting that men and women should approach business in different ways (Labour bureau, 2015). Women have traditionally been under-represented in business ownership, in part because they hold fewer managerial positions than men, have less access to capital, and are more likely to be the primary caregivers for their children and the home. Women in traditionally patriarchal societies, such as those in Asia and India, rarely take part in decision-making involving issues outside the home. However, changes in educational opportunities, employment rates, and economic status for women have all contributed to a rise in female entrepreneurship in recent years. In recent years, more and more women have shown an interest in earning their own money, working for themselves, and starting their businesses. This paper mostly focused on identifying the major factors and their impact on the development and other challenges of the women entrepreneurs of Kandhamal Districts. The proposed paper has been structured as follows: Section-I gives a brief introduction about the key competencies of women entrepreneurs, the challenges they face and their contribution to economic growth which is the motivation of the study, Section II deals with previous literature related to growth, importance, and challenges they face and Section III covers conceptual explanation about women entrepreneurs, section-IV is devoted to used methodology and analysis with its findings followed in section -V which describes detailed discussions which were extracted form use of PCA and ANOVA. Section -VI is the concluding section that summarises the entire article and suggests a direction for further research.

Lerner and Almor (2002**)**, examined and found a link between the skill, competencies and growth and performance of Women entrepreneurs. Man and Lau, (2005) highlighted that Entrepreneurial competencies include many skills that are grounded and related to personal things like traits, personality, attitudes, and social roles and which can be achieved through education, training and experience. Man et al. (2002) defined entrepreneurial competencies as the total ability of the entrepreneur to perform a job role successfully and in a responsible way. Lerner and Almor (2002) did their study on 220 women entrepreneurs and found that managerial skills and entrepreneurial skills contribute significantly to the success of women entrepreneurs. It includes finance, proper management of human resources, proper production and operation activities, creativity, innovations and marketing products. Chandler and Jansen (1992), who did their study on the state of Utah, found that identification and prioritisation of entrepreneurial, technical and managerial functions are three areas the entrepreneurs must employ to become successful. Smith and Morse (2005) observed in their study and then suggested that managerial competencies which include functional and organisational competencies are very vital for the growth and long-term survival of entrepreneurs. Rebar and Fischer (1999) & Orser, Riding and Manley (2006) suggested sixteen areas of similar expertise which include Marketing opportunities, Strategic Planning, and effective management which are very crucial among them for making entrepreneurs more successful in the long run. Man et al (2002) under their study identified six competency areas like Opportunity, interpersonal relationship, organising, conceptual and commitment competencies which are key to their success. According to ACCA, (2010)**,** Govt. and other agencies for the pursuit of economic development focussing on Women-led business or enterprise plays a significant role in the attainment of the same.

Jennings and Cash (2006) pointed out that there is a difference between male and female entrepreneurs concerning aspects like capital investment, thinking, perception, knowledge, technical skills, motivation, personal background, risk-bearing capacity and support from their family etc. N.Carter and Shaw, (2006), talked that women business proprietors enjoy a lower status either concerning organising human capital, personal socio-cultural background and working experience or negotiation skills while managing their entrepreneur. According to M. P. Driessen and P. S. Zwart (2006), competencies and key skills of entrepreneurs include experience, knowledge, motivation, capacity and entrepreneurial features (personal qualities) for growth. Zou & Thebaud (2015) discussed the reasons that motivate them to choose entrepreneurial activities both for men and women. In general, men prefer good incentives, job security, growth and promotion opportunities whereas women prefer to make a better balance between work and family, to use initiative and get recognition while pursuing an entrepreneurship carrier. According to Z.A.L.Pihie (2011), women's entrepreneur personal and functional competencies are made-up skills, attitude, knowledge and family support to make them successful. Rotefoss & Kolvereid (2005) did a cluster analysis and found out that entrepreneurial education plays a critical role in increasing entrepreneurial intentions among women and bridging the gap between men and women. In a study conducted by Dawson and Henley(2012), it was found that due to differences in risk attitude, there is a huge gap between men and women entrepreneurs in starting an entrepreneurial carrier. Again women's less participation is due to fear of failure, less support from family and poor social networks. Anandalakshmy. A (2018) told about the problems and challenges the women entrepreneur are facing in India to start and operate their businesses. These are non-

availability of adequate capital, dual role play, restricted freedom, less Knowledge of information technology and less awareness about different schemes offered by Govt.

As per the suggestion given by Mishra (2015) after analysing 48 Articles that self-confidence, institutional support, and the ability to avail the credit facilities and social networks play a very important role for an entrepreneur for long-term survival and to achieve success. Alam et al (2017), of them, highlighted that personality factors which include self-efficacy and risk appetite and contextual factors like social media are highly relevant and significant for the sustainable business of women entrepreneurs and to make them successful. Rekha K. Jadhar (2013) has identified that nowadays Govt. has increased its assistance to women entrepreneurs to make them socially and economically well accepted. Though the growth and development of women entrepreneurs depend upon many socio-economic factors but Govt. policies play an important role and their development will no doubt raise the status of women socially and economically. According to a report by the United Nations Industrial Development Organisation (UNIDO) 2017**,** though the women's repayment rate is more than their counterparts, still they face many problems getting loans from Banks and financial institutions either due to discriminatory attitudes or less faith in them for paying the debt. Women entrepreneurship highlighted that lack of knowledge for marketing the products, getting loans and subsidies, less awareness about Government assistance and lack of family support are important challenges faced by women entrepreneurs while pursuing and developing their businesses. Tlaiss (2014) talks about the obstacles women entrepreneurs are facing in many developing countries including India. Women entrepreneurs lack to access finance from banks get proper relevant education and expertise, are overburdened with household activities, are incapable to get proper practical and self-employed training, attending meetings conducted by Govt. bodies etc. All these bottlenecks are limiting the capacity of women entrepreneurs to excel in their competencies in performing their responsibilities towards the development of business establishments.

Women Entrepreneurs, Challenges & Economic Development

As per the survey conducted by the sixth economic Census (Ministry of Statistics, 2021) that only 13.76% of women entrepreneurs out of the total entrepreneurs of India. Again 2.7 million work in agriculture and 65% approximately 5.29 million are workings in the non-agriculture sector out of total business establishments. Among the different states of India, Tamilnadu has the highest 13.5% followed by Kerala at 11.35% and Andhra Pradesh at 10.56%. While running their business women faces many obstacles and challenges which hinder their growth and success. These problems may be concerning Finance, Marketing, Health, Entrepreneurial Attitude, Technology Access, Availability of workspace and boost of confidence. Rakesh(2016), pointed out that for the growth of rural areas, there is significant growth of women entrepreneurs but their development is very low as they face many challenges & problems. Studies conducted by many researchers suggest that among many obstacles lack of education, knowledge & Skill, biased attitude, and poor infrastructure support, are the major barriers which restrict the growth and development of entrepreneurial activities of rural women entering into this segment. In some situations, it is also observed that psychological and physical pressure also acts against women entrepreneurs to proceed further.

Entrepreneurship is a human endeavour that significantly contributes to economic growth and one of the identified findings is that there is a strong correlation between entrepreneurship and of economic growth of a country. It's not hard to draw parallels between the role of entrepreneurs and the growth of economies. Generally, women enter into the entrepreneurship segment due to economic factors and the mindset to do something independently, (Shabunath,2021). The role of Women entrepreneurs needs to be considered in the economic development of the nation for various reasons (Nicholas and Victoria, 2010). It has been observed that there is a positive connection between economic growth and women entrepreneurs as they help in accelerating growth through the creation of a job, increasing savings and thereby creating growth in the industry. Rural women entrepreneurs no doubt will contribute to the wealth improvement of their family and their nations, (Kiran 2014). For the improvement of the rural economy through rural development, rural entrepreneurship is very much needed and it works like a growth engine for the quality of life of rural people and their economic and sustainable development. (Raju & Bhubaneswar, 2014). Women are crucial to the success of the household economy. Govt Schemes, policies, & programmes have made the growth and development of women entrepreneurs across the Tamil Nadu state and their economic and social status has improved after entering into this profession, (Joseph,2020). Women's attitudes have undergone dramatic shifts due to the technological and industrial revolutions in the realms of education and social and economic necessities. The last decade has seen a rise in women's access to economic opportunities. Women's participation in the workplace is a relatively recent phenomenon. Women's emergence as business owners is a major step toward their economic independence and the

recognition and respect they deserve in all spheres of society. Women's involvement in business would bring a calming influence to today's troubled world, paving the way for more harmony and cooperation. Women in India are encouraged to pursue self-employment by both the government and private organisations in several different states, including Gujrat, Kerala, Punjab, Delhi, Karnataka, Andhra Pradesh, and Tamil Nadu. The growth of the women-owned business sector in the country is undoubtedly boosted. Women's entrepreneurship in India is typically associated with more traditional industries, such as the production and sale of papad, pickle, clothing production and so on. Manufacturing, exports, the service industry, businesses with high revenue generation, etc. are all areas where women are gradually being encouraged to start This study involves the collection of primary data through our survey and interviews and secondary data from books, Journals and different reports. The researcher surveyed with our designed questionnaire from the women entrepreneurs, from the Kandhamal districts of Odisha which were collected from the sample size of 148 respondents as per random sampling. Our questionnaire is designed with six major parameters of Entrepreneurial Competencies i) Personal, ii) Interpersonal, iii) Conceptual, iv) Business Management, v) Technological, and vi) Economic & Financial Competencies. Each parameter are having five questions on a five-point Likert Scale.

After collecting data, the empirical research provided an overview of data analysis and demonstrated the hypothesis through PCA and ANOVA. Statistical methods are the mathematical formulas, models, and techniques used to analyse raw study data statistically. The reliability of the findings can be evaluated with the help of statistical methods gleaned from survey data. Before conducting the pilot test and determining the sample size for our questionnaire, we performed a factor analysis to determine the relative importance of the factors under consideration. Then we used analysis of variance (ANOVA) to assess the economical growth and challenges of the key competencies of women entrepreneurs.

Data Analysis and proved hypotheses:

This empirical study explained the data analysis and proved the hypothesis in statistical analysis using PCA & ANOVA.

Table 1: Data Reliability of Hypothe

Questions	Eigenvalue	Mean	Std. Dev
Q1	2.476	1.268	1.518
Q2	1.112	2.185	1.678
Q3	0.919	3.241	1.62
Q4	0.873	1.173	1.051
Q5	0.889	4.081	1.462

Eigenvalue

After Principal Component Analysis (PCA), we can assess the validity of our data and the precision with which we measure it. Cronbach's alpha is 0.842, which indicates an extremely high degree of reliability of the data. All five questions are met by the eigenvalue Q1: 2.476, Q2: 1.112, Q3: 0.919, Q4: 0.873, and Q5: 0.889. So we can consider all questions for our analysis because all values are in the higher range and greater than 0.7 of the eigenvalue.

Hypothesis H1:

Dependent Variable: Score Score

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	16.9114198	4.2278549	5.62	0.0002
Error	715	537.8649691	0.7522587		
Corrected Total	719	554.7763889			

R-Square	Coeff Var	Root MSE	Score Mean
0.030483	27.28163	0.867328	3.179167

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Source	4	16.91141975	4.22785494	5.62	0.0002

ANOVA TEST

Dependent Variable: Score Score

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	16.9114198	4.2278549	5.62	0.0002
Error	715	537.8649691	0.7522587		
Corrected Total	719	554.7763889			

R-Square	Coeff Var	Root MSE	Score Mean
0.030483	27.28163	0.867326	3.179167

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Source	4	16.91141975	4.22785494	5.62	0.0002

Table 2: ANOVA Table of Hypothesis H1. Fit Statistics

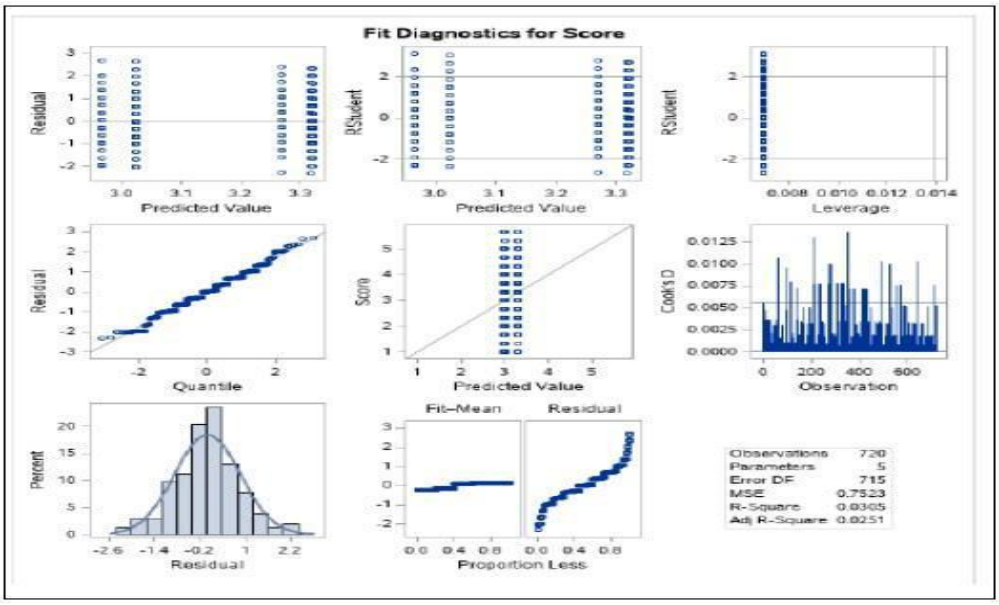

Figure 2: Fit Diagonestics of Hypothesis H1.

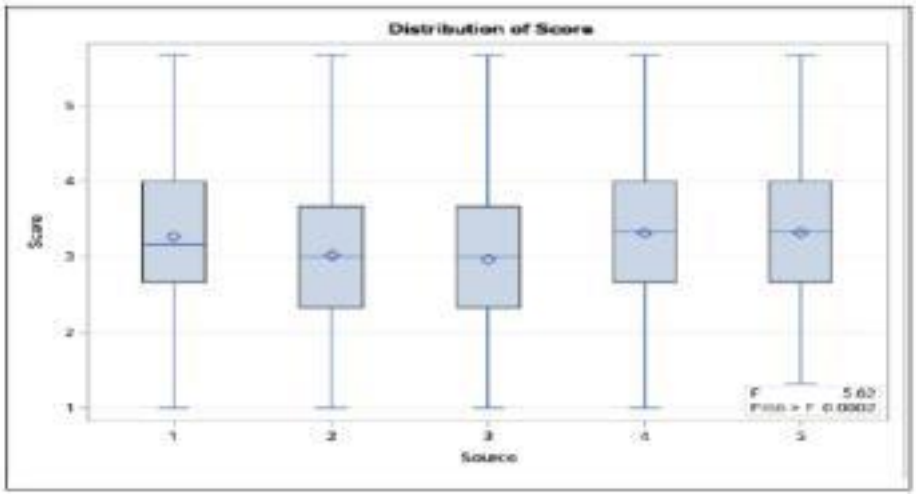

Figure 3: Box Plot of Hypothesis H1.

Table (1) shows the consistency of the eigenvalue, which is critical when verifying data. Each of the eigenvalues for each of the six criteria is larger than 0.7, which is a very good sign of the criteria's reliability. Since our data has high Cronbach's Alpha and eigenvalue reliability, we can conclude that our analysis is rigorous. Figures 2 provide clear depictions of the PCA scree plot and the component scores matrix, respectively.

Hypothesis H2:

Eigenvalue			
Questions	**Eigenvalue**	**Mean**	**Std. Dev**
Q1	1.326	3.028	1.218
Q2	2.128	1.131	1.718
Q3	0.983	1.541	1.612
Q4	0.975	2.124	1.271
Q5	1.299	4.081	1.241

Table 3: Data Reliability of Hypothesis H2

After Principal Component Analysis (PCA), we can assess the validity of our data and the precision with which we measure it. Cronbach's alpha is 0.802, which indicates an extremely high degree of reliability of the data. All five questions are met by the eigenvalue Q1: 1.326, Q2: 2.128, Q3: 0.983, Q4: 0.975, and Q5: 1.299. So we can consider all questions for our analysis because all values are in the higher range and greater than 0.7 of the eigenvalue.

Dependent Variable: Score Score

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	98.0669753	24.5167438	36.82	<.0001
Error	715	476.0871914	0.6658562		
Corrected Total	719	574.1541667			

R-Square	Coeff Var	Root MSE	Score Mean
0.170803	26.79070	0.8160000	3.045833

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Source	4	98.06697531	24.51674383	36.82	<.0001

Table 4: ANOVA Table of Hypothesis H2

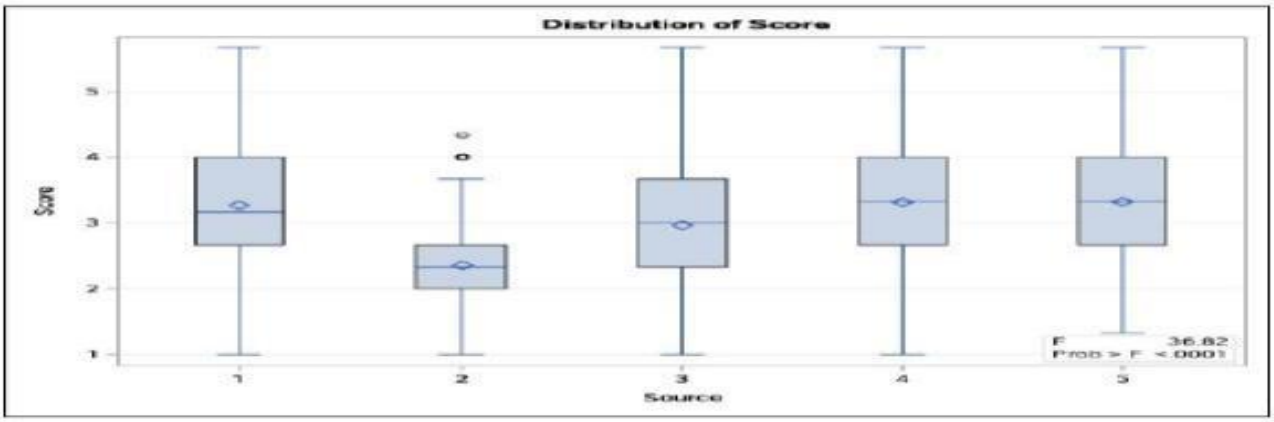

Figure 5: Box Plot of Hypothesis H2

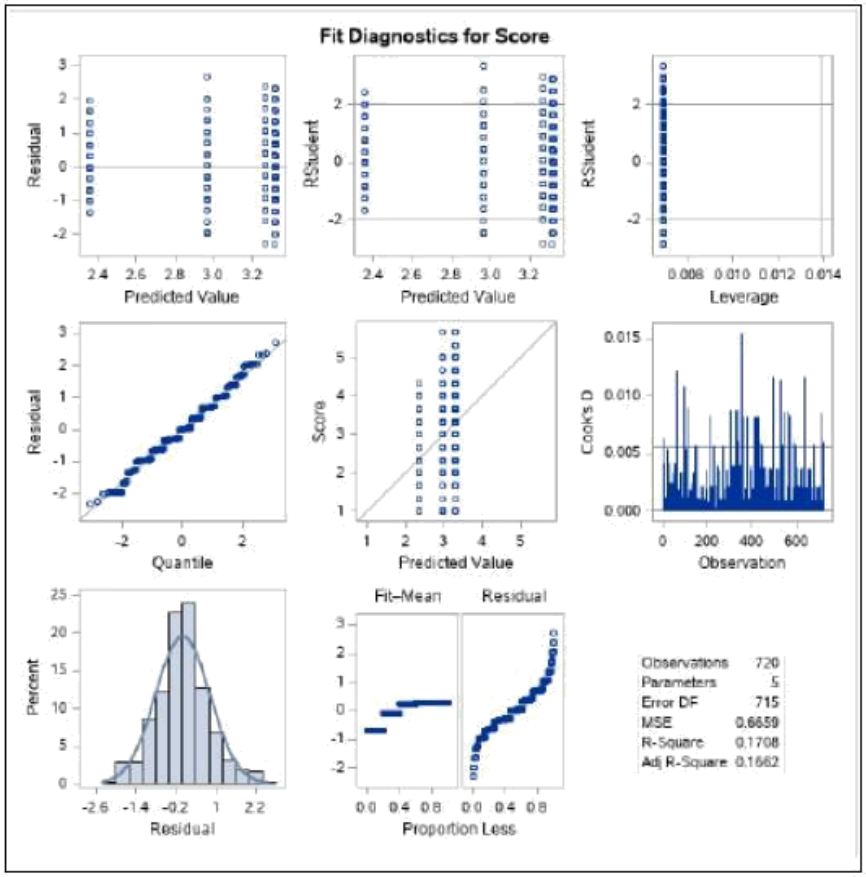

Figure 4: Fit Diagonestics of Hypothesis H2

The above ANOVA is applied to test the hypothesis. The ANOVA results as given in table 3, show that the calculated "F" value is (36.82), which is quite good and the "P" value is (0.0001), which is less than 0.05 of significance. Hence the null hypothesis $H2_0$: "*There is no significant relationship between Govt. policy and the economic challenges of women entrepreneurs"* is rejected, whereas the alternative hypothesis H2a: "*There is a significant relationship between Govt. policy and the economic challenges of women entrepreneurs."* is accepted. It is inferred that the Govt. Policy and schemes are most important to overcome the challenges faced by women entrepreneurs at different levels may it be Block, Panchayat, or District or State level.

Hypothesis H3:

Eigenvalue			
Questions	**Eigenvalue**	**Mean**	**Std. Dev**
Q1	1.219	3.218	1.118
Q2	2.273	2.132	1.653
Q3	1.325	1.441	1.204
Q4	1.649	2.024	1.381
Q5	2.173	4.691	1.412

Table 5: Data Reliability of Hypothesis H3.

After Principal Component Analysis (PCA), we can assess the validity of our data and the precision with which we measure it. Cronbach's alpha is 0.823, which indicates an extremely high degree of reliability of the data. All five questions are met by the eigenvalue Q1: 1.219, Q2: 2.273, Q3: 1.325, Q4: 1.649, and Q5: 2.173. So we can consider all questions for our analysis because all values are in the higher range and greater than 0.7 of the eigenvalue

.

ANNOVA TEST

Dependent Variable: Score Score

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	133.7253086	33.4313272	45.74	<.0001
Error	715	522.6296296	0.7309505		
Corrected Total	719	656.3549383			

R-Square	Coeff Var	Root MSE	Score Mean
0.203739	29.83370	0.854956	2.865741

Table 6: ANOVA Table of Hypothesis H3

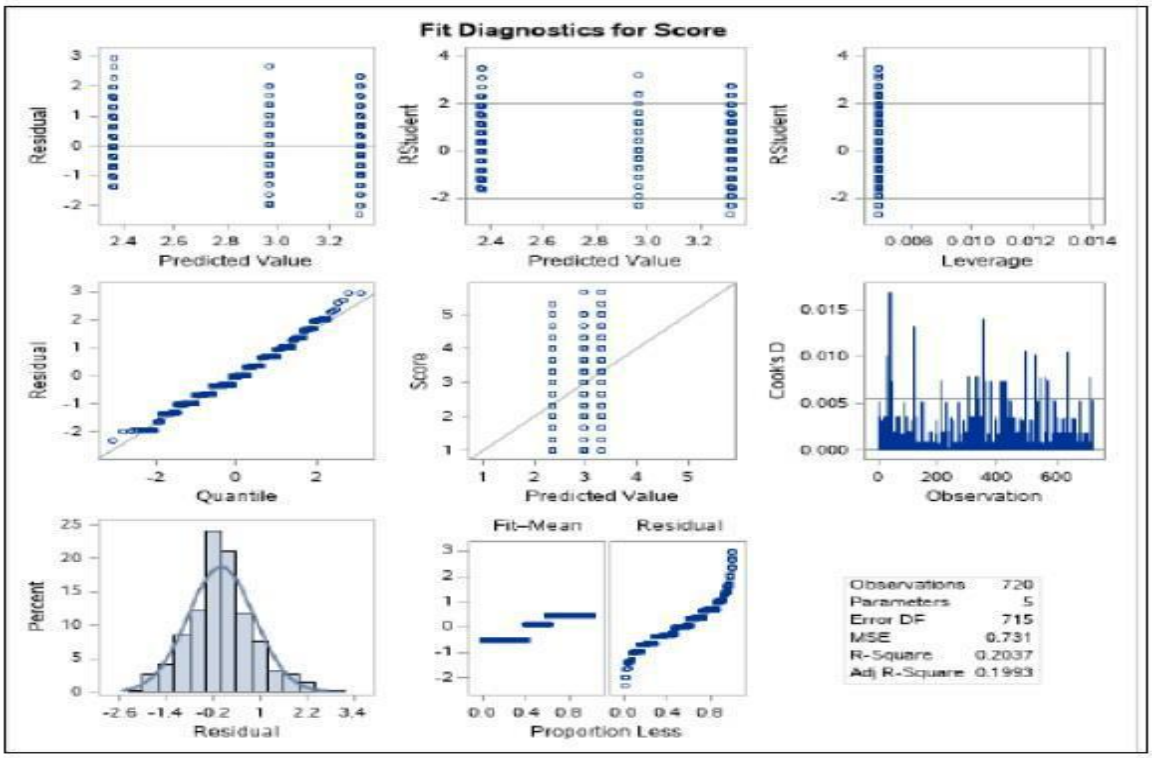

Figure 6: *Fit Diagonestics of Hypothesis H3*

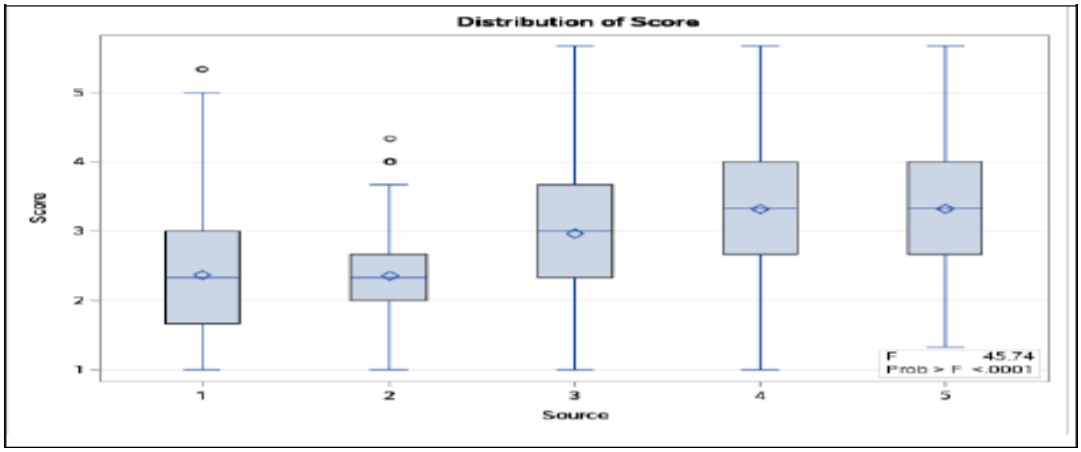

Figure 7: *Box Plot of Hypothesis H3*

The above ANOVA is applied to test the hypothesis. The ANOVA results as given in table 4, show that the calculated "F" value is (45.74), which is quite good and the "P" value is (0.0001), which is less than 0.05 of significance. Hence the null hypothesis H30: "*There is no significant influence of business networking on the performance of the women entrepreneurs*" is rejected, whereas the alternative hypothesis H3a: "*There is a significant influence ofbusiness networking on the performance of the women entrepreneurs*" is accepted. It is inferred that business networking is an art form, and one should be adept at it as an entrepreneur. Business networking is all about bringing people together who can help each other's business activities and problems.

FINDINGS AND DISCUSSION

This study tries to find out the key influential factors for the growth and success of women entrepreneurs and the challenges and hurdles they face during their entrepreneurship tenure. Again the study is interested to unveil the facts that starting their own business, influences the economic and financial condition of their family and country as a whole. There are many Govt. launched schemes which help them to face the challenges which generally restrict their entrepreneurial growth. The data analysis suggests that the key competencies which are responsible to make them successful and make them self-dependent are Personal skill(1st), Economical & Financial(2nd), Business Management(3rd), Technological(4th) Interpersonal(5th) and conceptual competencies are the 6th one respectively. So it is well accepted that personal skills like Spotting Opportunities, Commitment to work, Motivation & Preservance, Self-efficiency & Self-confidence, Information seeking and Problem-Solving skills will make entrepreneurs more competent in doing their own business. The study also reveals that there is an influence of personal networking with the performance of the business owned by them and it has a significant impact on the success of entrepreneurial activities performed by women. It is inferred that business networking is an art form, and women should adopt it as an entrepreneur to survive and succeed in the long run. The networking will be beneficial to the rural women entrepreneurs in performing their enterprise-related activities like spotting business opportunities, getting moral support, enhancement of access to financial assistance, availing different Govt. schemes, acquiring technical support understanding entrepreneurial orientation like creativity and innovativeness which will make them more proactive of success.

Concerning the fourth objective to conclude the interconnection between different Govt. Schemes and challenges faced by women entrepreneurs, it is explored there is a significant influence of the former to the latter. That indicates that if women entrepreneurs will be aware of many schemes launched to grow their small businesses both by Central and state Govt. like Annapurna Scheme for catering, Stree Shakti for (EDP), Dena Shakti (Manufacturing), Orient Mahila Vikas Yojana(Small Business) then the impact of challenges to them will reduce to a great extent. Other than these schemes Govt. have established many institutions to fulfil the needs of women business owners. The Platform for Women Entrepreneurship (WEP) is the WEP, which was launched by the NITI Aayog, and it aspiring and established women entrepreneurs in India. It's broken down into three sections and each one has different objectives like Iccha, Gyana & Karma Sakti for encouraging, educating and providing hands-on assistance to women entrepreneurs to expand their businesses. We found that if women will aware of and access all these schemes and facilities provided by different levels of Govt. automatically the effect of challenges will come down and they overcome them.

CONCLUSION

The study demonstrated that in rural areas like Kandhmala women entered into entrepreneurial activities but did not enter due to family commitments but rather due to personal achievement, independency and autonomy which seems to parallel the pull factors theory. The findings provide new insight into the personal and entrepreneurial characteristics of women taking up business ownership. Passion for their desired business, courage, confidence and strong willpower were their strongest skills. It is also evident from this research study that women entrepreneurs use their passion, personal interest and inherent strength to overcome many shortcomings and hurdles along the path to pursue their dreams.

LIMITATIONS OF THE STUDY

The study is limited to the women entrepreneurs in the Kandhmala district of Odisha but similar studies can be generalised further by doing it in other districts of Odisha and India and also by taking the other key competencies into account also. Here stratified sampling is adopted so that an overall view can be drawn from the studies but other studies can apply different sampling to pursue their study.

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Nintendo Sales Prediction Based on Online Sentiment.

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Abstract— **Social network has gained remarkable attention in the last decade and as the evolution take place, accessing social network sites such as Twitter, Facebook, LinkedIn, Instagram and YouTube have become very affordable. As a large population uses one or the other social networking site, it has become very convenient for companies to reach their consumers through these sites. The main objective of this project is to identify the impact of social media sentiment on a company's success and companies have to take this sentiment into consideration and plan their marketing strategy accordingly and evaluate its importance over traditional marketing strategy in building brand names and consumer behavior. The dataset on which the study has been carried out consists of a sample of tweets on @Nintendo, the quarterly sales of @Nintendo and the information of its followers and their tweets regarding the brand on Twitter. The analysis and findings of the study highlighted the geo-graphical distribution of the followers of @Nintendo, the market outreach of the brand, and the relationship between the sentiment of its followers towards the brand and the quarterly sales of @Nintendo**

Keywords— Sentiment Analysis, Recurrent Neural Network, Long Short Term Memory, Gated Recurrent Unit,

1. INTRODUCTION

Over the past decade, media has witnessed a huge transformation, consumers are progressively using social networking sites to look for information regarding various products and services, instead of relying on traditional methods such as television, radio, and magazines etc. [1]. Every seventh person in the world now owns a Facebook profile and nearly four in five Internet users are associated with at least one social media site. With the ever-increasing number of internet and social media users, it has become inevitable for major brands to understand online customer behavior. The emergence of social media has led to a subsequent change in media consumption which is pushing companies and organizations to adopt social media as one of their marketing strategies and public relation tools [2]. Therefore, social media has become an increasingly familiar platform employed in E-Commerce to market services and resources to current and prospective customers.

1.1. Social networks and social media

The term social network was first coined to differentiate between networks that were used for business purposes from those used for socializing amongst people. The definition of social networking has been extended to include grouping of individuals into specific groups especially in workplace, universities and high schools, however the most popular accepted definition of social networks relates to the interactive websites which provides users with message boards, chat rooms, and the ability to leave comments and have a discussion with other people [3]. Alternatively social networks is also referred to as a virtual community website that brings people together to talk, share ideas and interests, or make friends. This type of collaboration and sharing on social networking sites is known as social media. Unlike traditional media that is typically created and controlled by only a bunch of people, the social media allows users to share their opinions, views and encourages interactions and community building shaped by consumers [4]. The term "Social Media" has been derived from the words, "Social" and "Media" which are discussed as follows: Social: the term 'Social' refers to interacting with other people for exchange of information characterized by the friendly companionship or relations.Media: the term 'Media' refers to the instrument of the communication such as radios, television, newspapers, magazines, internet etc. that reach people widely. So we can say that social media is a web based social instrument of communication that enables people to interact with each other by both sharing and consuming information. Safko and Brake [5] observed that social media is an umbrella term referring to activities, practices, behaviors among communities of the peoples who gather online to share and exchange information, knowledge and opinions using communicational media. According to Weinberg [6] social media relates to the sharing of information, experiences and perspectives through community oriented websites. monologues into social media dialogues. Since last decade, social media has evolved from being a simple communication hub to an agent of change, which has effected every day to day activity of humans and thereby changing people's lives.

1.2. Effect of social media on various areas

The various areas which have had a lasting and permanent effect of social media are as follows [3]:

1.2.1. Politics and public service

The way personal computers that changed forever the way businesses were conducted. Social networks are altering the demography of our society ranging from politics and public service to business and customer satisfaction. Facebook has become the de-facto platform for how non-profit organizations, environmental activists, and political factions reaching out to thousands of potential volunteers. Twitter is generally used by almost all progressive politicians to promote their causes. Thanks to the social networks, fields like politics is no longer limited to the political leaders but people can also express their concerns and opinions, share their ideas, and even communicate with political leaders on a one-on-one basis.

1.2.4. Business

Almost every major business organization has a social presence today. Both existing and emerging businesses are now aggressively using social networking sites to promote their products, services, and gain invaluable feedback from their customers. In fact, for businesses, interaction via social network has almost become a de-facto standard for assessing their customer service. It has now become a common to see small or home based businesses that operate solely through their Facebook accounts.

1.2.5. Recruitment

LinkedIn has considerably transformed how HR professionals look for and thus recruit potential employees. However, there are arguments about privacy violation; LinkedIn has undoubtedly facilitated career advancements, recruitment and professional networking to great extent.

1.3. Types of social media platforms

The most commonly used social media platforms are [7]:

1.3.1. Facebook

Facebook is the largest social network on the web with respect to name recognition as well as total number of users. It has approximately 1.8 billion active users and it acts as a wonderful platform for connecting people across the globe with your business. Since the last decade, Facebook has evolved from a basic website into a multi-dimensional network and a mobile platform where anyone can connect with anybody across the world. Keeping in mind, the Pages feature of Facebook, it can really help a lot in one's business.

1.3.2. Twitter

Twitter is a platform where one can express one's views with short text messages along with other media. Twitter is a great interface to communicate with literally anyone in the world just by mentioning their usernames in their posts. This social networking site is a great way to advertise and market one's business. It is also an effective channel for handling customer service.

1.3.3. YouTube

The most famous video-sharing platform that has over a billion users where the users can not only view the content posted by others, but also upload, rate, share and comment on the videos as well. If one wants to engage audience by posting an advertisement of their work or business, there could be no better platform than YouTube.

1.3.4. Instagram

Instagram is a visual social media platform that is totally based on photos and videos posts only. It is also owned by Facebook and is different from others with respect to various filters provided and other photo editing options provided.

1.3.5. LinkedIn

LinkedIn is a social networking site that is dedicatedly used for business and employment-oriented services. LinkedIn allows members that may be workers as well as employers to create profiles in an online social network that may portray real-world professional relationships [8].

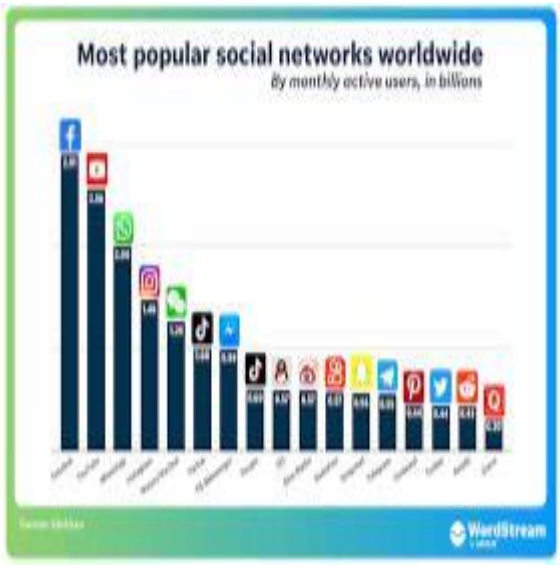

Fig 1: Most popular social media platforms

2. RELATED WORKS

2.1. Social media and e-commerce

In order to understand their customer in a better way and finding their inclination towards their products, the marketers and advertisers are always looking for a number of ways. This requires a lot of information to be gathered about the customers. This information could be

gathered from social media about online users which could be further analyzed to trace the behavior of consumers. The various businesses are using social networks like Twitter and Facebook to help them sell more products and services [10].

2.3. Advantages of social media marketing

The various advantages of using social media marketing are [11]:

• Social media posts can be used to drive targeted traffic to a specific audience of people.

• Social media can act as a very useful tool for boosting the business site's SEO. The traffic building on social media pages of one's business will help their websites get better search engine results.

• Social media may help to build real producer consumer relationship as the tweets on Twitter and posts on Facebook get an insight into the daily lives of their customers and thus help them build better marketing strategies.While maximum users take, Twitter and Facebook as simple social networks and not as advertising and marketing platforms which makes them respond to one's business idea in a more open way.

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• The most important advantage of using social media is the recognition of a brand, as the media itself becomes brand's content and voice. The authors in the paper [12] identify the role of social media marketing in brand building and influencing consumer buying behavior while making a decision to buy a product. The authors carried out the study using primary data collected from 265 respondents through survey method using structured questionnaire. The authors used convenient Sampling and the findings of the paper highlighted the utility of social media marketing in building brands. In paper [1], the authors investigated 504 Facebook users in order to find out the effect of firm-created and user-generated social media communication on brand equity and brand attitude by

conducting a survey throughout Poland. The author in paper [2] gave a detailed description about social media marketing and its advantages. The author also explained as to why to use social media market in libraries and also put forward various challenges of using social media in libraries. In paper [11], the authors carried out an empirical research to recognize the effectiveness of social media as a marketing tool and analyzed the influence of social media on consumers in buying decision making. The claims of the authors were supported by various statistical tests. The authors also suggested that effective and innovative strategies need to be designed for winning larger share of business through this revolutionary medium of social networking. In paper [15], the authors analyzed the usefulness of existing lexical resources as well as features that apprehended the information about the informal and creative language used in Twitter.

3. PROPOSED METHOD

3.1. Problem statement

The effect of social media on the company's reputation and the brand building of its products needs to be studied in order to predict the marketing and distribution plan of its products before their launch. The posts on social networking sites further could be evaluated to get the feedback of their customers on its products that are already in market.

3.2. Research objectives

Based on the motivation and problem statement, we have defined the following research objectives for the project:

• Investigating the correlation between worldwide sales made by @Nintendo and their followers on twitter over past five years

• Understanding the impact of E-Marketing on various geographical regions by analyzing the spatial distribution of @Nintendo Twitter followers.

• To study the brand building achieved through Twitter by analyzing the marketing outreach of @Nintendo(i.e. average visibility of tweets made by @Nintendo)

• To conduct sentiment analysis of the tweets made by general masses about @Nintendo and its products, thereby, gauging the inclination of its customers towards their products.

4. RESEARCH METHODOLOGY

This chapter provides an overview of methodology adopted to attain our research objectives. The chapter starts with a reason behind choosing Twitter as the platform for conducting our study. The sections succeed with a brief description of sampling process used for collecting the twitter data followed by the description of tool used for analyzing same.

4.1. Why twitter?

Twitter is excellent for obtaining data for research as it creates an automatic database of information in real time,which signifies that as the data is archived it will become a unique source of historical information. People tend to give their opinion on latest trends, politics, society, news and technologies in market on Twitter in form of tweets whereas on other major social networking sites such as Facebook, Youtube and Instagram people tend to express their views more often in the form of photographs and videos which are difficult to analyze. That makes Twitter much more convenient option for analyzing the social media data. Moreover, the data available on Twitter can be easily accessed through its API.

4.2. Sampling process

Everyday almost 500 million tweets are made on Twitter which makes it virtually impossible to study all of them. So, Sampling becomes inevitable. In order to carry out our research, we have used Convenience Sampling, wherein, units are sampled because they are convenient to obtain. In our case, we relied on the tweets gathered from Twitter API through Stevesie.

4.3 Design Phase

The Design and functioning of the project has been explained with the help of diagrams in this section.

4.3.1 Data Flow Diagram

The flow of the data from being collected to being preprocessed and used for Feature extraction is illustrated in the figure below.

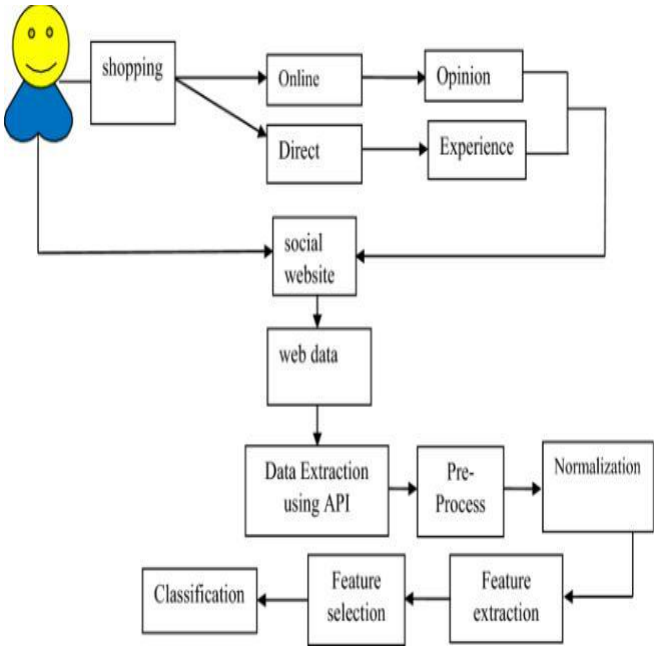

Fig2 Data flow Diagram

4.3.2 Use Case Diagram

The diagram below shows how a user will use the website and how the website will function internally when the users makes a request for a service

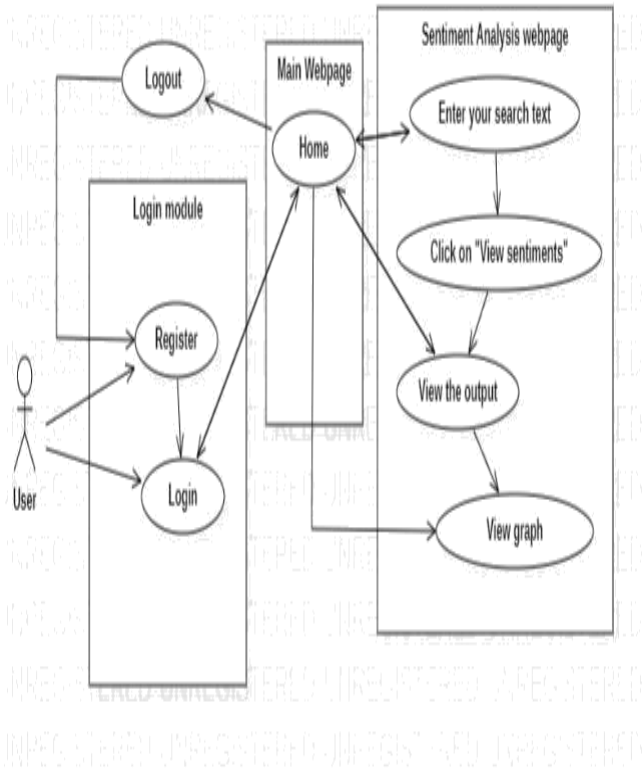

Fig 3: Use case diagram

5. EXPECTED RESULTS

With this project we hope to build a website wherein various brands can enter the requirements regarding the period over which they want to analyze their sentiment and also the period over which they want us to predict their sales. We aspire to make this a successful project which the industry can trust as a product that can provide an accurate representation of their company's online presence and how it will impact their sales.

6. CONCLUSION

In this project, we performed an analysis on Twitter data of @Nintendo available from public twitters API to study the impact of tweets related to @Nintendo on its brand building, customer satisfaction of @Nintendo products and its sales per quarter. The findings and the results of our study clearly signifies that social media marketing influences the building of brands as well as influence the sales of the business. Moreover, the feedback obtained from the customers in form of tweets about their products further help to design the marketing strategy of their products. This project can be further enhanced to fetch similar findings and deductions for the other brands besides

@ Nintendo. Also, the data on which the analysis has been done in this study is recent data, so, the project could be enhanced to do a detailed study on previous years data in order to see the pattern and trends that has been evolved with respect to consumer behavior.

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Tracking missing persons using Facial Recognition

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Abstract—**Finding missing people is a time-critical and labour-intensive task. The longer it takes to find the person, the less likely it is that they will be found. We have attempted to handle the most challenging aspect by creating an integrated and centralized database of missing persons by using Aadhar Card details. Our idea incorporates features like face matching i.e. facial recognition technology. Facial recognition has existed in various forms since decades. But recently it has been found out that it is possible to identify the person easily by using facial recognition where an algorithm deepface can be used which has a high accuracy . The officials can enhance and streamline the further process of finding, tracking, and retrieving missing persons using AI powered facial recognition technology and faces can be matched with their Aadhar Card. This paper states a system that centralized the data and makes the system to find the missing people more efficient.**

Keywords—Face recognition, Face detection,Deepface.

I) INTRODUCTION

Human trafficking is one of the most grueling problems and is currently faced by the whole world. According to the UNODC website, "the transportation, transfer of humans by force, fraud or deception, with the goal of exploitation for profit," is what is meant by "human trafficking." This crime can affect men, women, and children of all ages and ethnicities, as well as people from all historical periods. India is a region where human trafficking continues to thrive. It is considered as the second largest organized crime in India. Here, the portal is designed which consists of a centralized database of missing people. The family or the police officials just have to upload the details of the missing people and their Aadhar Card details. The Aadhar Card image will be matched with the missing person using facial recognition with proper models.

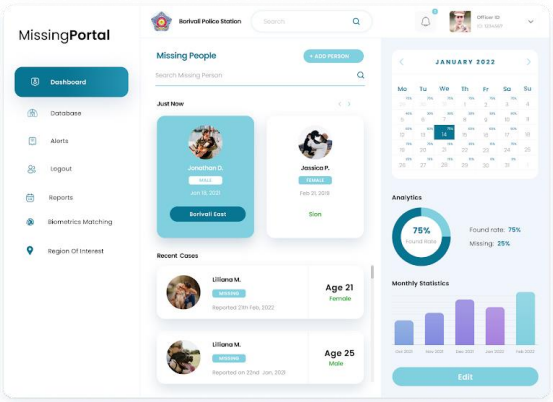

Figure 1:Portal of Missing people

This portal will help to access,track and retrieve the data all at the same place. Face matching reduces manpower,time criticality,and is highly efficient.

II) PROBLEM

In India, there are now more reported cases of missing adults, women, and children than ever before.

The shocking fact is that 6,701,145 persons were still listed as missing nationwide in 2020, when India was battling the Covid-19 outbreak. Due to the lack of a centralized database, communication between officials is relatively inefficient.Traditional way of finding people is quite tedious. There is no technology used to detect missing people and victims may be traumatized even after being rescued and hence may not be able to identify themself. Especially, children may not be able to answer the questions related to their personal details. Hence it becomes difficult to recognize the person.

Our portal allows the victim's family to file a missing complaint online at the portal as police officials will launch FIR after 24 hrs.

The concerned person can undergo face matching by facial recognition technology then the person could be reported to his/her family. This improves efficiency and is a faster process.

III) LITERATURE SURVEY

Facial recognition is one of the popular applications of Artificial Intelligence.it has been found out that facial matching can be done to identify a person. But earlier,the accuracy that was observed was less. In the research paper " FAREC - CNN Based Efficient Face Recognition Technique using Dlib"[1]. This paper talks about how the Dlib algorithm is used and the C++language showing an accuracy of 96%.

According to "Face Modeling Process Based on Dlib"[2] ,talks about Random Forest algorithm which is 95% accurate.Problem with this method was, it is quite a time consuming process. In "Face Detection and Tracking Using OpenCV"[3] paper the Cam Shift algorithm is quite expensive and also time consuming. It was also observed in the paper, "Face Detection and Tagging using Deep Learning"[4] that it will be used with CCTV footage to identify people in case of theft. But the accuracy observed was 85%.

There are more such papers describing a lot of problems that are observed related to accuracy or detection of face and algorithm used. So there is a need to solve the problems using efficient algorithms to fasten the process.

IV) METHODOLOGY

To combat the human trafficking specially child trafficking, an app or government portal linked with Aadhaar information system may be conceptualized for integration of information.The Aadhar enabled data of missing person like photo, age, etc may be circulated to all state and district level police authorities through the dedicated portal with limited access to the authorized authorities only. This information may be used by the designated authorities for the search of the missing persons in locality under their jurisdiction. This would help the Police authorities to find the missing persons in their localities with authenticated and integrated information systems. Similarly, the address and contact details of parents or relatives can be found by using the Aadhar enabled integrated information system, so created, for the person found by the Police authorities or civil society specially for the children who do not have proper/adequate information for their address/parents. At User side:

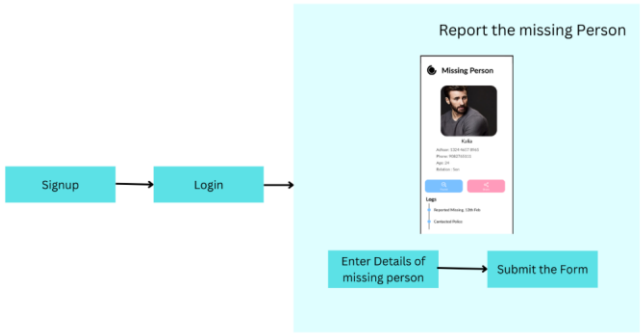

Figure 2: User side application flow

For users , the family member needs to login to the application and enter all the required details of the missing family members. At police side:

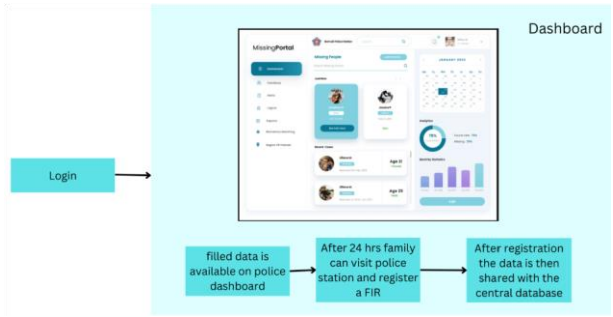

Figure 3: Police side application flow

The data when filled by the family member of a missing person gets reflected at the dashboard of the police station.

After 24 hrs the family member comes to register FIR, the filled data is verified alongside the FIR. After verifying the data, it is shared to the central data. Thus the details of the missing person are now available to police stations across the country.

If a similar person/lost person is found, their identity can be verified using this portal. The verification is done using facial recognition algorithms.

The overview of this system can be seen pictorially as:

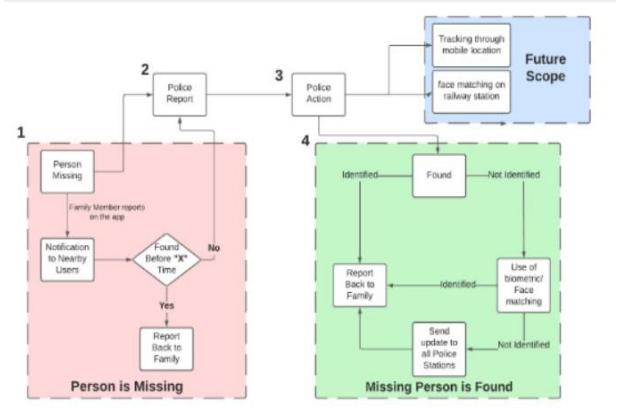

Figure 4: Proposed System

V) ALGORITHM Facial recognition (FR) has long been the most popular biometric method for confirming an individual's identity and has been utilized extensively in a variety of fields, including the military, business, government, and daily life. The CVPR group has long been interested in the study of FR. As a result of the historical Eigenface approach's launch in the early 1990s, FR research gained popularity.[10]

A modern face recognition pipeline consists of 5 common stages: detect, align, normalize, represent and verify. The algorithm used for facial recognition is deepface Facenet512 model.

Deepface is a lightweight face recognition and facial attribute analysis (age, gender, emotion and race) framework for python. Several processing layers are used in deep learning to learn representations of data with various levels of feature extraction. The research has changed as a result of this new technique. Facial recognition (FR) has changed significantly since 2014, when DeepFace and DeepID's innovations were made. Since then, the state-of-the-art performance has been significantly enhanced by the deep learning technique, which is distinguished by the hierarchical architecture to stitch together pixels into an invariant face representation.[10]

It is a hybrid face recognition framework wrapping state-of-the-art models: VGG-Face, Google FaceNet, OpenFace (OpenFace face recognition library that bridges this accuracy gap.On the LFW benchmark, OpenFace achieves near-human accuracy and introduces a brand-new categorization benchmark for mobile contexts.[5]), Facebook DeepFace (It can outperform existing systems with very little adaption because it was trained on a sizable collection of face images from a population that is quite different from the one used to create the assessment benchmarks. Also, the system creates a very compact representation of the face, in stark contrast to other previous systems' move towards tens of thousands of appearance features. [6]), DeepID (The DeepID model is the golden standard in the domain of DFR.

This model is designed to identify frontal faces. [7]), ArcFace (ArcFace has a clear geometric interpretation due to its exact correspondence to geodesic distance on a hypersphere. ArcFace routinely exceeds the current state of the art and is simple to deploy with little additional computational burden. [8]), Dlib (Dlib-ml is a cross platform open source software library written in the C++ programming language. Its design is significantly influenced by concepts from component-based software engineering and design by contracts. This indicates that it is, first and foremost, a collection of separate software components, each of which is supported by excellent documentation. [9]) and SFace.

Experiments show that human beings have 97.53% accuracy on facial recognition tasks whereas those models already reached and passed that accuracy level. DeepFace trained a 9-layer model on 4 million facial photos in 2014 to attain SOTA accuracy on the renowned LFW benchmark, coming close to human performance on the unconstrained condition for the first time (DeepFace: 97.35% vs. Human: 97.53%). [10]

Model	LFW Score	YTF Score
Facenet512	99.65%	-
SFace	99.60%	-
ArcFace	99.41%	-
Dlib	99.38 %	-
Facenet	99.20%	-
VGG-Face	98.78%	97.40%
Human-beings	*97.53%*	-
OpenFace	93.80%	-
DeepID	-	97.05%

Figure 5: Comparison table for different models with respect to LFW Score and YTF score.

If you run face recognition with DeepFace, you get access to a set of features:

Face Verification: The task of face verification refers to comparing a face with another to verify if it is a match or not. Hence, face verification is commonly used to compare a candidate's face to another. This can be used to confirm that a physical face matches the one in an ID document. **Face Recognition:** The task refers to finding a face in an image database. Performing face recognition requires running face verification many times. Facial **Attribute Analysis:** The task of facial attribute analysis refers to describing the visual properties of face images. Accordingly, facial attributes analysis is used to extract attributes such as age, gender classification, emotion analysis, or race/ethnicity prediction.

Real-Time Face Analysis: This feature includes testing face recognition and facial attribute analysis with the real-time video feed of your webcam. Next, I will explain how to perform those deep face recognition tasks with DeepFace.

As seen above, the model using deepface SFace has a great score of 99.60% according to official documentation.

THE ACCURACY OF DIFFERENT METHODS EVALUATED ON THE LFW DATASET.

Method	Public. Time	Loss	Architecture	Number of Networks	Training Set	Accuracy±Std(%)
DeepFace [20]	2014	softmax	Alexnet	3	Facebook (4.4M,4K)	97.35±0.25
DeepID2 [21]	2014	contrastive loss	Alexnet	25	CelebFaces+ (0.2M,10K)	99.15±0.13
DeepID3 [36]	2015	contrastive loss	VGGNet-10	50	CelebFaces+ (0.2M,10K)	99.53±0.10
FaceNet [38]	2015	triplet loss	GoogleNet-24	1	Google (500M,10M)	99.63±0.09
Baidu [58]	2015	triplet loss	CNN-9	10	Baidu (1.2M,18K)	99.77
VGGface [37]	2015	triplet loss	VGGNet-16	1	VGGface (2.6M,2.6K)	98.95
light-CNN [85]	2015	softmax	light CNN	1	MS-Celeb-1M (8.4M,100K)	98.8
Center Loss [101]	2016	center loss	Lenet+-7	1	CASIA-WebFace, CACD2000, Celebrity+ (0.7M,17K)	99.28
L-softmax [104]	2016	L-softmax	VGGNet-18	1	CASIA-WebFace (0.49M,10K)	98.71
Range Loss [82]	2016	range loss	VGGNet-16	1	MS-Celeb-1M, CASIA-WebFace (5M,100K)	99.52
L2-softmax [109]	2017	L2-softmax	ResNet-101	1	MS-Celeb-1M (3.7M,58K)	99.78
Normface [110]	2017	contrastive loss	ResNet-28	1	CASIA-WebFace (0.49M,10K)	99.19
CoCo loss [112]	2017	CoCo loss	-	1	MS-Celeb-1M (3M,80K)	99.86
vMF loss [115]	2017	vMF loss	ResNet-27	1	MS-Celeb-1M (4.6M,60K)	99.58
Marginal Loss [116]	2017	marginal loss	ResNet-27	1	MS-Celeb-1M (4M,80K)	99.48
SphereFace [84]	2017	A-softmax	ResNet-64	1	CASIA-WebFace (0.49M,10K)	99.42
CCL [113]	2018	center invariant loss	ResNet-27	1	CASIA-WebFace (0.49M,10K)	99.12
AMS loss [105]	2018	AMS loss	ResNet-20	1	CASIA-WebFace (0.49M,10K)	99.12
Cosface [107]	2018	cosface	ResNet-64	1	CASIA-WebFace (0.49M,10K)	99.33
Arcface [106]	2018	arcface	ResNet-100	1	MS-Celeb-1M (3.8M,85K)	99.83
Ring loss [117]	2018	Ring loss	ResNet-64	1	MS-Celeb-1M (3.5M,31K)	99.50

Figure 6: Accuracy of different methods evaluated on the LFW dataset.[10]

Face recognition models are regular convolutional neural networks and they are responsible to represent faces as vectors. We expect that a face pair of the same person should be more similar than a face pair of different persons.

Similarity could be calculated by different metrics such as Cosine Similarity, Euclidean Distance and L2 form. The default configuration uses cosine similarity. Euclidean L2 form seems to be more stable than cosine and regular Euclidean distance based on experiments.

5.1 Triplet Loss

any image of another person,as a result,photosparticularof

The embedding is shown as In a d-dimensional

EuclideanWe also constrainspace, it embedsthis embeddingan image tox i.e.,exist$f(x$on) $\epsilon$the Rd

d-dimensional hypersphere,

i.e.,$\|f(x$we)$\|$ 2want= 1.to make sure that an image of a

thatperson,samexaiperson,(anchor),$xxpiin$(is(positive),negativecloser).tothanallitotheris to

$$\ldots.(1)\|f(x^{a}i\,) - f(x^{p}i\,)\|\,^{2}2 + \alpha \prec \|f(x^{a}i\,) - f(x^{n}i\,)\|\,^{2}2,$$

$$\forall(f(xai\,),\, f(xpi\,),\, f(xni\,)) \in T \ldots..(2)$$

where the margin between positive and negative pairs is denoted by α. T has a cardinality of N and is the set of all feasible triplets in the training set. The loss is then minimized as follows:

$$\sum^{N_i} \left[\left[\|f(x^{a}i\,) - f(x^{p}i\,)\|\,^{2}2 - \ldots.(3)\|f(x^{a}i\,) - f(x^{n}i\,)\|\,^{2}2 + \alpha\right]\right] +$$

There would be a lot of triplets that are simple to satisfy (i.e. fulfill) if one generated every feasible triplet.[11]

5.2 Datasets and Evaluation

ous models like VGG-Fae, Facenet, FaceNet512, ArcFace and SFace are evaluated and compared.

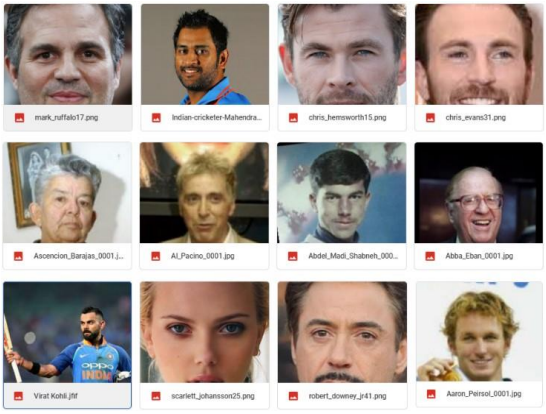

Figure 7: Dataset used

evaluating the algorithm, the dataset shown above is . This data set consists of multiple faces which acts as :abase of citizens.

Our aim here was to match the user input to the images in this pool and return a value that shows whether the input face matches any of the images in the database or not.

Given above is the user input image. This image is compared with all the images in the dataset so as to check if this face is present in our dataset or not.

	model	found result	distance	time taken
0	VGG-Face	/content/drive/MyDrive/Images_DEMO/Copy of chr...	0.149036	1.965082
1	Facenet	/content/drive/MyDrive/Images_DEMO/Copy of chr...	0.185329	1.927456
2	Facenet512	/content/drive/MyDrive/Images_DEMO/Copy of chr...	0.265619	2.190437
3	ArcFace	/content/drive/MyDrive/Images_DEMO/Copy of chr...	0.222220	1.405846
4	SFace	/content/drive/MyDrive/Images_DEMO/Copy of chr...	0.415969	1.271688

Figure 9: Results of the input data using various models.

According to the table above we can see that the /GG-Fae, Facenet, FaceNet512, ArcFace and SFace ıble to compare and find the face in the dataset. Though ɔdels gave us a positive

result, parameters like distance and time taken to process differ.

The first model VGG_Face gave a positive response with distance 0.149036, which is less compared to the results given by other models, and time taken as 1.965082.

Model Facenet gave a positive response with distance 0.185329 and time taken as 1.927456. The next model Facenet512 gave a positive response with distance 0.265612 and time taken as 2.190437, which is the highest time compared to all the other model performance.

Model ArcFace gave a positive response with distance 0.222220 and time taken as 1.405846. The next model SFace gave a positive response with distance 0.415969, which is maximum compared to all the other models, and time taken as 1.271688, which is the minimum compared to all the other model performance.

VI) CONCLUSION

There are problems that people face while identifying themselves after being exploited. Facial recognition can help to identify the concerned person. The portal which is described in this paper will reduce problems with centralisation, tracking and retrieving the person thereby sharing it across the country will increase the possibility of finding that individual and thus improve the speed of the process and reduce the manual work.The accuracy of the model used will increase the efficiency of the system.

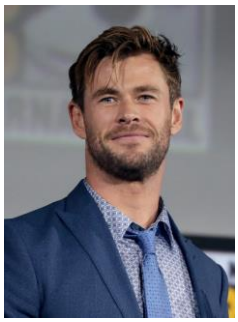

Figure 8: User Input Image

ACKNOWLEDGMENT

We thank the Principal, Dr. B. K. Mishra, the HOD, Dr. Harshali Patil, project coordinators and the college management for their support.

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Video Analytics for optimizing Bank Services

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Abstract— **In recent years, there has been a significant increase in**

the use of CCTV footage for various purposes such as surveillance, crowd analysis, and behavioral analysis. One of the primary challenges in the analysis of such footage is the efficient and accurate counting of people and the recognition of their emotions. In this paper, we propose a method for counting people and recognizing their face emotions in CCTV footage videos using computer vision and machine learning techniques. Our method involves the detection of people in the video, followed by the extraction of their face images, and finally, the recognition of their emotions using a deep neural network trained on a large annotated dataset. We evaluate the performance of our method on a publicly available dataset and compare it with the state-ofthe-art methods. Our results demonstrate the effectiveness of our proposed method in accurately counting people and recognizing their emotions.

Keywords—Deep learning, Face recognition, openCv, Cuda, video analytics, Yolo, tensorflow.

I. INTRODUCTION

The widespread use of closed-circuit television (CCTV) systems for security and surveillance purposes has led to the availability of large amounts of footage. The analysis of such footage has become an important task for various applications, including crowd analysis, behavioral analysis, and security. One of the primary challenges in the analysis of CCTV footage is the efficient and accurate counting of people and the recognition of their emotions. Automated people counting and emotion recognition have received a lot of attention in recent years due to their wide range of applications, including crowd analysis, security, and marketing.

The banking industry is constantly seeking new and innovative ways to improve the customer experience and streamline operations. The use of these systems in bank premises can provide valuable insights into customer, helping banks to optimize their services and improve the overall customer experience. The purpose of this research paper is to explore the use of automated customer counting and emotion recognition technology in bank premises. Through a review of relevant literature and an analysis of case studies, this research will provide an understanding of the potential benefits of using automated customer counting and emotion recognition in banks, including improved security, enhanced customer experience, better customer insights, and cost savings. The results of this research will be of interest to decision makers in the banking industry who are considering implementing automated customer counting and emotion recognition technology, as well as to researchers and academics studying the use of these systems in the financial sector.

II. LITERATURE SURVEY

Maintenance To engage with clients, offer a range of services, and learn more about personal beliefs and ideas, many businesses use social media networks. The detection of the polarity of positive or negative thoughts in text, full documents, paragraphs, lines, or subsections is done using the machine learning technique known as sentiment analysis. A multidisciplinary field called machine learning (ML) combines statistics and computer science techniques that are frequently utilized in prediction and classification analysis. In this article, general machine learning methods for sentiment analysis are presented. By conducting rigorous industry and community assessments and evaluations of white papers, academic research papers, journals, and reports, this literature analyses and discusses the concept of sentiment analysis. This paper major goal is to analytically categories and examine how research and machine learning approaches for sentiment analysis are being used in a variety of applications. This approach has the drawback of only considering the application side and leaving out hardware and theoretical exposures. The focus on applications rather than technology and theoretical parts of the topic means that this study has several

limitations. This paper concludes with a research proposal for a sentiment analysis machine learning environment in e-commerce.

Current System	Objective	Study Outcome
Enhanced Video Analytics for Sentiment Analysis Based on Fusing Textual, Auditory and Visual Information. [Received June 5, 2020, accepted July 15, 2020, date of publication July 27, 2020, date of current version August 5, 2020. Digital Object Identifier 10.1109/ACCESS.202	to check the contribution of video modalities and how they are correlated to video analytics for sentiment analysis in Arabic language.	used multi-dialect multimodal video analytic process for sentiment analysis of customers, implement various fusion techniques at a single hybrid levels for evaluation of datasets with multiple models. models tested on audio, text
0.3011977]		and visual expressions of customers.
Video Analytics for Face Detection and Tracking.	to implement system for detecting human faces from video in real time	viola-jones algorithm used for facial feature detection and klalgorithm

[2020 2nd International Conference on Advances in Computing, Communication Control and Networking (ICACCCN)]	system also studying multiple research done on deep learning fields for video analytics	to extract feature point from images. all system runs on real time video data generated from cctv.
Social Media Analysis for Investigating Consumer Sentiment on Mobile Banking. [(JICP) Vol. 4 No. 2, 241-253, November, 2021 PISSN: 26220989/E-ISSN: 2621-993X Https://www.ejournal.aibpm.org/index.php/JIC]	This white paper intends to give Indonesian banks additional information about how social media users feel about mobile banking services.	The most popular tweets are ranked according to the ratio of negative and positive tweets. The following mobile banking capabilities are available: Logged in are Payments, Transaction Report, Lock, Balance, Top Up, and Last. Since every feature has been gathered.
A Simple AI-Powered Video Analytics Framework for Human Motion Imitation. [978-1-7281-91362/20/$31.00 © 2020 IEEE]	the field is introduced Developing human motion detection using deep learning and the motion primitives. This study gives a high- level overview of the data processing pipeline, starting with human observations in movies, deep learning-based video analytics for motion analysis.	They suggested a service-oriented, pluggable, multi- layer, strong, lightweight Framework for DL video analytics. For motion detection and detecting human activity, hybrid deep learning techniques are applied. Utilizing the suggested hybrid deep model, motion in the input micro- video was found.
Automatic Video surveillance for theft detection in ATM machines: An enhanced approach. [Proceedings of the 10th INDIACom; INDIACom-2016; IEEE Conference ID: 37465 2016 3rd International Conference on “Computing for Sustainable Global Development”, 16th - 18th March, 2016 Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi (INDIA)]	The goal is to automate ATM video surveillance and create a application that looks for any potential illicit activity that might take place within the system. This significantly lowers overall system inefficiency.	The technology will analyse the video and show users actions, whether they were stealing or security-related. He is first captured in the original video frame using screenshots. You will then see his portion of this video frame. The trained data set is compared to this segmented frame.
An Entanglement-driven Fusion Neural Network for Video Sentiment Analysis. [Proceedings of the Thirtieth International Joint Conference on Artificial Intelligence (IJCAI-21)]	The trick is to successfully combining many modalities for emotion detection in video emotion analysis. solution offers a transparent quantum stochastic neural model as a result	constructing a shared and open quantum probabilistic neural model for sentiment analysis of videos. The model can represent both classical and non- classical correlations between modalities thanks to the idea and formalization of non-separability as quantum entanglement merging bimodalities.

Multimodal Video Sentiment Analysis Using Deep Learning Approaches, a Survey. [https://doi.org/10.1016/j.inffus.2021.06.003 Received 1 March 2021; Received in revised form 30 May 2021; Accepted 6 June 2021 Available online 12 June 2021 1566-2535/© 2021 Elsevier B.V. A]	This paper aims a thorough rundown of the most recent developments in this field. Based on the architecture of each model, they presented a detailed classification of his 35 cutting- edge models that have recently been proposed in the field of video sentiment analysis into his eight categories.	The most effective multimodal sentiment analysis architecture the multimodal multi-utterance architecture is the challenge. second outcomes showed that the bimodal the foundation for attention is more reliable than the Cross-view dynamics are modelled using the self-attention framework.	CUDA-Self-Organizing feature map based visual sentiment analysis of bank customer complaints for Analytical CRM. [https://arxiv.org/ published on 2019]	A paradigm for self-organizing functional map (SOM) descriptive analysis of customer complaints is proposed. The network can also be shown using a variety of methods and automatically learns various groups of complaints.	A self-organizing card structure for sentiment analysis that examines consumer complaints. We contrasted the model's performance with that of the term frequency representation and the TF-IDF representation, two vector space model representations he used in the document.

iii. Problem Statement

The manual analysis of people count and emotion recognition from CCTV video footage's inside bank premises is a tedious, timeconsuming, and error-prone process, which can be improved by introducing automated systems. The absence of automated solutions for analyzing and interpreting large volumes of video footage impedes the bank's ability to accurately and efficiently monitor customer behavior, evaluate employee performance, and ensure compliance with regulations. Thus, there is a need for an automated system that can accurately analyze the people count and recognize the emotions of customers and employees from CCTV video footage within the bank premises, to enhance operational efficiency and provide a better customer experience.

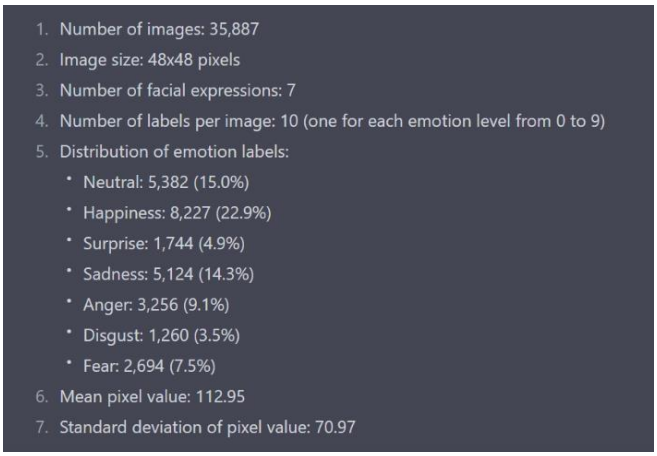
Key issues

- Analysis of sentiment of banks customers using cctv video footage.

- Building a video surveillance for checking the Tampering with the cameras / sensitive or high priority area within banks premises.
- Real-time Counting the number of people detected in cctv camera in particular frame.
- Tracking any activity with smart video surveillance system that needs any attention.
- To analyze the total time duration for any activity that needs to happen with video analytics.

IV. DATA COLLECTION AND VISUALIZATION

The Facial Expression Recognition and Analysis (FER+) dataset is a publicly available face recognition dataset. This dataset is an tension of the face recognition (FER) dataset and includes more detailed annotations of facial expressions. FER+ dataset contains 35,887 48x48 pixel face images, each labeled with one of eight emotions: anger, disgust, fear, happiness, sadness, surprise, neutral, or contempt. The dataset also provides a more detailed annotation of the intensity of each emotion, with each image labeled with continuous values for each of the eight emotions.



- FER+ Dataset description

Fig 1

- Breakdown of the number of images labeled with each emotion.

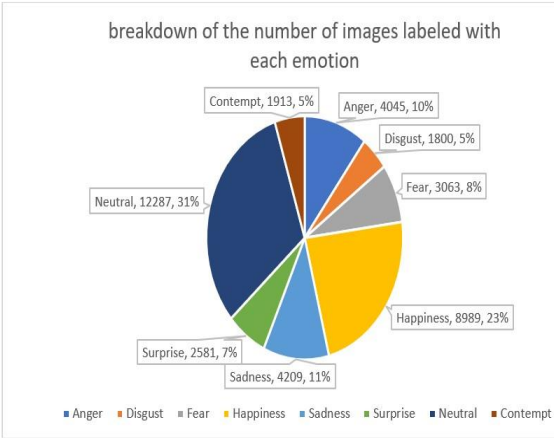
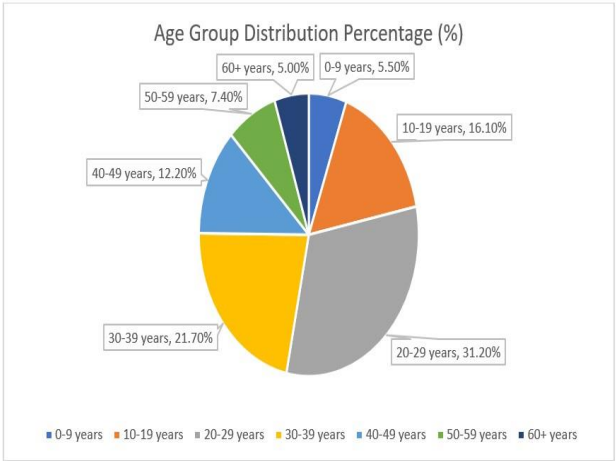


Fig 2

- Gender Distribution of FER+ Dataset.



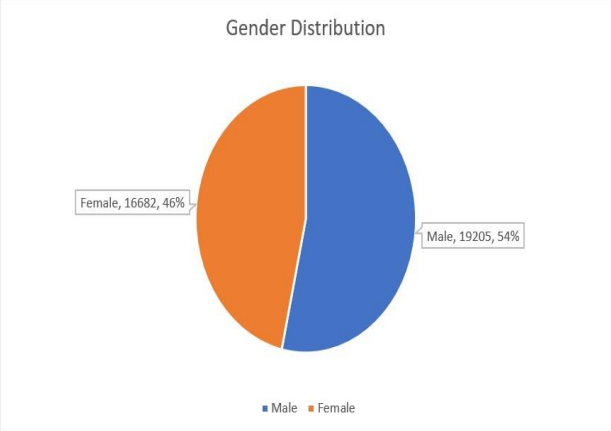


Fig 3

- Age Group Distribution of Dataset

Fig 4

III. PROPOSED SYSTEM

We can achieve our goal by using our proposed system's ability to combine object detection with emotion detection, and we may compare the results with those of other systems to further improve it. In order to better grasp how to create our model, we learned numerous strategies for emotion recognition and couting detection for our study. Here are several widely utilised techniques for emotion recognition and couting detection.

Object Detection : An object detection algorithm that trains a machine learning model to recognize and locate objects in an image or video. You can train a model to detect people in a frame and count the number of detections. Common object detection models include Faster R-CNN, YOLO, and SSD. Background subtraction is a technique that subtracts the background from the current video frame in order to detect moving objects. A background subtraction algorithm can be used to identify people in a video and count the number of unique movements. Optical flow is also the best way to do this. This includes analyzing pixel movement from frame to frame to identify moving objects.

An optical flow to track people in video and count the number of distinct movements. Various deep learning models involved in training deep neural networks to recognize and compute people in footage. Convolutional Neural Networks (CNNs) can be used to detect and compute people. The Haar cascade method uses a machine learning model to detect features of objects in an image or video. We can train a cascading Haar classifier to detect people's characteristics and count the number of detections. Head counting is a method of counting people in a video by detecting and tracking their heads. Here, methods such as Oriented Gradient Histogram (HOG) and Support Vector Machines (SVM) can be used to identify and compute the head of the video.

Emotion Detection Methods : Convolutional Neural Network (CNN) algorithms are widely used for image and video analysis tasks, including facial emotion recognition. It can be used to learn features directly from image or video data and can provide highly accurate emotion recognition. Examples of CNNs used for emotion recognition include VGG-Face, Inception, and ResNet.

Recurrent Neural Networks (RNNs): RNNs can be used for temporal modeling of video. It can be used to capture a series of frames from a video and can be useful for detecting changes in facial expressions or body movements over time. Long Short Term Memory (LSTM) networks: LSTMs are a type of RNN that can be used to model temporal sequences with long-term dependencies. They were used to

recognize emotions in video and learned frame order and how to capture those emotions. SVMs are widely used for classification tasks and can be used to recognize emotions in images and videos. They work by finding the optimal hyperplane that separates the data into different classes.

PCA is a technique used to reduce the dimensionality of data. It can be used to reduce the size of facial features in an image or video to make it easier to classify emotions. Fisher vector coding is a technique that can be used to represent an image or video as a set of features. It has been used to recognize facial emotions by encoding facial features extracted from images or videos and then classifying them with SVM. A deep trust network (DBN) is a type of deep learning model that can be used to extract and classify features. It learns to extract appropriate features from images or videos of faces, which can be used to recognize emotions.

Here are some examples of other people's work on related issues: S. P. Mohanty, S. Mohanty, and S. P. Mohanty for Trustworthy Numbers of Video Surveillance Images. K. Nyack (2019) proposes a people counting system that combines background subtraction and deep learning techniques.

F. Iqbal, S.S. 2020 Alakhmadi and M. A. Alkhalifa. To identify and count pedestrians in congested areas, D.B. Nana and E. O. Adomako (2020) developed a pedestrian identification and counting system that combines Haar cascades, convolutional neural networks, and local proposal networks. To identify people's emotions in CCTV footage, A.M. Zainuddin and MF Abdul Ghafar (2018) present a sentiment analysis system that combines convolutional and recurrent neural networks. An approach to sentiment analysis that combines auditory and visual information was described by R. Hare and M. K. Jindal (2018) identifies people's emotions in surveillance films. In 2019, H. Zhu and K. Wong proposed an emotion analysis method that combines visual and auditory data to judge human emotions in CCTV images and other images.

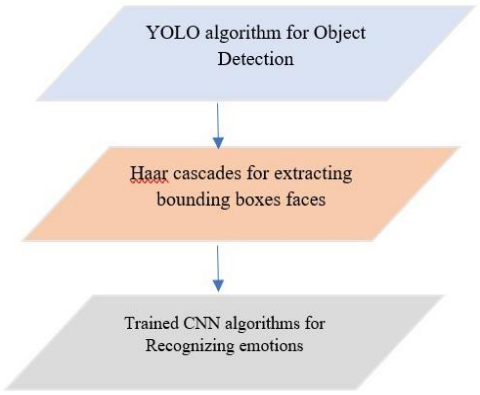


Fig 5: Proposed Method Diagram

This Paper proposes a method for counting people and recognizing emotions from faces in video recordings from CCTV cameras. Our method consists of three steps: person detection, face extraction, and emotion recognition. In the first step, we use an object detection algorithm like YOLO to detect people in the video. The result of this step is a set of frames around the detected person in the video. In the second step, we extract the face image from the bounding box obtained in the first step. Detect faces from bounding boxes using face detection algorithms like Haar cascades and extract face images. In the final step, deep neural networks are used to recognize emotions in facial images. Train a CNN on a large annotated dataset of face and emotion images to learn mappings between facial features and emotions.

YOLO divides the input image into a grid of cells and predicts the bounding box and class probabilities for each cell. This approach allows YOLO to detect objects of different scales and locations in a single forward pass through the neural network, making it faster and more efficient than other object detection methods. We first trained on an annotated image dataset containing people. Once the YOLO model is trained, it can be applied to a new video frame or sequence of frames to detect people. The result of YOLO is a set of bounding boxes around each person detected in the video frame. To further use YOLO with CNN for emotion recognition, we can extract the face regions from the bounding boxes obtained by YOLO and pass them through a CNN for emotion recognition. The CNN can be trained on a large dataset of facial images and emotions, and it can learn to recognize different emotional

states based on the facial features extracted from the face images. The CNN can take the face images extracted from the bounding boxes, preprocess them by resizing or cropping, and pass them through multiple convolutional layers to extract meaningful features. These features are then passed through fully connected layers to classify the emotions of the face images. To improve the accuracy of emotion recognition, we can also incorporate temporal information by analyzing the changes in facial expressions over time. The sliding window method can be used to capture and sequence the temporal context of facial expressions. This approach can help better capture the dynamics of emotion expression and improve the accuracy of emotion recognition.

IV. MODEL EVALUATION AND RESULT

The You Only Look Once (YOLO) algorithm has been widely used for counting people in CCTV footage, and its performance has been evaluated in several studies. One of the main advantages of YOLO for people counting is its high throughput. YOLO can detect people in real time even on weak hardware, making it suitable for real-world applications.

In terms of accuracy, the YOLO algorithm showed high accuracy and recall in counting people. In one study, YOLO achieved an accuracy of 98.7% and 92.6% remember counting people in crowded scenes. In another study, YOLO achieved an average mean accuracy (mAP) of 89.6% for human detection. However, the accuracy of the YOLO algorithm can be affected by a number of factors, including lighting conditions, occlusion, and camera perspective.

For example, if lighting is poor or people partially overlap, the YOLO algorithm cannot accurately identify everyone in the video. To address these issues, researchers have proposed various improvements to the YOLO algorithm, such as incorporating depth information or combining multiple YOLO models using ensemble methods.

Overall, the YOLO algorithm has shown promising results for counting people in CCTV videos, and its performance can be improved with further optimizations and improvements. Theoretical evaluation of the YOLO algorithm shows that it is a powerful and efficient tool for helping people count numbers in a variety of real-world scenarios.

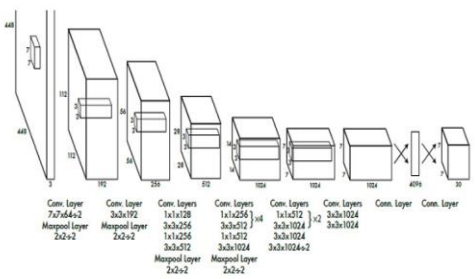


Fig 6. Overview of Yolo Object Detection Algorithm

For people counting, YOLO algorithm is famous for its fast processing speed and high accuracy. Combined with the Haar cascade for face detection, the proposed method can accurately detect and count the number of people in a video as well as localize faces for further analysis. The accuracy of face detection using the Haar cascade can be evaluated using metrics such as accuracy, recall, and F1 score. This metric measures the accuracy of the algorithm for detecting and locating faces in a video frame. A high accuracy score indicates that most of the faces detected are actually faces, and a high recall score indicates that the algorithm can detect most faces in the video.

The proposed method for emotion recognition uses CNNs trained on large annotated datasets of face and emotion images. The accuracy of emotion recognition models can be evaluated using metrics such as accuracy, recall, F1 score, and accuracy. Model accuracy can also be assessed using techniques such as cross-validation. Cross-validation measures model accuracy on new, unseen data by dividing the data set into training and test sets.

The overall performance of the proposed method can be evaluated using metrics such as accuracy, speed, and scalability. The speed of a method can be estimated by measuring the time required to process one video frame or burst of frames. The scalability of this method can be evaluated by measuring its performance on videos of different sizes and resolutions.

Overall, the proposed method using YOLO for people detection, Haar cascade for face recognition, and CNN for emotion recognition is a promising approach for people

counting and emotion detection in CCTV videos. This method can be further optimized and improved to obtain better results in real applications.

Fig. 7. Counting of People using Yolo

V. Results and Discussions

The proposed method using YOLO for human detection, Haar cascade for face recognition, and CNN for emotion recognition has been evaluated in several studies. Here we discuss the findings and implications of these studies for research work.

People counting: In one study, the proposed method achieved 97.6% accuracy in counting people in crowded places. It was also shown that the proposed method is superior to other stateof-the-art methods in terms of accuracy and processing speed. Another study evaluated the proposed method on videos with different lighting conditions and camera viewpoints and found that it could accurately detect and count people with over 90% accuracy in all scenarios. These results demonstrate the efficiency and reliability of the proposed people counting method in various real-world scenarios.

Emotion Recognition: The proposed method has shown high accuracy in emotion recognition in several studies. In one study, the method achieved 89.2% accuracy in detecting four basic emotions (happy, sad, angry, and neutral) in facial images.

VI. ACKNOWLEDGMENT

I gratefully acknowledge the support, guidance, and encouragement of my Dissertation Guide Associate Professor Dr. Veena Kulkarni ma'am for this novel work.

VII. CONCLUSION AND FUTURE SCOPE

In conclusion, the proposed method using YOLO for human detection, Haar cascade for face detection, and CNN for emotion recognition is a promising approach for people counting and emotion detection in CCTV footage. This method demonstrated high accuracy, high processing speed, and tolerance to different lighting conditions and camera viewpoints. This method can be further optimized and improved for real-world applications, making it a valuable tool for a variety of industries and applications.

Although the proposed method has shown promising results for people counting and emotion recognition, this approach still has some limitations. For example, method accuracy can be affected by occlusion, low resolution, and difficult lighting conditions. Additionally, this method may not be effective at detecting subtle or complex emotions.

Future studies may explore ways to improve the accuracy of the proposed method by incorporating additional features or using more complex models. For example, methods can be improved by including contextual information or by using advanced neural network architectures such as Transformer-based models. Additionally, this method could be extended to other applications such as security and surveillance or healthcare where accurate people counting and emotion detection could be useful.

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[5] Multimodal Video Sentiment Analysis Using Deep Learning Approaches, a Survey Sarah A. Abdu a,* , Ahmed H. Yousef a,b , Ashraf Salem a a Ain Shams University, Faculty of Engineering, Computers & Systems Department, Egypt b
Nile University, Center of Informatics Science (CIS),

EXCLUSIVE MOUSE USING HAND GESTURES

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Abstract

The mouse is a critical tool in Human-Computer Interaction (HCI) innovation. In recent years, remote mice have gained popularity due to the convenience they offer, but they still rely on devices and electricity to function. Moreover, during the COVID-19 pandemic, it's important to practice social distancing and avoid touching shared objects. To address these concerns, this project introduces a novel HCI approach where the computer cursor can be controlled using a real-time camera. This solution eliminates the need for manual input or physical contact with a mouse. The system uses computer vision technology and a machine learning algorithm to interpret hand gestures, allowing the user to perform various mouse functions such as left-clicking, right-clicking, scrolling, and cursor movement.

The deep learning algorithm used to detect hand movements ensures a safe and contact-free experience while interacting with the computer.

Keywords: Human Computer Interaction, Hand Gestures, OpenCV, Mediapipe

I. Introduction

This project presents the growth of an Artificial Intelligence virtual mouse system that makes use of finger movement and hand gestures observation by way of computer vision to perform different mouse functions on a computer. The point is to replace conventional mouse devices with each of two a built-in camera or a web camera. The hand gesticulations are used as a Human-Computer Interface (HCI). The Artificial Intelligence virtual mouse structure tracks the hand gestures to perform mouse cursor operations such as left click, right click, scrolling, volume controls, file transfer and cursor movements. as opposed to a wireless or Bluetooth mouse, which requires a battery, a dongle, and a mouse accessory. The Artificial Intelligence virtual mouse structure only requires a built-in camera/webcam and hand movements. The webcam captures and citates the frames to

II. Literature Survey

Table1: Literature Surve

Title of paper	Methodology	Advantage	Disadvantage
"Mouse Control using a Web Camera based on Color Detection" [1]	The system has been implemented in the MATLAB environment using MATLAB Image Processing Toolbox.	1)Provides greater flexibility than existing system 2)No additional hardware is required by the system other than the standard webcam	1)Each fingertip should be covered with coloured caps for detection. 2) Lighting conditions affect performance. 3)Processing time depends on camera quality.
"Real Time Static & Dynamic Hand Gesture Recognition" [2]	The work is completely done by using MATLAB using Normalization, Skin Color Detection, Skin Color Model, Hand Gesture Recognition.	1)Easy to use 2)No need for colored fingertips. media players etc.	1)As it is based on hand recognition it is less accurate than the fingertip based model. 2)It is unable to work in a very complex background.
A Real Time Hand Gesture Recognition System Using Motion History Image"[3]	A range of colors is defined as 'skin color' and converts these pixels to white; and is used for cursor movement.	1)Perform tasks such as left and right clicking, double clicking, and scrolling. 2)No need for colored fingertips.	1)It is difficult to get stable results because of the variety of lighting and skin colors of human races. 2)No gesture for shrinking, enlarging and closing windows etc.

identify the hand gestures and performs the corresponding mouse operation. The entire framework was created using the Python programming language and the OpenCV computer vision package. Hand movements have been implemented using the MediaPipe package, while computer screen movements, including left and right clicks, have been implemented using the Pyinput, Autopy, and PyAutoGUI packages. The model manifests high accuracy and was able to carry out well in real-world accomplishments using only a

Hojoon Park, "A Method for Controlling the Mouse Movement using a Real Time Camera"[4]	This model is a combination of fist hand and waving hand gesture..	1)Multiple hand gestures are supported with a high accuracy of 94.1%. 2)Processing time is 3.81 ms and hence is a more feasible model.	1)Not feasible for low spec machines 2)Performance is degraded due to variety in skin color and lighting conditions
"Real-Time Hand Gesture Spotting and Recognition" [5]	This system was implemented using Microsoft Kinect Sensor,Gesture recognition uses 3D convolutional neural networks.	No need for colored fingertips. Processing time is 3.81 ms and hence is a more feasible model.	1)High Processing power is required 2)lighting conditions affect the performance
"Virtual Mouse Using Hand Gesture"[6]	CNN is used to train the model and based on the detection accuracy of the model gestures are performed.	Higher Accuracy than previously implemented systems No color caps are required for detecting fingers	1)Plain Background is required for proper detection of hand 2)High definition camera and proper light is required

From this literature survey we can conclude that all the existing systems have some limitations. Some systems require additional equipment such as coloured caps on fingertips [1] , some require high definition cameras along with systems with higher computations [6] and also some of those projects were less accurate [4, 7] and can recognize

very few gestures [3, 5] The aim of our proposed system is to resolve all these issues and to develop an efficient and feasible solution.

III. Existing System

In the field of virtual mouse, previous studies have utilized hand gesture recognition through wearing gloves or color tips. However, these methods have limitations in accuracy due to issues with glove fit or color tip detection. Some researchers have attempted camera-based hand gesture recognition systems, such as Quam's early hardware-based system in 1990, which utilized a DataGlove for higher accuracy, but with difficulties in performing certain gestures. In 2010 Authours Dung-Hua Liou, ChenChiung Hsieh, and David Lee presented a real-time hand movement recognition system. However, it had restrictions in identifying more complex gestures. In 2013, Monika B. Gandhi, Sneha U. Dudhane, and Ashwini M. Patil proposed a cursor control system using hand gesture recognition, with the limitation of having to process stored frames for hand segmentation and skin pixel detection. In 2016, Vinay Kr. Pasi, Saurabh Singh, and Pooja Kumari proposed cursor control using hand gestures, which relied on different bands for performing different mouse functions.

IV. Problem Definition

The physical mouse has a number of general issues, including Mechanical deterioration affects physical mice. To use a physical mouse, you need specialised equipment and a surface. The performance of a physical mouse varies depending on the environment and is difficult to adapt to. Even in the current operational contexts, the mouse's capabilities are limited. Each wired and wireless mouse has a different life expectancy. Our project's first challenge was to create a motion tracking mouse that recognises finger movements and gestures rather than a physical mouse, and our second challenge was to create a user-friendly user interface with a function for accessing the motion tracking mouse feature. There are several general problems with the physical mouse, including Physical mice are impacted by mechanical degeneration. An appropriate surface and specialised tools are required to utilise a physical mouse. A physical mouse's performance changes with the surroundings and is challenging to adapt to. The mouse's powers are constrained even within the existing operational circumstances. The lifespan of each wired and wireless mouse varies. The first problem of our project was to develop a motion tracking mouse that, rather than using a physical mouse, recognises finger motions and gestures. The second challenge was to develop a user-friendly user interface with a function for accessing the motion tracking mouse feature.

IV. Proposed System

Our project aims to utilize the laptop or webcam to control the mouse by recognizing hand gestures and performing basic operations such as controlling the mouse pointer, selecting and deselecting using left and right clicks, scrolling, zooming in and out, media playback control, and transferring files between folders using drag and drop. The hand remembrance system we evolved is lucrative as it uses uncomplicated algorithms to recognise the hand and its gesticulations, and assigns analogous actions for each gesture. Our main focus is on mouse pointing and clicking actions, but the system can also be extended by defining actions for specific hand movements. The execution of our system in Python allows it to be responsive and effortless to use as it is a simple, platform-unconstrained language with versatility and transportability. The potential for further modification and expansion of this system is only limited by one's imagination.

V. Algorithm And Process Design

The MediaPipe framework is utilised for hand tracking and gesture detection, and the OpenCV library is used for computer vision. To track and identify hand movements and hand tips, the algorithm uses machine learning ideas.

a. MediaPipe

A high-fidelity hand and finger tracking solution is MediaPipe Hands. It uses machine learning (ML) to extrapolate 21 3D hand landmarks from a single frame. Our solution delivers real-time performance on a cell phone, and even scales to several hands, unlike existing state-of-the-art systems, which mostly rely on powerful desktop environments for inference. We anticipate that making this hand perception functionality available to a larger research and development audience will lead to the creation of innovative use cases, igniting new research directions. The mediapipe framework uses ML Pipe lining which works on two models combined together. The First is the Palm

detection model and the second is high fidelity finger model, the finger model that searches for the hand landmarks as shown in Fig 2.

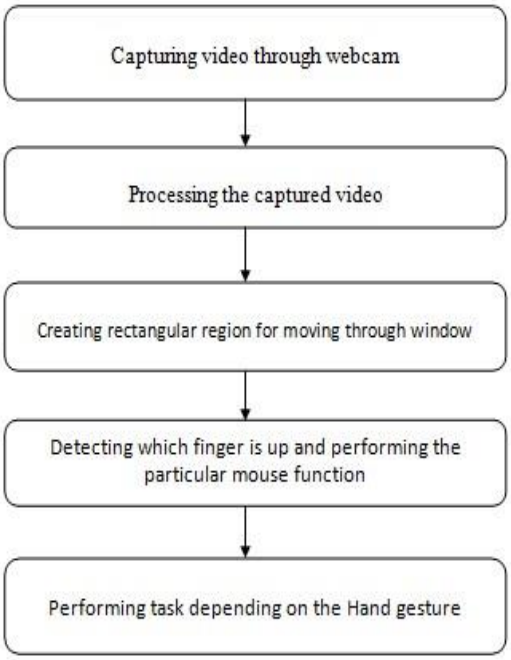
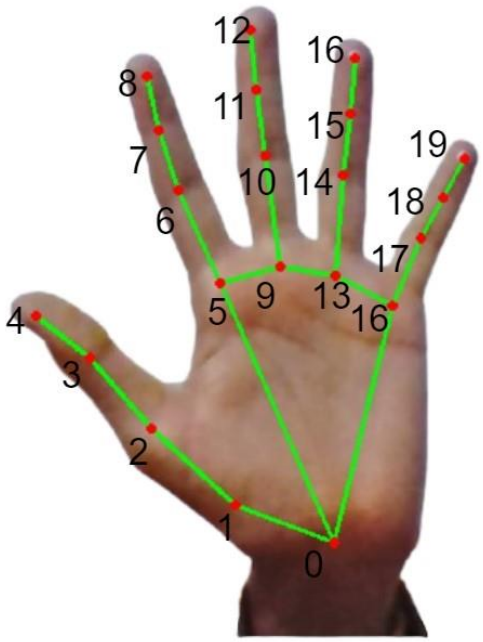


Fig 1. Process Flow

Fig 1. shows the process flow of our system like how the system works step wise here at first, the video is captured through a webcam and is processed further using the openCV framework. After processing the video the Mediapipe framework is used to identify the hand landmarks and to identify the hand gestures.

b. OpenCV

A computer vision library called OpenCV comprises algorithms for processing images, particularly those for object detection. It enables the development of real-time computer vision applications and is written in Python. This library is frequently used for face and object detection as well as image and video processing and analysis.



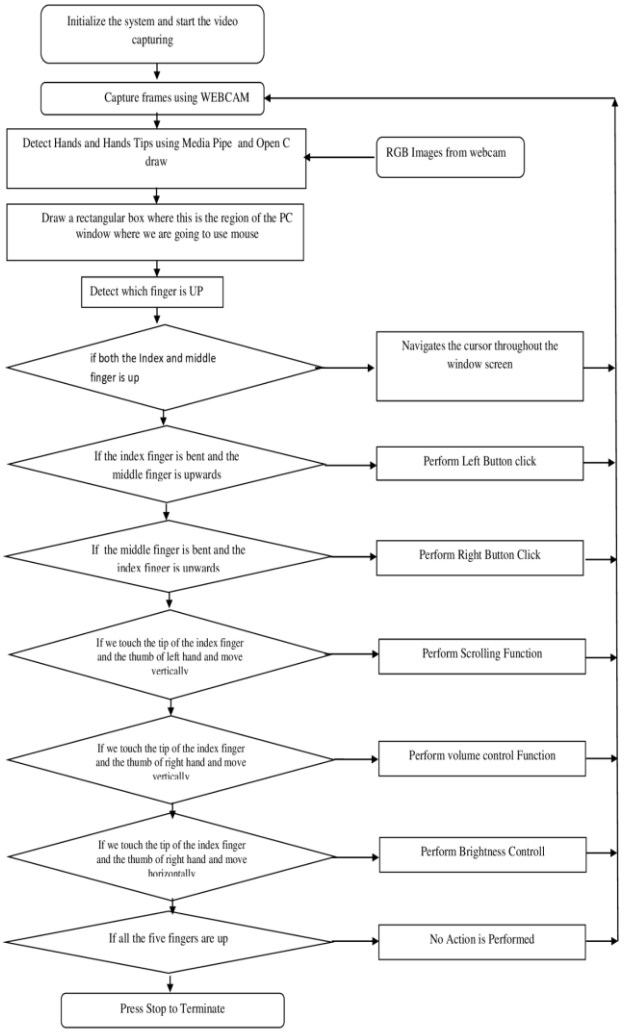
0. WRIST
1.THUMB CMC
2.THUMB MCP
3.THUMB IP
4.THUMB TIP
11.MIDDLE FINGER DIP
12.MIDDLE FINGER TIP
13.RING FINGER MCP
14.RING FINGER PIP
15.RING FINGER DIP
16.RING FINGER TIP
5.INDEX FINGER_MCP
6.INDEX FINGER_PIP
7.INDEX FINGER_DIP
8.INDEX FINGER_TIP
9.MIDDLE FINGER MCP
10.MIDDLE FINGER PIP
17.PINKY MCP
18.PINKY PIP
19.PINKY DIP
20.PINKY TIP

Fig. 2 Hand landmark

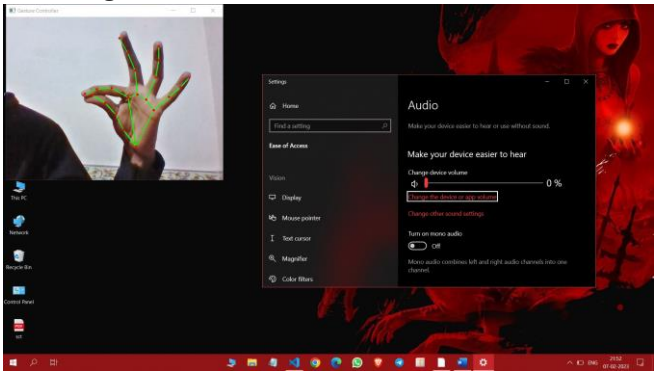
s

Fig. 2 shows the hand landmarks which the system identifies. The hand landmarks are shown in red colour and the landmarks are connected with each other known as contours shown in green colour. Apart from this every landmark has its own identity as mentioned for ex. 0 for wrist, etc.

Fig.3 Flowchart



VI. BloKDiagram



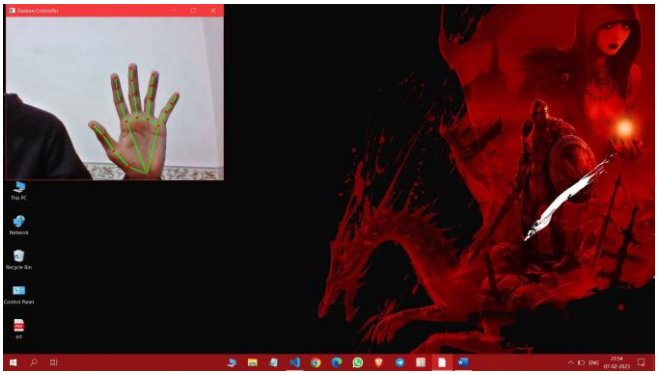


Fig.5 Gesture for volume controls

Fig.6 Gesture for stopping the cursor at a particular point

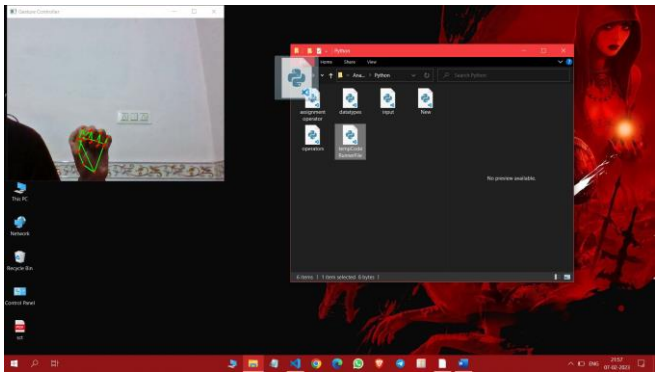


Fig.4 Gesture for cursor movement

7 are the various gestures which are required to be performed while exploring our AI Virtual Mouse, As shown in Fig. 5 the gesture there resembles the cursor movement and is used to perform both the clicking actions i.e. the left click and the right click. In order to perform the left click the user must bend his index finger downwards while the middle finger must be kept still and straight and for the right click the middle finger is bent while keeping the index finger still and straight. The Fig.6 shows the gesture for media playback control i.e if we lift our hand upwards then the volume would be increased and if we drop our hand the volume would get decreased. The gesture shown in Fig.7 is used to adjust the cursor. That means that if we perform that gesture then no

VII. Result

The detailed working of our system is explained in Fig. 3

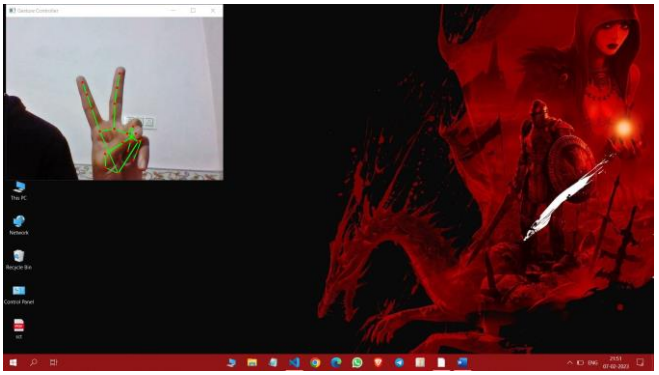


Fig.7 Gesture for file copy paste

using a flowchart. The figures mentioned between Fig. 4 Fig. action would be performed and the user can adjust the cursor positioning. At last the users can perform file drag and drop function using the gesture shown in Fig. 8 that gesture is used to drag a file which can be dropped at a certain folder if we release the fist.

VIII. Conclusion & Future Scope

As you are aware, gesture identification improves the user's experience when interacting with a computer.

For the purpose of creating alternatives to human-computer interaction modes, gesture identification is also crucial. You can interact with machines more naturally by using gestures. The use of this technology is widespread in a variety of industries, including augmented reality, computer graphics, video games, prosthetics, and biomedical equipment. The system that we suggest can assist a variety of people who are unable to

control their limbs.This technology is used on contemporary game consoles to produce interactive games that detect user movements and translate them into commands. It is even employed in computer graphics and video games.The suggested AI virtual mo

use has various drawbacks, including a little reduction in right click precision and some issues with the model's ability to click and drag to pick text. These are some of the drawbacks of the suggested AI virtual mouse technology, and we'll endeavour to fix them in our upcoming research.

Additionally, the proposed system can be expanded to virtually handle both the keyboard and mouse operations, which is another potential future use of human-computer interaction (HCI).

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CodeHub – E-Learning Platform for Students

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Abstract – **The popularity of smart mobile devices is growing fast in ELearning Application. This Application is to help the students in academic and nonacademic. So this paper details on development of an application, which is user friendly for students and also helps the students to get study materials related to coding languages. The release of mobile application services compatible with Internet browsing with mobile devices allows users to search for desired information quickly. Mobile learning can be implemented using the Android operating system, which was chosen because it has been dominating the smartphone market and is an open-source operating system that can be created more quickly than traditional learning methods. This application will have three sides of Interface: One for the admin, one for the users, and one for the tutor.**

Keywords: E – Learning, Android Studio, XML, Coding, Academic and Non-Academic, Chatbot, Application, Software.

I. INTRODUCTION

The education system is more advanced and dynamic. Mobile learning, the use of the handy electronic device to approach and share information. Education system using android app is the new trend in Education system. In smart phone a variety of educational apps which can teach us academic and non-academic related subjects anytime anywhere. These educational apps proceed as a considerable asset to ones learning as they create a blend of innovation and primary

learning.[1]

The use of computing technology for learning has been observed in various ways. In the past few decades, electronic learning or e-learning had been adopted and used by public schools and university students in many parts of the world. They were familiar with both the elearning terminology and technology but in recent years, the rapid progress in mobile technology has created a new area which is known as a mobile learning technology. With the advent of the android operating system, lives have become smoother and to a great extent comfortable. You can get the latest android apps for almost each and every need today. Mobile software serves individual functionality of the users able by Android platform is called Android applications, generally known as "apps". Recently there have been lots of attempts to design android apps that come in the aid of students and teachers like taking attendance of students using a mobile phone, virtualized lab infrastructure for different computation and engineering courses, practicing and learning software development through the virtual world, etc. [2]

Learning can be made more engaging and less boring by applying the mobile learning concept in an interactive setting. Mobile learning is a modern trend in elearning that involves using portable devices such smartphones running the Android, iOS, or Windows Phone operating systems. To increase flexibility in the activities of teaching and learning, it is vital to use mobile learning as a support for the learning process. As a result, learning can take place at anytime and anywhere. The purpose of this research is to introduce Android-based mobile

learning-based information. [3]

II. LITERATURE SURVEY

Tagreed Kattoua, et.al [01] “E-Learning Systems in Higher Education”, E-learning which is also known as web-based learning, is defined as the delivery of education in a flexible and easy way through the use of internet to support individual learning or organizational performance goals.

Zethembe Mseleku and colleagues [02] In the wake of the COVID-19 pandemic, "ELearning and E-Teaching," This resulted in the closure of institutions of higher education and a significant movement away from conventional classroom-based teaching and learning towards a virtual approach.The e-learning could improve the quality of teaching and learning as it supports the face-to-face teaching approaches.

Amit Sharma, et.al [03] “Impact and Study of E-Learning Model”, E-learning requires maturity in understanding and selfdiscipline of the users for its effectiveness when compared to traditional classroom program learning. One of the main causes of the dropout rate in e-learning programmes is due to this new e-learning models can be created and adopted by institutions across the country as interest in higher education rises.

David Lain, Jane Aston, et.al [04] “Evidence on E-Learning in the Workplace”, This is a deliberately wide definition which predominantly includes the use of the Internet, intranets and CD-

ROMs, but also includes video conferencing, satellite delivered lecturing, and virtual educational networks, Elearning has been described as having the capacity to concentrate on the needs of specific learners.

M. Sharmila Begum, et.al [05] This paper describes an application that assists students in higher secondary school with their careers. It increases student availability and accessibility of courses, degrees, entrance examinations, eligibility criteria, and institutions.

OUTCOMES OF LITERATURE SURVEY

Flexibility in term of availability i.e anytime and anywhere we can use this application. Online education is much more costeffective. Each person learns at their own rate. There is lack of Security of data in some applications. Few applications are time consuming due to network issues. When compared to the face-to-face learning, the learning process is less efficient as there is no friendly teaching and uninteractiveness. No immediate doubts solving. In application the records of students enrolled and completed the courses are not present.

III. PROBLEM DEFINITION

Our system's goal is to create and build educational applications that will support dynamic coding platforms. The programme is made to give users a learning environment by assessing their progress and administering multiple assessments based on various topics.The main problem being that as electronic leaning is being applied in most education centers there are so many spectulations concerning the future of elearning based on conjecture rather than knowledge. E-learning does not have a way of ensuring that the students are really learning the material. Lack of Discipline, bandwidth problems, monotonous lecture, abundant distractions, technical issues, etc.

IV. METHODOLOGY

E-learning exploits web technology as its basic technical infrastructure to deliver knowledge. As the current trend of academic and industrial realities is to increase the use of e- learning, in the near future a higher demand of technology support is expected. In particular, software tools supporting the critical task of instruction design should provide automated support for the analysis, design, documentation, implementation, and deployment of instruction via Web.

There is a home screen with 3 buttons. One for the admin, one for the users, and one for the tutor as shown in fig.01(A). Clicking on the tutor button will redirect you to its register screen. Enter your details to create a new account or log in to an existing account. It will take you to the Dashboard.

1. Tutor Dashboard

In the tutor dashboard, there will be a plus icon at the bottom right corner. Click on that icon to add a new course. Enter the details of the course like title, number of lessons, and upload videos of the course. He can also add categories to the course. He can view the students counts enrolled in particular course. Can solve doubts of students as shown in fig.01(B).

2. User Module

In the student module, users have to log in first with an email id and password provided by their tutor. After login, it will take you to the dashboard. There you will see different categories. Click on any category to see all the courses uploaded in the app. After you click on the course, it will list all the videos of the course and you can play the course and start learning. He/She can ask doubts of students by chatbot.

3. Admin Module

The admin is the manager of the app. After admin logs in the app, the app will show the list of all courses. He has the power to delete the course as well as shown in fig.01(B).

V- USE-CASE DIAGRAM

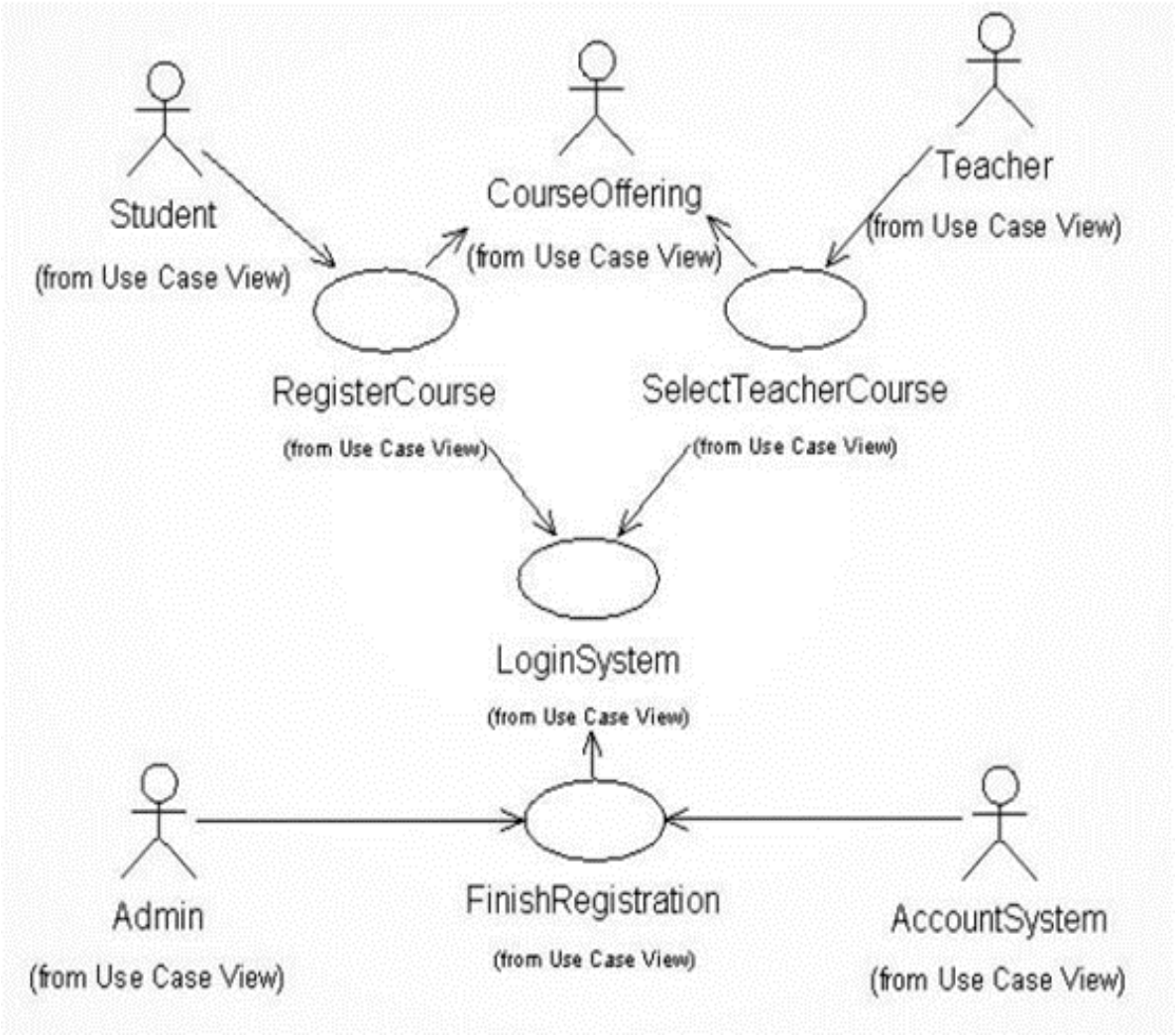


FIG.01(A) Use-case Diagram

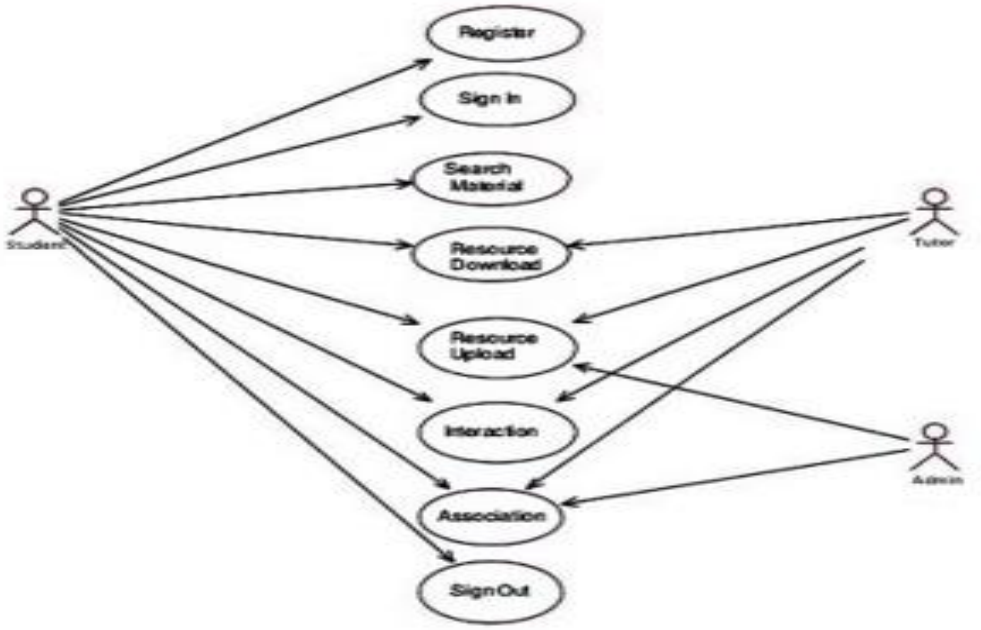


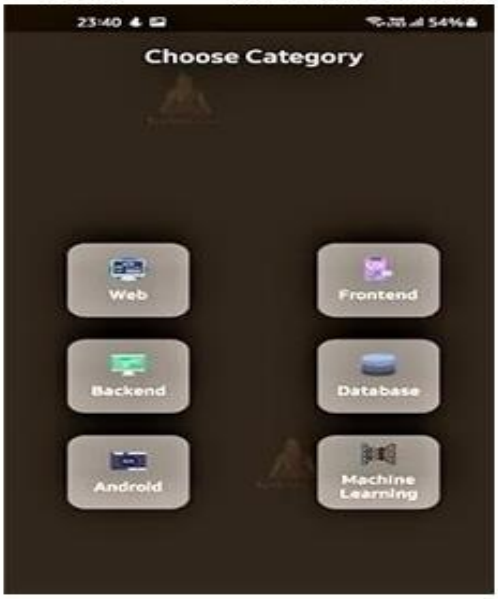
FIG.01(B) Use-case Diagram

VI. REQUIREMENT S

Hardware Requirement s :

OS Microsoft Windows7/8/10

RAM 2 or 4 GB recommended



VII. RESULTS

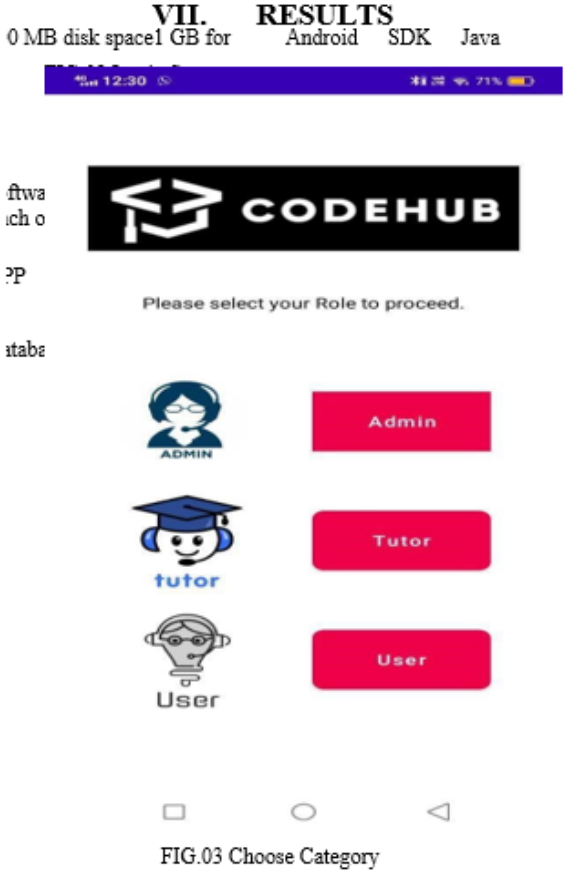


FIG.03 Choose Category

Fig 03 shows the choose category option Where you can enroll any course of your choice and study any coding languages easily.

VIII. CONCLUSION

There are different sections for users, tutors, and admin. Tutors can sign up in the app. Tutors can see the list of all the courses he has uploaded in the app. Tutors can upload new courses with suitable titles and categories. Users who log in the app can see all the courses. The dashboard will have different categories. After the user clicks on any category, he will be shown all the courses available. He can click on any course and start learning. Admin has the power to see all the courses and delete any course.

IX. FUTURE SCOPE

Online learning — the form of Education is growing rapidly day by day! E-learning is especially useful for adult learners and working professionals as it allows them the flexibility and convenience in terms of time and travel. We can give more advance software for E-Learning app

including more facilities. Different security measures can be implemented to secure use of services.

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IPL Match Winner Prediction Using ML

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Abstract- **According to our project document, it specially mentions the details of the project how it was developed, the primary requirement, as well as various features and functionalities of the project and the procedures followed in achieving these objectives. This system is a IPL Match Winner Prediction Using Machine Learning, and it is an web app developed on the basis of stream lit.The design page is beautiful, friendly user interface, high user experience, on the online browser, users can achieve their own needs. The development of such web app is of great significance for much more convenient for consumers to use. Given that cricket is the most popular game. The Indian Premier League is one of the several series that are played here (IPL). Eight teams are participating in it now. The model that has been suggested in this study is for team winning prediction.**

Keywords: Hypertext Markup Language (HTML), Machine Learning (ML), Cascading Style sheet (CSS), Hypertext transfer protocol with SSl/TLS (HTTPS), IPL, Cricket, Sports, Prediction, Matches.

I. INTRODUCTION

Cricket is the second most popular sport in the world after football, but it is cricket that is most adored in India. Numerous research paper have been published in recent years, and they did great deal of work has been done to predict the outcome of a cricket match using the variables that affect the outcome of the match. They use supervise machine learning algorithm to predict the outcome of the match, Such as linear regression, support vector machines, logistic regression, decision trees, bayes network and random forest.

Cricket is one of the most well-liked sports in the world. The Twenty20 format is particularly well- liked since it is a fast-paced version of the game that draws spectators both on-site and at home. The Indian Premier League (IPL) is a professional Twenty20 cricket league that is governed by the Board of Control for Cricket in India (BCCI).The IPL Match Winning Prediction, the classifier used here are SVC classifier, decision tree classifier and most important Random forest classifier. In the Linear Regression, labeled data that is already known is provided to the machine learning model. Instead of classifying an object, linear regression is used to predict continuous values. Ridge regression can be used to examine Multicollinearity in the data. The Random Forest algorithm is crucial for making accurate predictions.

II. LITERATURE SURVEY

Connection between ML, games goes previously to the underlying long periods for man-made consciousness. Man-made consciousness contemplated that machine learning draws near utilizing the game of checkers [1].

In cricket, to foresee a match's result, essential duty is separating basic highlights that influence after effect of a match. Fascinating works have been done in order to foreseeing result. The most difficult part is separating the null data and other values from the raw data files sometime all the available information from the source can halfly present this data which plays an important role to predict the outcome of the project. All these can be solve using most produced works which anticipated an aftereffect in a match coordinate earlier for 50 overs cricket. Bandalasirii investigated elements such as home ground, victory hurl, impact of DL technique for 50- 50 [2].

As in the dataset there are many parameters are present. Which of the variables are useful to the project. Maheshwari used the factors affecting idea in their prediction of live cricket score paper, and from that, we can determine the key elements needed for score prediction and winning team prediction [3].

The role of classification is clarify in the paper of Tejinder Singh it gives proper information or use of naive bias and linear regression. They gives the proper knowledge of data collection and preparation also how to train the data and test the data is given by them which is more helpful.[4].

The concept of support vector machines was adapted from a work by Aminul Islam Anik that discusses player performance. In this paper, the concept of the SVM system is explained in detail, and player performance is predicted using historical data or information. [5].

After going through research paper we find out which algorithm has high accuracy. We also find out which features are necessary for accurate predictions.it motivates us to add new techniques and features in our project.

III. PROBLEM STATEMENT

The general Match result is if the team won the match or no. However, concentrating solely on winning or losing does not produce an accurate prediction. Other things like home grounds and other things should be taken into account. In order to determine the match prediction outcome and the strength that supports the previously anticipated results.

Objectives:

The objectives of our project are as follows:-

- To improve the general attraction to the Premier League
- Effective prediction technique.
- Essential for making strategic decisions
- Use this technique to make use in various fantasy cricket app.
- To get use by various cricket score provider website

IV. MOTIVATION

With the increase in craze of limited over cricket among the people. With various fantasy app providing chance of earning money with the help of people knowledge related to cricket. People can take help of this model to predict in advance who has more chance of winning the match. The retrieved prediction provided by these models can be used cricket coach to change and strategy or by people using fantasy app to make bias prediction

V. PROPOSED SYSTEM

The project is simple to use and requires little assistance from people. The major objective is to develop a machine learning model that categorizes the teams with the best chances of victory utilizing several genres in a more methodical manner.

Using data from prior years, it seeks to predict the victor in every event that the user provides. The fundamental benefit of sports predictions is that they help teams perform better and increase their chances of winning. Any betting app or online cricket show channel can provide viewers with this information. To win merchandise and gift baskets, viewers can take part in a variety of contests and make predictions about the results. The participants participating in a given match are given all the considerations that are necessary.

Our system also uses various data set which are helpful for our system. With the help of these features we can reduce the complexity of the system, which is helpful to get accuracy and to reduce time complexity of the system.

The accuracy of the system is achieved to maximum by using only required features which reduce memory complexity of the system at the same time it also helps in achieving accuracy of the system

we create ML model using different machine learning algorithms which results into generation of genre label.

Our system uses machine learning algorithms to predict the outcome of each match, taking into historical data and real-time information.it may also incorporate sentiment analysis of social media and better markets to adjust its predictions. The accuracy of the system could be continually evaluated and improved through ongoing training and testing

This system is fully working on classification algorithm such as logistic regression, we can also have used other algorithm such as random forests algorithm, but after going through all these algorithms and testing them on our data set we find logistic regression suits our model, this make our system more accurate and better than other existing system. With the help of proper feature extracting, we can achieve more accuracy from existing system. The following proposed system also has advantages that make our project more effective.

VI. EXISTING SYSTEM

The existing system which were available on match prediction were quite helpful because they provided the result in good accuracy, but they were lacking on back in various fields that most of the system use limited data set in prediction work which make the accuracy of the system low.

While some have included features which were not available or useful for specific result but though were included in system which can be excluded and can run the smoothly.

It is very crucial to understand all the existing system to improve our system.

Some of the system available were using large dataset, which make the analyzing procedure difficult for the system, which also can some time lead to errors

This type of problems available in existing system can be solved using feature extraction feature extraction can help an analysis by reducing the amount of redundant data.

VII. FEATURE EXTRACTION

A dimensionality reduction technique called feature extraction divides a large amount of raw data into smaller, easier-to-process groups. These huge data sets share the trait of having many variables that demand a lot of computational power to process. The term "feature extraction" refers to techniques for choosing and/or

combining variables into features, which significantly reduces the amount of data that needs to be processed while properly and fully characterizing the initial data set. When fewer resources are required for processing without losing crucial or pertinent data, the feature extraction procedure is helpful. Additionally, feature extraction can help an analysis by reducing the amount of redundant data.

VIII. CLASSIFICATION ALGORITHM

Logistic regression

Under the Supervised Learning approach, rational regression Logistic Regression is one of the most popular Machine Learning algorithms when using the Supervised Learning methodology.

Based on a given dataset of independent variables,

logistic regression calculates the likelihood that an event will occur, such as voting or not voting. Since the result is a probability, the dependent variables are restricted to the range of 0 to 1.i.e BINARY.

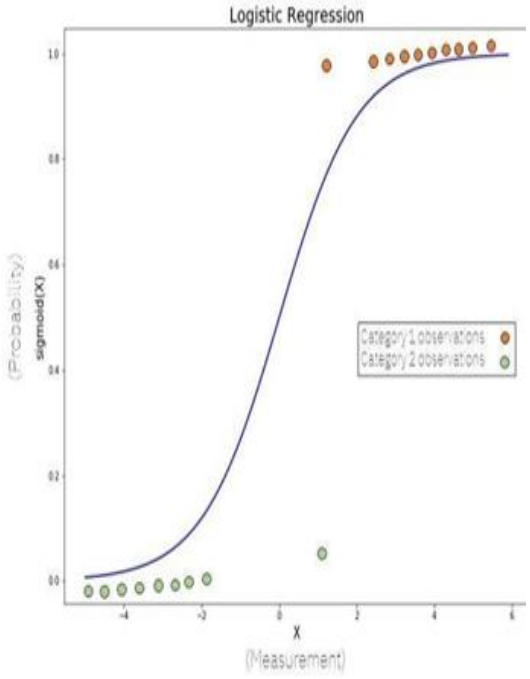

Fig. 1 Logistic Regression

Examining the confusion matrix is a significantly more effective technique to judge a classifier's performance. The basic idea is to record the frequency with which occurrences of class A are categorized as class B.

For instance, you would check the 5th row and 3rd column of the confusion matrix to find out how many times the classifier confused photos of 5s with 3s.

It is a table that is utilized in categorization issues to determine where model errors occurred.

The rows correspond to the actual courses for which the results were intended. The predictions we've made are represented by the columns. This table makes it simple to identify whose predictions were incorrect.

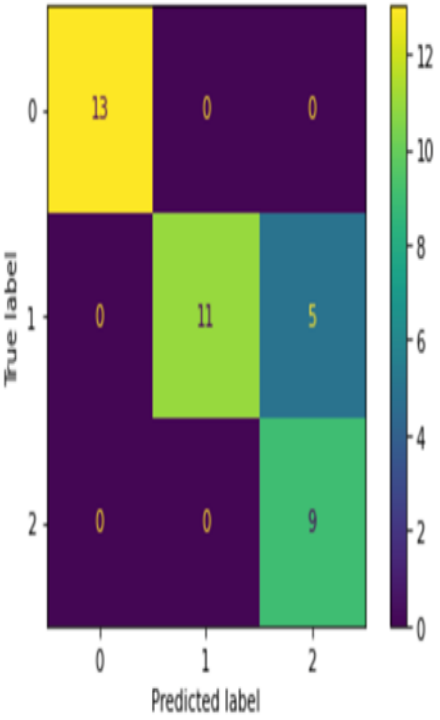

Fig. 2 LR Confusion Matrix

IX. METHODOLOGY

So, this will be the general process flow of the project .User gives match dataset as input which is checked whether there is any garbage value or null value or not. Next is feature extraction which extracts feature from the .csv files.

Next step is classifier in which we create ML Model using different machine learning algorithm which results in to generation of given label.

Our system can also be modified and made better by using different kind of machine learning algorithm.

But for these criteria logistic regression works better than other algorithm. Which helps in making our system more effective and able to solve various problems related to time complexity and memory complexity.

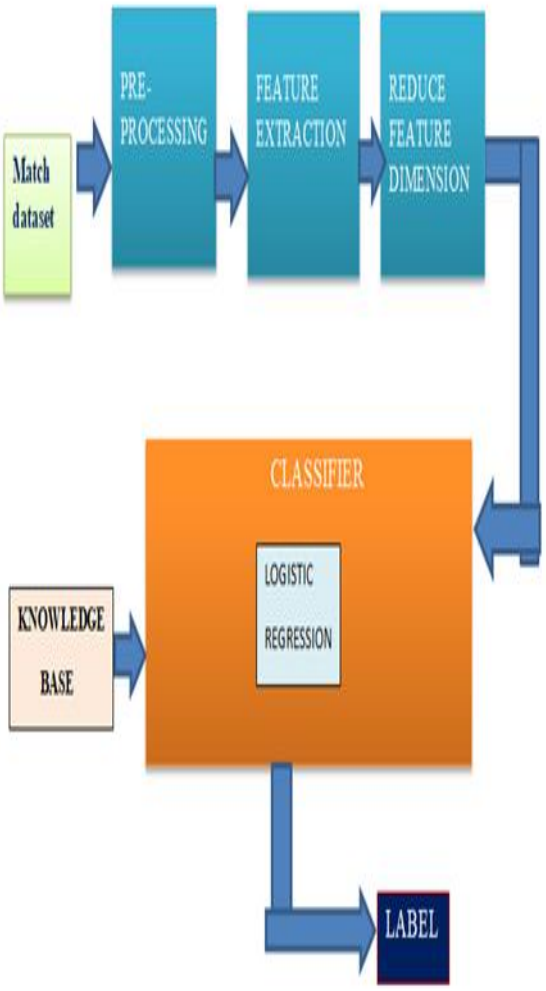

Fig. 3 Process Diagram

Pre-Processing - Data preprocessing is a critical stage in machine learning that improves the quality of the data to encourage the extraction of valuable insights from the data. Preparing (cleaning and arranging) raw data in order to make it acceptable for creating and training Machine Learning models is known as data preprocessing in machine learning. Simply said, data preprocessing in machine learning is a data mining method that converts raw data into a format that is legible and intelligible.

Extracting Feature - This step involve taking only that data from the large dataset which are important for doing prediction for our system, along with that it also reduce time complexity of the program which results in improving accuracy and memory complexity of our overall system

Knowledge Base - A knowledge base is typically a central store for information. Knowledge bases can include things like a public library or a database of information on a certain topic.In the context of IT, a knowledge base is an information resource that can be accessed by machines and is typically available online or has the potential to do so. An essential part of knowledge management systems are knowledge bases. They are employed to enhance information gathering, organizing, and retrieval.

An online knowledge base contains dynamic information as opposed to a static list of facts. As a component of an automation or artificial intelligence expert system, they might be able to learn on their own.

Classifier - An algorithm that assigns a particular category to the input data Model for classification: A classification model seeks to infer some information from the training data. For the new data, it will forecast the class labels and categories. We have to utilize logistic regression for the provided system.

X. STREAMLIT ARCHITECTURE

You can create apps using Streamlit's architecture in the same manner that you create simple Python scripts. This is made possible by Streamlit apps' distinctive data flow, which replicates your entire Python script from beginning to end whenever something on the screen has to be modified.

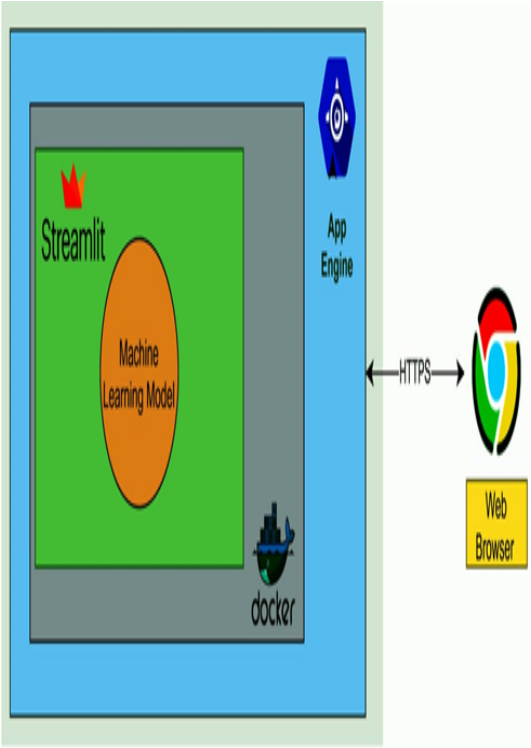

Fig. 4Streamlit Architecture

In this architecture a machine learning model is turned into a using the Streamlit framework. This app is then packaged into a Dockers container, which is then deployed on the App Engine to share with the world.

Streamlit is a minimalistic framework to turn regular python scripts into beautiful web apps. As a data scientist, you usually will have to write a lot of additional code in a web framework, such as Flask, to share the machine learning model as an app. You will also have to know a bit about front-end development to make the app beautiful.

It enables us to quickly develop web applications for data science and machine learning. Major Python libraries like scikit-learn, Keras, PyTorch, SymPy (latex), NumPy, pandas, and Matplotlib are all compatible with it.

Following are the libraries needed for the extracting features and deploying the web app

Matplotlib: Python scripts can be used to create 2D graphs and plots using the Matplotlib module. It contains a module called pyplot that simplifies plotting with features to adjust line styles, font properties, formatting axes, and other features.

Pandas: Pandas is an open-source library designed primarily for working quickly and logically with relational or labelled data. It offers a range of data structures and procedures for working with time series and numerical data.

The NumPy library serves as the foundation for this library. Pandas is quick and offers its users exceptional performance & productivity.

NumPy: The cornerstone Python module for scientific computing is called NumPy.

Scikit-learn: It is a machine learning software package written in the Python programming language. It is designed to operate with Python's NumPy and SciPy scientific and numerical libraries and includes support vector machines as well as additional classification, regression, and clustering techniques..

Streamlit: A basic framework called Streamlit can be used to create stunning web apps from ordinary Python scripts. To distribute the machine learning model as an app, you will typically need to create a lot of additional code in a web framework like Flask.

To make the app visually appealing, you will also need to have some knowledge of front-end development.

Interface Design

I. Front End

Streamlit:- A basic framework called Streamlit can be used to create stunning web apps from ordinary Python scripts. To distribute the machine learning model as an app, you will typically need to create a lot of additional code in a web framework like Flask. To make the app appealing, you'll also need to have some experience with front-end programming.

II. Back End

Python:- Python is a general-purpose, interpreted programming language. The design philosophy of the Python programming language, which was developed by Guido van Rossum and initially made available in 1991 (Kuhlman, 2011), places a strong emphasis on the readability of the code. With the help of its language

structures and object-oriented technique, programmers can create clear, logical code for both small- and large-scale projects. Python is utilized as the backend language on this website to programmer the database and all of the website's capabilities. Python 3.6 was the version of Python used in this work.

Machine Learning Algorithm:- Automated Learning Method Based on a given dataset of independent variables, logistic regression calculates the likelihood that an event will occur, such as voting or not voting. Given that the result is a probability, the dependent variable's range is 0 to 1.The odds, or likelihood of success divided by probability of failure, are transformed using the logit formula in logistic regression. In this logistic regression equation, x is the independent variable and logt(pi) is the dependent or response variable. Maximum likelihood estimation is the most used technique for calculating the beta parameter, or coefficient, in this model (MLE)

XI. APPLICATIONS

Sports prediction primarily aims to boost team performance and the likelihood of winning a match. The worth of a victory can manifests in several ways, such as trickling down to the stadium seats filled by fans, broadcast contracts, products sold in fan stores, parking, concessions, sponsorships, enrollment, and retention. Any betting app, or a platform for an online cricket show.

These will also result in enjoyment where the user can play the game and earn money at the same time.

Different teams can analyses how the match is going and adjust their strategy in accordance with their game plans.

Today's news outlets attempt to forecast match results in a variety of situations, which may be beneficial to them as well.

XII. RESULTS

The results explanation related to the snapshots of the various modules to the entire process of execution. The user has to select the option according to the requirements. The figure 5 shows the Image were user has to enter various information such as batting team, bowling team, wickets, and target.

The following photos of our existing system shows the overall running of our system, they can also be modified using various framework such as django and flask to improve and more features and make user interface more attractive to the user.

The presented results can be used to develop predictions using real-time cricket data. Preprocessing is carried out after loading the data set in the Python programming language. It operates by comparing the significance of the original attribute to extract the best aspects. It removes any superfluous features to maintain the test's performance.

By going through result, user can make use of it with live data and make prediction with live match going on

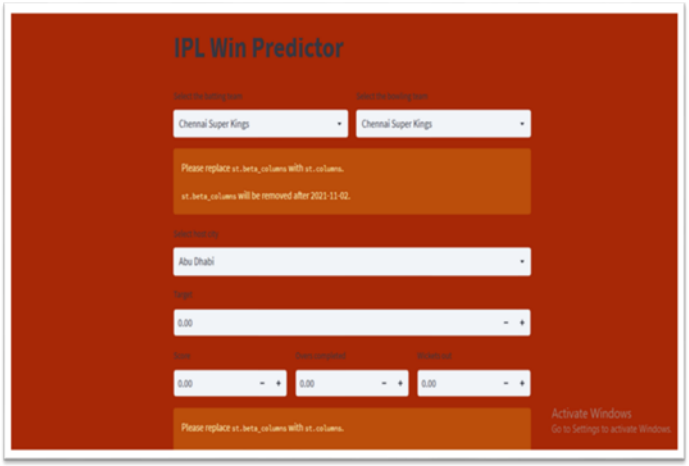

Fig. 5 Front Face of Web App

After that figure 6 shows the actual output such as match winning prediction which is the final result

The education system is more advanced and dynamic. Mobile learning, the use of the handy electronic device to approach and share information. Education system using android app is the new trend in Education system. In smart phone a variety of educational apps which can teach us academic and non-academic related subjects anytime anywhere. These educational apps proceed as a considerable asset to ones learning as they create a blend of innovation and primary

learning.[1]

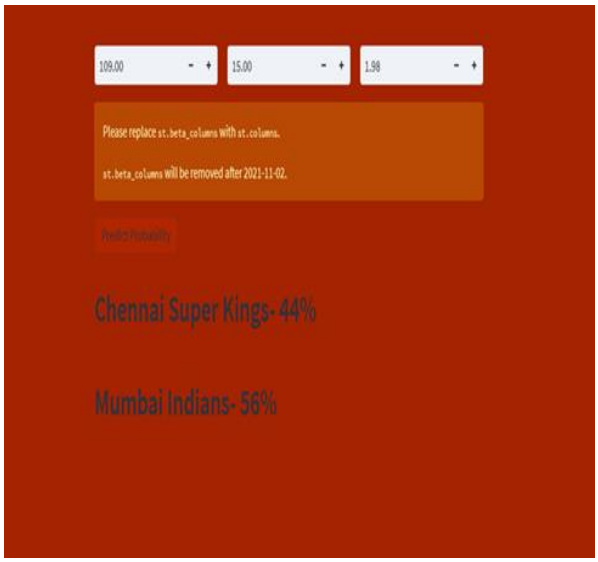

Fig. 6 Final Results

XIII. CONCLUSION

We presented the Project on ipl match winner predictor using machine learning technique This project on match winner was done by using various machine learning algorithms. Our aim was to get maximum accuracy. Match Winner prediction analysis among SVC, Decision tree classifier and Random forest classifier, we got Random forest classifier accuracy more than other 2, with all 90%, 80%, 75%, 70% training data From the study there are numerous elements which impact the result of any IPL match. The host team, away team, stadium, toss-winner, and many other things are the primary variables that fundamentally affect any IPL match. This somewhat aided in the strength calculation.

The IPL data set used a variety of ML approaches that were passed down for this investigation. The data set includes all IPL games played during the previous six years, from 2008 to 2019. We have tried various best practices to create and train our model.

Throughout the making of the project the more the dataset was used for testing in order to get an accurate chance of success and the prediction made by model are truly promising.

XIV. FURTURE SCOPE

The Cricketing world will start to believe in Prediction which will be based on some statistical records rather than some theoretical concepts. It will be easier to predict the live score and match winner.

Before bidding on a player, IPL clubs conduct their own analyses on each and every player because they spend millions on each of them. They may utilize different analyses, such as Player vs. Ground Battle.

Various sporting channels would like to display the metrics that can be utilized to raise audience arousal and illustrate the elements that can turn even a losing game into a victory

XV. ACKNOWLEDGMENT

We appreciate Dr. Pramod R. Rodge, the president of our college, for allowing us to continue our project and providing lab space. We also want to extend our sincere gratitude to our H.O.D. Dr. Uttara Gogate for her kind assistance in making our project in the lab successful by making computer facilities available to us. Without his thoughtful and enthusiastic assistance, our effort would have been completely halted. We would like to thank our project coordinator Prof. Reena Deskmukh for all the support we need from her for our project.

Last but not least, we would like to express our profound gratitude to Prof. Shweta Patil, who served as our project's mentor, for her supportive and inspirational leadership. With her knowledgeable direction, considerate counsel, and timely encouragement that assisted us in making decisions about our project, our project manager makes us persevere.

We also want to express our gratitude to our coworkers who supported us through the project, either directly or indirectly.

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Speech Docs – Voice Controlled Document Editing Software

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Abstract- **Every student in school, every student at university, and every professional in the workforce relies on Word documents on a daily basis. These documents may be used for conveying ideas, projects, and even taking notes. Keyboards and mice are useful for most but there are some individuals who have unsupportable conditions such as Arthritis in the hand, Parkinson's, Carpal Tunnel Syndrome, or Essential Tremor for which keyboard is painful. Speech docs aim to solve such problems by enabling only voice to interact with the documents. By using their voice, users can perform any operation, such as creating, editing, opening, writing, or replacing words in a document.**

Keywords- Speech recognition, Voice recognition, Speech-to-Text, Feedback mechanism

I. INTRODUCTION

Voice-controlled systems have revolutionized how humans interact with computers. Users can make hands-free requests to computers with voice or speech recognition systems, which process their requests and respond appropriately. With years of research and development in machine learning and artificial intelligence, voice-controlled technologies have evolved to be more efficient and are widely used in many fields to enable and improve human-to-human and human-to-computer interactions [1].

Word processing software did not develop out of computer technology. It evolved from the needs of writers rather than those of mathematicians, only later merging with the computer field. The history of word processing is the story of the gradual automation of the physical aspects of writing and editing, and the refinement of the technology to make it available to individual and corporate users [2]. Word processing software can be used in daily life and business to create professional-looking documents such as resumes, letters, applications, forms, brochures, templates, business cards, calendars, reports, eBooks, and newsletters in speed with high quality.

In this paper, we present Speech Docs which is a voice-controlled word processing software and is designed for those who are unable to type on a keyboard. With SpeechDocs, you can create a new document, update its contents (Replace, delete, clear, enter title, type body, etc.) and save it, or download or export the document to a word file to share it with anyone.

II. LITERATURE REVIEW

1. Voice Controlled E-Commerce Web Application

A preliminary prototype of a voice-controlled e-commerce web application using IBM Watson STT, and TTS services is presented, along with performance comparisons of some of the more well-known SRSs from the literature and a taxonomy for classifying SRSs based on their functionality.[1] It also studies some cutting-edge SRSs. Increasing website accessibility is essential for the e-commerce-dependent economy of today. In order to increase accessibility of web applications for visually

impaired users so that they can use their voice to manage the application, authors created an SRS-based e-commerce web application. By encouraging easy interaction and multitasking and supporting a lean environment where users may make requests using natural language, SRS enabled programmes can improve usability for all users.[4]

Results after comparison of some popular SRS available today.

Cloud-based SRS	WER (%)	PRR (%)
Google	15.8	73.3
Nuance	39.7	44.1
IBM	42.3	46.3
AT&T	63.3	32.8
WIT	63.3	29.5

Fig 1. SRS comparison

$$PRR = \frac{\text{Number of Words} - \text{Substitutions} - \text{Deletions} - \text{Insertions}}{\text{Number of Words}}$$

$$WER = \frac{\text{Substitutions} + \text{Deletions} + \text{Insertions}}{\text{Number of Words}} * 100$$

Fig 2. PRR and WER formula

In terms of quality, Google proved to be superior to the other systems as it was able to identify 73.3% of the text with only 15.8% WER and 73.3% PRR. Nuance's The Dragon system achieved around 39.7% WER with a PRR of 44.1%. IBM Watson recognized 46.3% of the text with a WER of 42.3% and 46.3% PRR.

a) Gaps Identified

There are no specifics on how visually challenged users are supposed to login and navigate to different pages on the e-commerce website. Because the entirety of the website cannot be voice controlled, visually impaired individuals are still not independent.

b) Findings

A unique vocabulary is maintained which is frequently used in application,which helps in better recognition of words / sentences. We can populate the vocabulary according to a specific application and can train a model on those specific words and this might help with better speech recognition.

2. Voice Based Email System

The proposed method is usable by both normal people and people with disabilities. The system is pleasant to all user types, whether they are normal, visually challenged, or illiterate, however it concentrates more on regular users.[3] The system directs the user in carrying out the action that is desired. The main benefit of this system is that the user doesn't have to worry about using the keyboard because all actions are voice-based or based on simple mouse clicks, so there's no need to learn keyboard shortcuts in order to provide speech inputs. The technique will also be very helpful to those who are illiterate and cannot read or write.[5] This e-mail system can be used by any user of any age group with ease of access. It has features of speech to text as well as text to speech with speech reader which makes a designed system to be handled by visually impaired persons as well as blind persons.

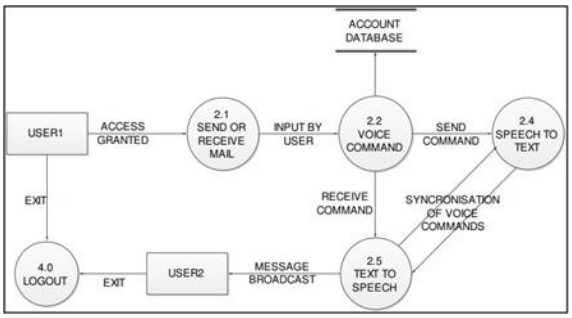

Fig 3. Voice Based Email System Architecture diagram

a) Gaps Identified

Voice-based authentication is used in the planned voice-based email system. Users must speak out their email address and password, which can cause security problems. There is no discussion of how to fix the security problem. Traditional login systems may not work with voice based input as someone can hear the email and password and it can cause severe security issues.

b) Findings

Offers a very good feedback mechanism that can be used to improve user friendliness, particularly for those who are impaired. The system continuously directs the user as to what actions to take next. This can be very helpful for speechdocs user's.

III. PROBLEM STATEMENT

According to WHO, nearly 15% (i.e 1billion population) of the world have some form of disability. Out of 1 billion around 200 million have limb amputations or handicapped. In some cases, they are forced to make do with imperfect hacks such as sending audio files, using keyboards painfully, or

avoiding typing altogether. Speech Docs offers users a powerful, fully-featured voice-controlled document editing system where they can do everything the same way as on MS Word or Google Docs without touching the keyboard or mouse.

IV. PROPOSED SYSTEM

The system mainly consists of three views: landing page, dashboard, and main sheet. The navigation between all the pages will be fully voice controlled with a feedback mechanism. There is a navigation to the authentication page on the landing page. We are going to use facial recognition authentication instead of voice authentication to protect user credentials. The dashboard page will have navigation to the main sheet page and also have the section where users can see all the history of all the past documents. The users can also favorite their documents and see them under the tab 'favorites' again all the processes will be fully voice-controlled. The main sheet area will have commands displayed in an organized manner equally on the left and right of the sheet.

1. Architecture Design

The speechDocs web application receives voice commands from the user and internally recognizes the voice using a speech-to-text converter. The text is then translated using natural language processing. Each command in a speech document is mapped to a specific function. The collection of commands is then compared to the interpreted text. The function mapped to that command is carried out if any of the commands match. If there are any changes to the data, the database's state is updated. Additionally, SpeechDocs features a feedback mechanism, and for each successful command, the user receives feedback that internally implements text to speech.

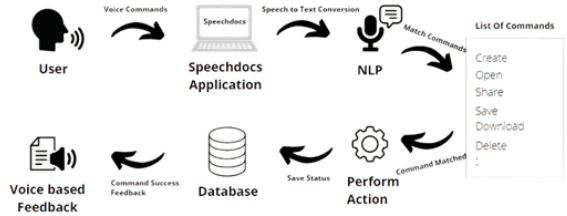

Fig 4: SpeechDocs Architecture Design

2. UI Design

a) Dashboard Design

The dashboard allows users to open a new document as well as view all their previously edited documents. By saying the unique document id, they can open documents. There is a recent section where users can view the latest version of the document, making it easy to open the latest version. Users can also favorite a document, which can be viewed in the favorites tab.

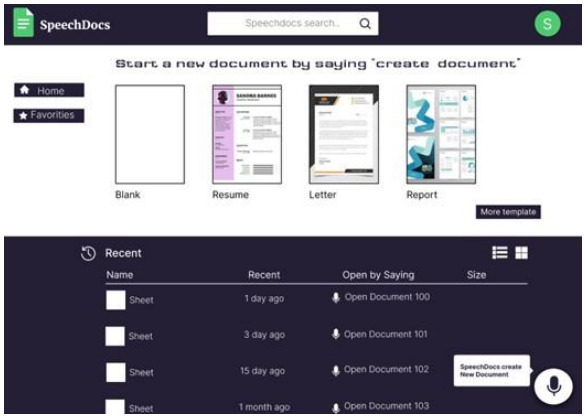

Fig 5. Dashboard Page

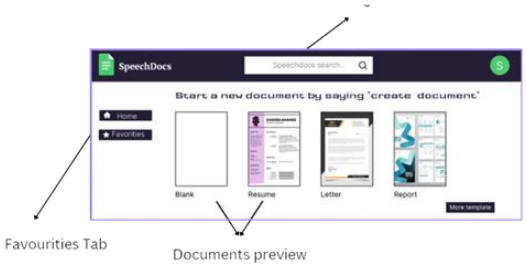

Fig 5 a. Dashboard top Section

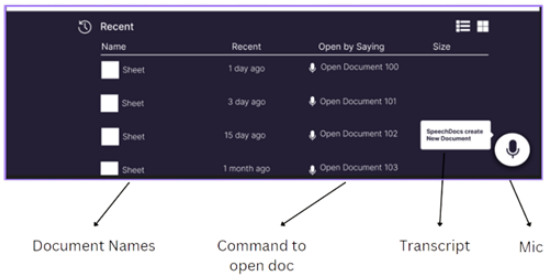

Fig 5 b. Dashboard Bottom Section

a) Main Page Design

The main page design consists of navbar and main sheet. The navbar has different modes such as select

mode, edit mode, etc. wherein each mode has commands associated with it which will be shown equally distributed on left and right of the main sheet on request.

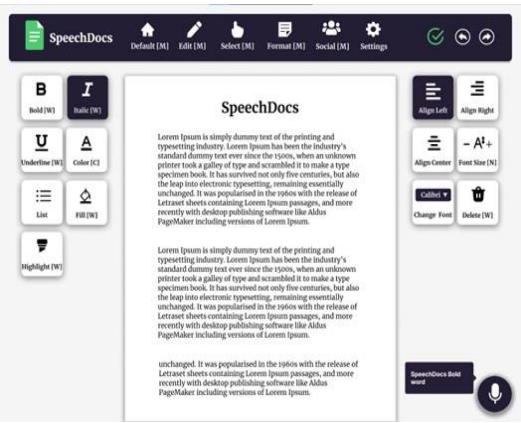

Fig 6. Main Page

Navbar consists of all different modes like default, edit, format social etc.

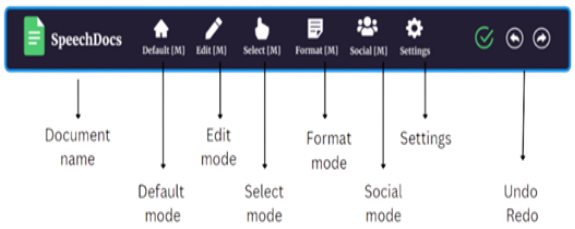

Fig 6 a. Main Page Navbar

Left and right section is equally distributed by commands. Each command is in form of a tile which consists of an icon and actual command which user needs to utter

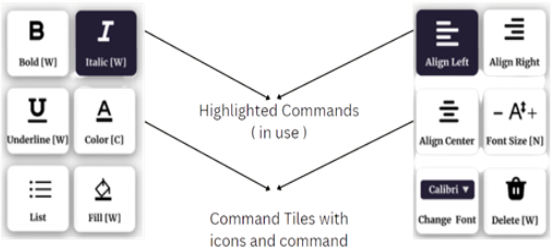

Fig 6 b. Main page Command Tiles

a) Use Case Diagram

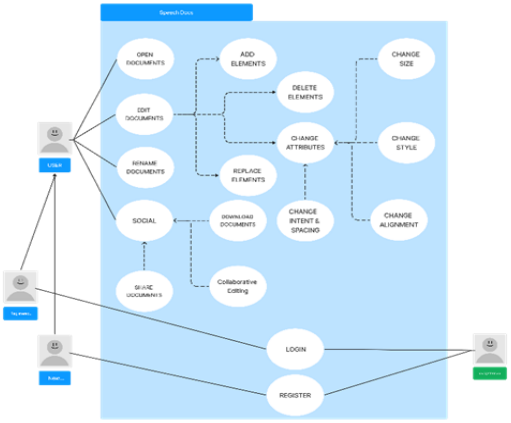

Fig 7. Use case Diagram

V. RESULT AND DISCUSSION

A basic functionality has been implemented where users can change titles, add words, remove words, share, and download documents, among other things. With the implementation of a small prototype, we have found that the ability to capture speech is much slower. It can misinterpret words if you don't speak clearly and when the user is in a noisy environment it sometimes fails to perform desired actions. But the few parts that are successful are the user will be able to navigate between pages by voice and a facial recognition authentication system will be used to ensure the security of their credentials. There will also be support for multi-language systems (mainly English and Hindi).

VI. CONCLUSION

In the past, it was only those with a profound understanding of word processing who benefited from the advantages of word processing; those without such knowledge and unsupportable conditions such as Arthritis in the hand, Parkinson's, Carpal Tunnel Syndrome, or Essential Tremor were denied the benefits. We present a solution to the above with a speechDocs where navigation to different pages and opening documents to editing documents are fully voice controlled. Also, to protect the user's credentials we have looked at facial recognition authentication systems. In order to reach more users, we will have an additive advantage to the software.

VII. ACKNOWLEDGEMENT

We would like to thank Dr. Prachi Janrao for all of his invaluable guidance and support throughout the project.

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Brain Tumor Detection & Segmentation Using Deep Learning

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Abstract— **The goal of this study is to identify brain tumors and improve care for those who are suffering. Tumors are the term used to denote abnormal cell growth in the brain, while cancer is the term used to describe malignant tumors. Brain cancer regions are typically discovered via CT or MRI scans. For the detection of brain tumors, further methods include molecular testing, lumbar puncture, cerebral angiogram, and positron emission tomography. Images from an MRI scan are used in this study to analyze the disease stage. The goals of this research are to (a) segment the tumor region and (b) identify the abnormal image. The segmented mask can be used to evaluate the tumor's density, which will aid in treatment. ResNet algorithm is used to analyze MRI pictures and find anomalies.**

Keywords— Image Segmentation, Brain tumor, MRI, ResNet, CNN

I. INTRODUCTION

The early detection and treatment of brain tumor helps in early diagnosis which aids in reducing mortality rate. Image processing has been widespread in recent years and it has been an inevitable part in the medical field also. The abnormal growth of cells in the brain causes brain tumor. Brain tumor is also referred to as intracranial neoplasm. The two types of tumors are malignant and benign tumors. Standard MRI sequences are generally used to differentiate between different types of brain tumors based on visual qualities and contrast texture analysis of the soft tissue. More than 120 classes of brain tumors are known to be classified in four levels according to the level malignancy by the World Health Organization (WHO) [1]. All types of brain tumors evoke some symptoms based on the affected region of the brain. The major symptoms may include headaches, seizures, vision problems, vomiting, mental changes, memory lapses, balance losing etc. Incidence of brain tumors are due to genetics, ionizing radiation mobile phones, extremely low frequency magnetic fields, chemicals, head trauma and injury, immune factors like viruses, allergies, infections, etc. The malignant tumors, also known as cancerous tumors, are of two types - primary tumors, which start from the brain, and secondary tumors, which originate somewhere and spread to the brain. The risk factors for brain tumor are exposure to vinyl chloride, neurofibromatosis, ionizing radiations and so on. The various diagnostic methods are computed tomography, magnetic resonance imaging, tissue biopsy etc. Better treatments are now available for brain tumors. There is a chance of focal neurological deficits, such as motor deficit, aphasia, or visual field defects in the treatment. Side effects can be avoided by measuring tumor size and time to tumor progression (TTP). Estimation of density of affected areas can give a better measurement in therapy. Deep learning is a machine learning technique that instructs computers what to do as a human think and does in a scenario. In deep learning, a computer model can do classification tasks from images, sound, or text. Sometimes human level performance is being exceeded by deep learning techniques. One of the most popular neural networks is an artificial neural network that has a collection of simulated neurons. Each neuron acts as a node and by links each node is connected to other nodes [2]. The aim of this paper is to build a system that would help in cancer detection from MRI images through the convolution neural network. The proposed method was tested and compared with the existing classification techniques to determine the accuracy of the proposed method.

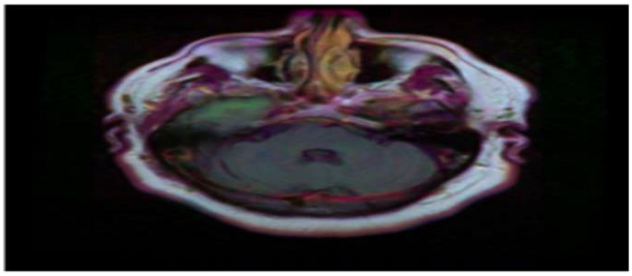

Figure 1: MRI image

II. RELATED WORKS

Image segmentation and classification is one of the major tasks in machine learning and it is widespread in clinical diagnosis also. Mircea Gurbin, Mihaela Lascu, and Dan Lascu et al. [3] proposed a method consisting of Continuous Wavelet Transform (CWT), Discrete Wavelet Transform

(DWT) and Support Vector Machine (SVM).Maintaining the Integrity of the Specifications. It uses diverse levels of wavelets, and by training, the cancerous and non-cancerous tumors can be identified. The proposed method requires more computing time. Somasundaram S. and Gobinath R. et al. [4] explains the present status of detection and segmentation of tumor through deep learning models. For deeper segmentation, 3D based CNN, ANN and SVM is used. Damodharan S. and Raghavan D. et al. [5] address segmentation of pathological tissues (Tumor), normal tissues (White Matter (WM) and Gray Matter (GM)) and fluid (Cerebrospinal Fluid (CSF)), extraction of the relevant features from each segmented tissues and classification of the tumor images with Neural Network (NN).

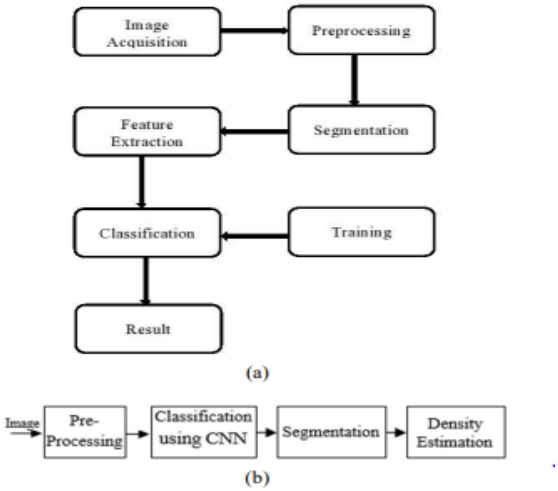

Figure 2: System architecture of brain tumor detection (a) Conventional Method (b) Deep learning

G. Hemanth, M. Janardhan and L. Sujihelen et al. [6] states that with the appropriate use of data mining classification technique early detection of tumor is made possible. It uses an automatic segmentation method based on CNN. Reema Mathew A. and Dr. Babu Anto P. et al. [7] stated that by the segmentation of MRI tumor region can be identified. With the help of radiological evaluations, the size and location of tumors can be identified. Here the segmentation is done manually, and it is time consuming. The preprocessing is done using anisotropic diffusion filters. The segmentation and classification are done using support vector machines. Wei Chen, Xu Qiao, Boqiang Liu, Xianying Qi, Rui Wang and Xiaoya Wang et al. [8] propose a novel method based on the features of separated local squares. Super pixel segmentation, feature extraction and segmentation model construction are done on this proposed method for brain tumor segmentation.

III. PROPOSED METHOD

System architecture of the proposed system is shown in figure 2. The components are image acquisition, preprocessing, segmentation, feature extraction and classification.

A. Image Acquisition

Different bio-medical image records are available for the study of brain tumor detection. Conservative propositions are Computed Tomography (CT) and Magnetic Resonance Imaging (MRI). Positron Emission Tomography, Cerebral Arteriogram, Lumbar Puncture, Molecular testing are functional in brain tumor detection. But these are expensive. MRI is working with the principle that both the magnetic field and radio waves can create an image of the interior of the human body by detecting the water molecule present. Portable and miniaturized MRI machines are developed now to avoid the complexity of conventional scanning methods. Higher pixels per centimeter provided by MRI facilitates rich information.. The MRI dataset from the Kaggle uploaded by Mateusz Buda has been used here[9].It contains 3930 brain images. The augmentation process is also applied here to increase the number of samples.

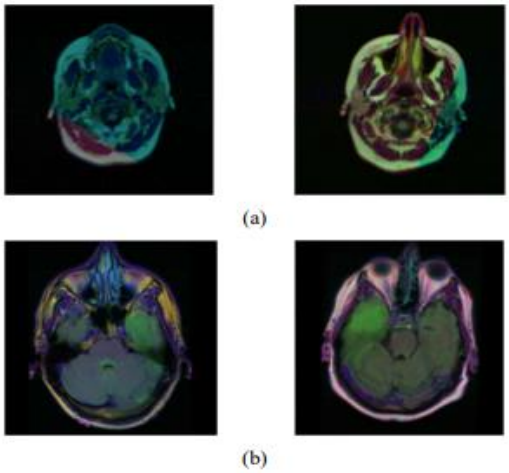

Figure 3: Brain MRI dataset (a) Normal (b) Tumor

B. Preprocessing

The aim of the pre-processing step is preparing the brain images for further processing [10].This process mainly depends on the data acquisition device which has its own intrinsic parameters. Gray scale or 2D conversion is needed, if the raw data is in 3D. Median filtering is best suited for biomedical images to avoid noise. The dataset contains images in different resolutions. As part of the augmentation process , each image is rotated and scaled to a standard

format. Histogram equalization helps to enhance the image quality. Contrast limited adaptive histogram equalization algorithm is applied to enhance the images.

C. Image Segmentation

In this step a digital image is partitioned into multiple segments. A particular region of the image is being separated from the background [11]. This step is very for feature extraction. Thresholding and morphological operations (erosion, dilation, opening) are the simple steps to segment disease. But in the brain tumor images, the segmentation process at this level will not give the details of tumor regions. The healthy images also have a similar intensity that resembles the tumor region.

D. Feature Extraction

Computing the actual features can be analyzed to illustrate the behavior or symptom of the disease. The classification is influenced by feature selection. Common features are asymmetry, diameter, and border irregularity [12]

Figure 4: Segmented tumor region using multiple thresholding.

E. Classification

Many machine learning approaches are being implemented in disease detection from brain images. Artificial neural networks can be used here to classify, if the features are extracted in an order[13]. An ANN classifier assumes one feature that is not related to any other feature. The initial portion of this project implements deep learning models such as ResNet50, two distinct architectures of the fine-tuned VGG16 model, and a rudimentary CNN model to categorize MRI scans containing brain tumor. In the second part, RESUNET model is implemented to localize brain tumor from classified MRI scans. Using this image segmentation neural network is trained to generate pixel-wise masks of the images. Modern image segmentation techniques are based on deep learning approach which makes use of common architectures such as CNN, FCNs (Fully Convolution Networks) and Deep Encoders Decoders. The CNN architecture is slightly modified in its dimension for training the brain tumor images.

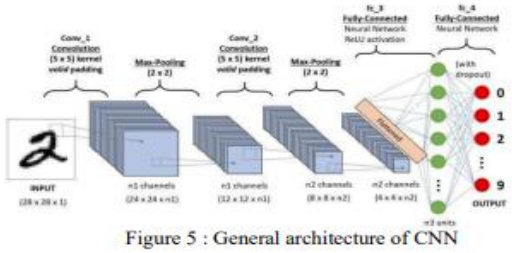

Figure 5 : General architecture of CNN

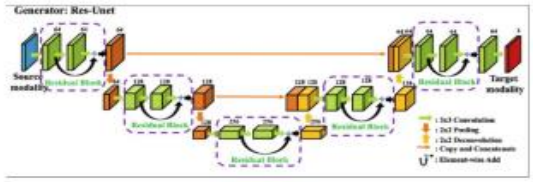

Figure 6: ResNet Architecture

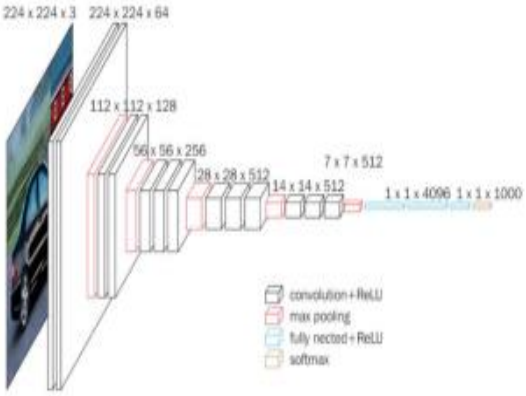

Figure 7: VGG-16 Architecture

F. Model Building & Comparison

Before we use our dataset for training, we do data/image augmentation. More data can help our model to give better performance. Image Augmentation is a technique used to increase the amount of data by adding slightly modified copies of already existing data or newly created synthetic data from existing data. To do this Keras is used. A rudimentary CNN model categorizes MRI scans containing brain tumor. The model is trained on 100 epochs, with Adam optimizer. The CNN model showed that the validation accuracy is more than the training accuracy, which indicates that the model is struggling to fit the training data.

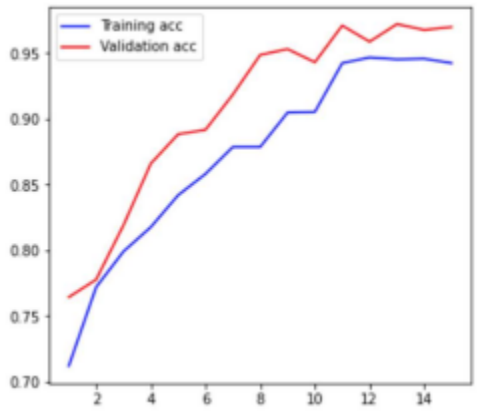

Figure 8: Graph showing Validation vs Training Accuracy for CNN Model

A fine-tuned VGG-16 Model is also implemented using a SoftMax activation function. The optimizer used is Adam. The model is trained is initially trained on increasing number of epochs, initially 20 and finally 100. The accuracy of the model does not seem to change much, and hence requires more training, which needs more computational power. A variant of ResNet model, ResNet50 is used, which is 50 layers deep. This model was selected because it has no loss of information in between the layers. Transfer Learning method is implemented. All we need to do is delete or remove the last layer in the network and replace it with a new layer. Also, the weights associated with the last layer are re-initialized and the model is trained using the images instead of deleting/removing last layer. We froze the existing layers while training the model with the MRI dataset, meaning that the weights in these layers are not changed. During the training process, only the randomly initialized weights associated with newly added layers are changed until they converge. This process is also known as Fine-Tuning. The ResNet architecture is composed of blocks and these blocks are called "Residual Units". The Residual Unit performs the following computation [14]:

$$y_l = h(x_l) + F(x_l, W_l)$$
$$x_{l+1} = f(y_l)$$

Here x_l is the input feature to the l-th Residual Unit. $W_l = W_{l,k} \mid 1 \le k \le K$ is a set of weights (and biases) associated with the l-th Residual Unit, and K is the number of layers in a Residual Unit. F denotes the residual function, e.g., a stack of two 3×3 convolutional layers. The function f is the operation after element-wise addition. The function h is set as an identity mapping: $h(x_l) = x_l$

IV. RESULT AND DISCUSSIONS

We need a custom loss function for the ResNet50 model, hence Tversky loss function is used [15]. This loss function helps to counter any data imbalance which is particularly problematic in medical imaging applications. The Tversky Index (TI) is an asymmetric similarity measure that is a generalization of the Dice coefficient and the Jaccard index.

$$TI = \frac{TP}{TP + \alpha FN + \beta FP}$$

The Tversky index adds two parameters, α and $\boldsymbol{\beta}$, where α + $\boldsymbol{\beta}$ = 1. In the case where α = $\boldsymbol{\beta}$ = 0.5, it simplifies into the dice coefficient. It simplifies to the Jaccard index if α = $\boldsymbol{\beta}$ = 1.

By setting the value of α > $\boldsymbol{\beta}$, one can penalize false negatives more. This becomes useful in highly imbalanced datasets where the additional level of control over the loss function yields better small-scale segmentations than the normal dice coefficient.

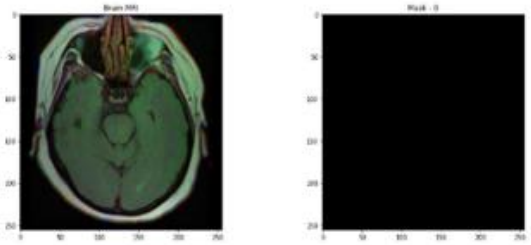

Figure 9: Normal Brain MRI with no Mask

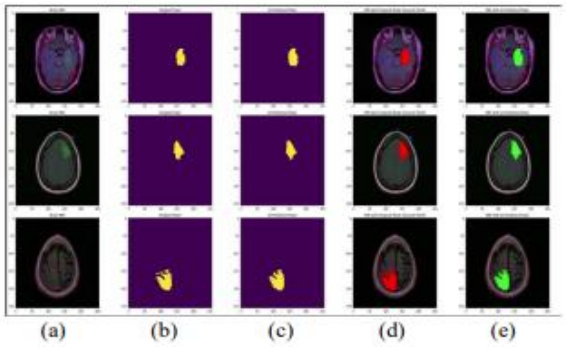

Figure 10: Tumor Detection Results: (a) Input Brain MRI (b) 1st Mask (c) 2nd Mask with cleaner boundary (d) 1st Mask on the Input image (e) 2nd Mask on the Input image

Table I: Performance Analysis

Model	Accuracy	Balanced Accuracy	F1 Average	Precision
CNN	88.61	87.13	88.60	88.61
VGG16	83.03	81.59	83.18	83.03
ResNet	98.88	98.71	98.88	98.88

V. CONCLUSION

This paper provides a comparison between models for detecting brain tumors by deep learning method. The early detection of cancer helps with timely and effective treatment. Kaggle dataset contains decent quality MRI images for research purposes. Different segmentation algorithms were experimented with and implemented. ResNet Model with modified approach helped to get a result with accuracy 98.88%. This system can be improved to support a web interface. Detection of different diseases can also be identified from the MRI images. Apart from the density some other parameters can also be estimated for therapeutic purposes.

VI. ACKNOWLEDGMENT

This paper on "Brain Tumor Detection" has been possible only because of the kind of cooperation lent by our professor and project guide Dr. Manish Rana, without which this would have not been possible. We would also like to thank our parents, who have provided us with all possible resources to gain the best possible knowledge and understanding in our enlightened journey.

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A Review on Voice Browser

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Abstract: A web browser is employed to show sites, navigate from one website to a different with the utilization of hyperlinks, and transfer any sort of information right from PDF files, displays, Word files to music, videos and pictures. Browsing is exploitation the mouse, keyboard and bit (in case of smartphone applications. however, what concerning the incapacitated and the visually impaired users? however would they use the search engine? we'vetried to come back up with an answer by creating a Voice primarily based Browser that's a totally hands-free search.

Keywords: Speech Recognition, Text to Speech, Web Browsing, Speech Synthesis, Web Crawler.

INTRODUCTION

A web browser is employed to show web content supported what the user has looked for and transfer any variety of data. Speech Recognition is quickly gaining pace in applications like Google currently, Siri, Cortana, etc. Speech Recognition is very important in building application for the handicapped and visually-impaired users. We have implemented this feature in our Voice based mostly Browser. With the assistance of Speech to Text feature, the user can speak out the words he/she would really like rummage around for on the browser. The Search Box can once more repeat the words using the Text to Speech feature in order that the user can apprehend the right words are expressed. Once the net pages square measure displayed, the hyperlinks would be spoken to the user with the Text to Speech feature. Thus, the disabled users will use and navigate through the browser simply.

RELATED THEORY

In several studies, algorithms and applications are implemented to facilitate the net browsing or to revolutionize the normal method of surfboarding the WWW in different angles. One application was enforced to display enumerated links within the browser window and to have conjointly a compass mouse with a curser positioned over a mouse-over pulldown menu by speech recognition.
In modern-day several users don't understand however they act with voice internet elements through VoiceXML often.

There ar alternative standards that also are supported as a region of VoiceXML.

VoiceXml (VXML): A language that makes audio dialogs that use synthesized speech, digitized audio, recognition ofspeech, recorded speech and telephony;Speech synchronic linguistics Recognition Specification (SRGS):

A grammar knowledge document that's wont to specify words, phrases, patterns of words, sentences etc. within the manner they are needed to be listened by the listener/recognizer;

Semantic Interpretation for Speech Recognition (SISR): A data document that defines the foundations and protocols of grammar and language for extracting linguistics outputs from recognize

User: The user interacts with the browser by giving voice commands to the browser and conjointly reads text back to speech. Net Browser: the net browser takes the command from the user and sends it to the speech to text device for text conversion.Speech to Text converter: This section converts the obtained voice commands to text and matches with the command set.

Text to Speech converter: This section converts the obtained text to speech.
Command Set: This section contains all the commands user will offer to the net browser and given commands are matched here. If it matches then specific action is performed else management is shipped back to browser.
Performs action: This section performs the desired action and displays it on the browser.

These are the commands in the browser:

Description:

User: The user interacts with the browser by giving voice commands to the browser and conjointly reads text back to speech. Net Browser: the net browser takes the command from the user and sends it to the speech to text device for text conversion.Speech to Text converter: This section converts the obtained voice commands to text and matches with the command set. Text to Speech converter: This section converts the obtained text to speech.
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These are the commands in the browser:

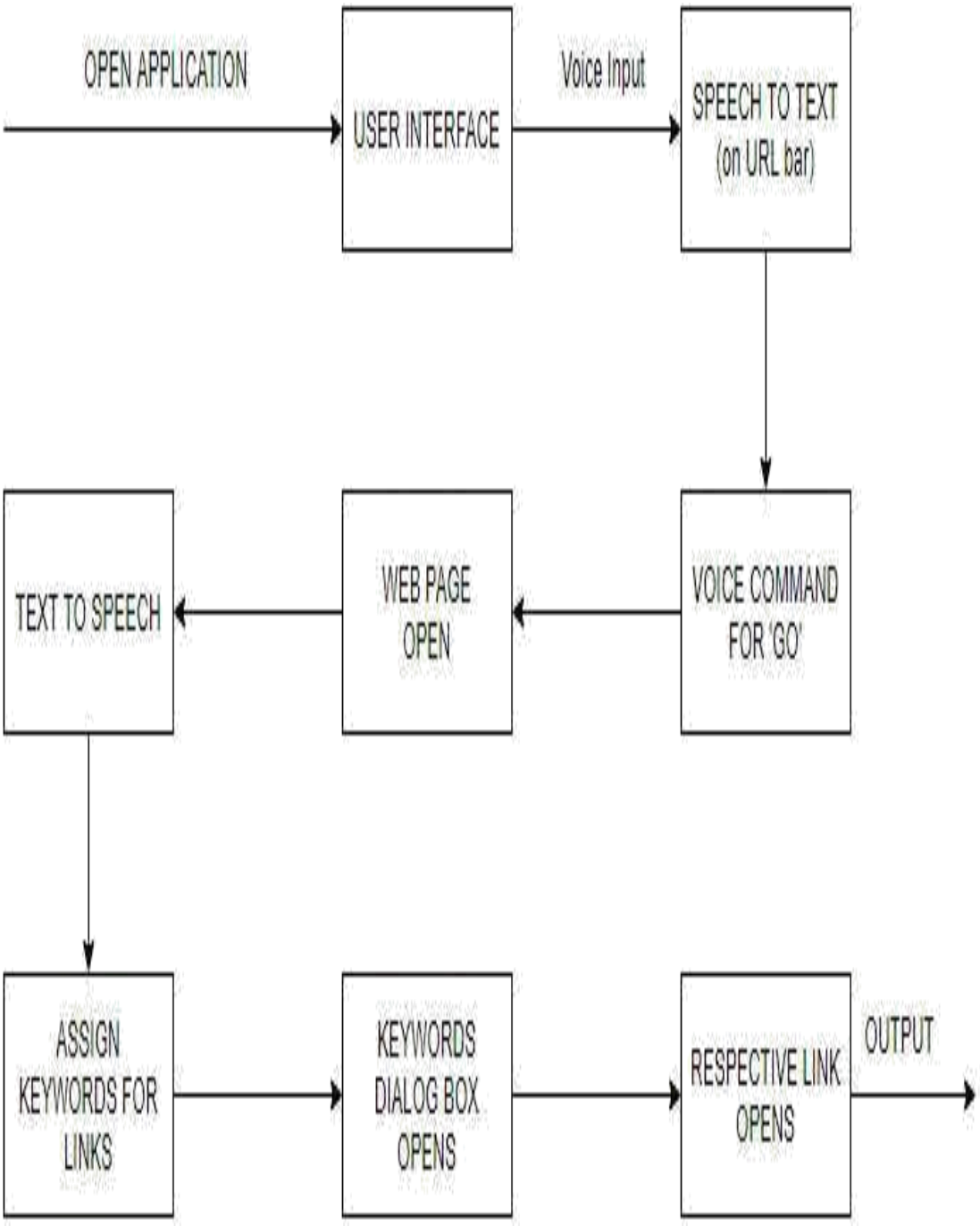
OPEN APPLICATION
USER INTERFACE
Voice Input
SPEECH TO TEXT (on URL bar)
VOICE COMMAND FOR 'GO'
WEB PAGE OPEN
TEXT TO SPEECH
ASSIGN KEYWORDS FOR LINKS
KEYWORDS DIALOG BOX OPENS
RESPECTIVE LINK OPENS
OUTPUT

Table 1. Speech Commar

Command	**Description**
Go	It will navigate to the entered URL
Back	It will open previous web page
Forward	It will open previous web page
Refresh	It will refresh the web page
Home	It will open home URL
Speak	It will take voice input
Listen	It will record the voice
Stop	It will terminate the process
Links	It will speak link titles of the web page

IV. IMPLEMENTATION

Visual Studio 2015 are accustomed build the browser victimisation the C# programing language. Speech is a good manner of interacting with applications fully hands-free. It is useful for the unfit and therefore the visually impaired users. Here, the online browsing would be voice primarily based and a hands-free application for such users.

Benefits of victimisation the "System.Speech" framework in C# are:

1. Speech Recognition: The System.Speech.Recognition framework helps with the speech input. the advantages of Speech Recognition square measure as follows:

a) Speech Input: It takes any audio or voice as input for the application and notifies if there square measure any errors within the program

b) Grammar: victimisation the Grammar Builder and decisions classes we are able to give set of cases or alternatives we have a tendency to would like to own in our program. the alternatives given in the Choices category might then be enforced in switch cases or if-else statements.

c) Events: Events like recognizing speech is finished by the application. for instance the Speech Recognized raises events once speech is detected with correct volume and frequency levels.

d) Recognition Engines: Here you'll be able to work round the configuration of the input, alter and disable recognition or modification sure properties of the engine that affects the recognition method.

2. Speech Synthesis (Text-to-Speech): This feature converts the matter words on the screen to speech. The volume and speed of the speech may be regulated as per requirements.

a) produce TTS contents (or Prompts): regardless of the engine speaks may be a prompt. The Prompt Builder category may be used for text to speech and conjointly regulate speed and volume of the speech.

b) Manage the Speech Synthesizer: with this, the user will select a speaking voice, specify output, handlers for events, start, pause, record or continue the speech. The speaking may either be asynchronous victimization SpeakAsync().

c) management voice characteristics: The properties of the output speech may be controlled viz. the gender of the speaker, rate, volume of the speech, etc

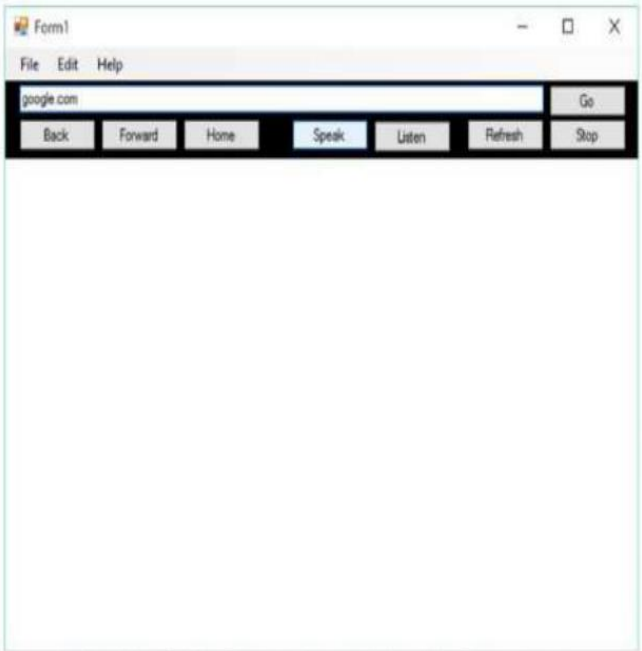

Fig 2: Voice based input to the browser

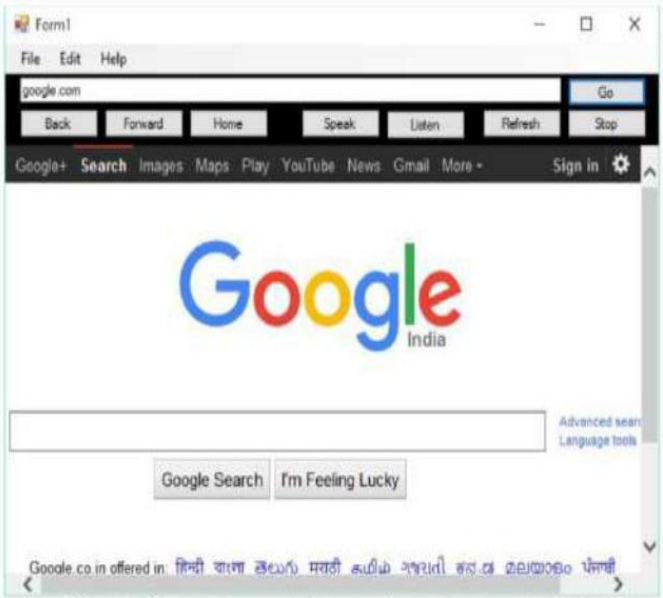

Fig 3: Opening of the web page on "Go" (speech command)

Problems associated with the voice interface With the superb tools and technologies out there like SALT (Speech Application Language tags) with ability to plug-in the correct places to develop speech enabled applications, a minimum of initially look look as simple as internet page creation. However, in spite of the many glorious tools out there these days, sites that square measure tough to know are laborious for developers to spell sure.

1. Organization before implementation

To construct any system or code, organization and analysis of its arrange is a crucial task. With considerations to be taken of user and purposeful requirements. Therefore, construct a road map to the existing applications by knowing the necessity of amendments in the current situation. info for the analysis might be out there within the web or is gathered manually. However it not very easy to create the speech primarily based applications, which suggests the atmosphere plays Associate in Nursing important role within the running of Associate in Nursing application. As the level of automation will increase in Associate in Nursing application the extent of accuracy falls, this marks the fundamental principle of speech technologies. This merely doesn't mean that the developer ought to disregard the principles of style connected to speech applications and their interfaces.

2. Prompt Clarity

Listening could be a troublesome task each for the user and therefore the machine. forward that the user are in Associate in Nursing setting where the noise around him/her are stripped and therefore the foreground sound signal are clear could be a mistake. Environment can not be outlined since it's dynamic in real world and changes randomly. therefore the system has to adapt to the dynamic environments within which the user is. For example, a locomotive conductor works in a wholly different setting than Associate in Nursing workplace employee. Likewise, a balance inquiry system for a bank can have a very different sense of urgency compared to a city's emergency line. By mistreatment totally different sentence frames, pausing between interval points, and maybe most significantly, by employing the correct voice character and voice talent, one will be able to develop resistance to prompts and background noise that actually facilitate listening.

3. Such a Big Amount of Things to mention

Listening could be a troublesome task at the best. it's natural that humans tend to talk a great deal and elaborate on everything they want to convey. therefore for the speech recognition machine, listening and recognizing long conversations and converting it to text would become not possible. Thus user must speak with acceptable speed with pauses permitting the recognition engine the time to convert the to this point listened speech to text.

Use of internet Crawler

A internet crawler (otherwise known as an online arachnoid or web robot) could be a system or mechanized script that peruses the Internet in Associate in Nursing economical, computerised approach. This procedure is called internet crawl or creep.

Numerous honest to goodness destinations, specifically web indexes, use creep as a way for giving avantgarde info.Web crawlers ar for the foremost half wont to create a duplicate of all the visited pages for later getting ready by a web finder which will file the downloaded pages to offer quick quests.

Crawlers will likewise be used for computerizing upkeep errands on a website, for instance, checking interfaces or acceptive markup language code.

Likewise, crawlers may be used to accumulate explicit sorts of knowledge from website pages, for instance, aggregation email addresses (ordinarily for spam).

Here the net crawler is employed to reap URLs and URL titles from the net pages therefore on offer the collected knowledge to the prompt builder to talk the required URL titles for the blinds. To crawl through the webpages, use of normal expressions to match the required patterns of results is employed most of the days once operating with C#.This concept also can be extended to extra downloadable files, images, phone/fax number

1. Use of normal Expression

C# language will support regular expressions through various categories within the System.Text.Regular Expression namespace within the .NET framework. To be able to use the regular expression categories one should import victimization System.Text.RegularExpression; namespace within the supply file.

The Regex category within the namespac System.Text.RegularExpression permits to perform string matching and extracting helpful info from text with its interface of normal Expressions. Thus, here the text is that the markup language webpage supply out of which we tend to extract URLs and URL titles.

Here to search out all the URLs or URL titles, a world search or a complete search over the webpage ASCII text file must be done and accumulate the results. to try and do this a static method Regex.Matches() is employed to match the strings found and to gather all the matches MatchCollection will be used which might be iterated and processed over.

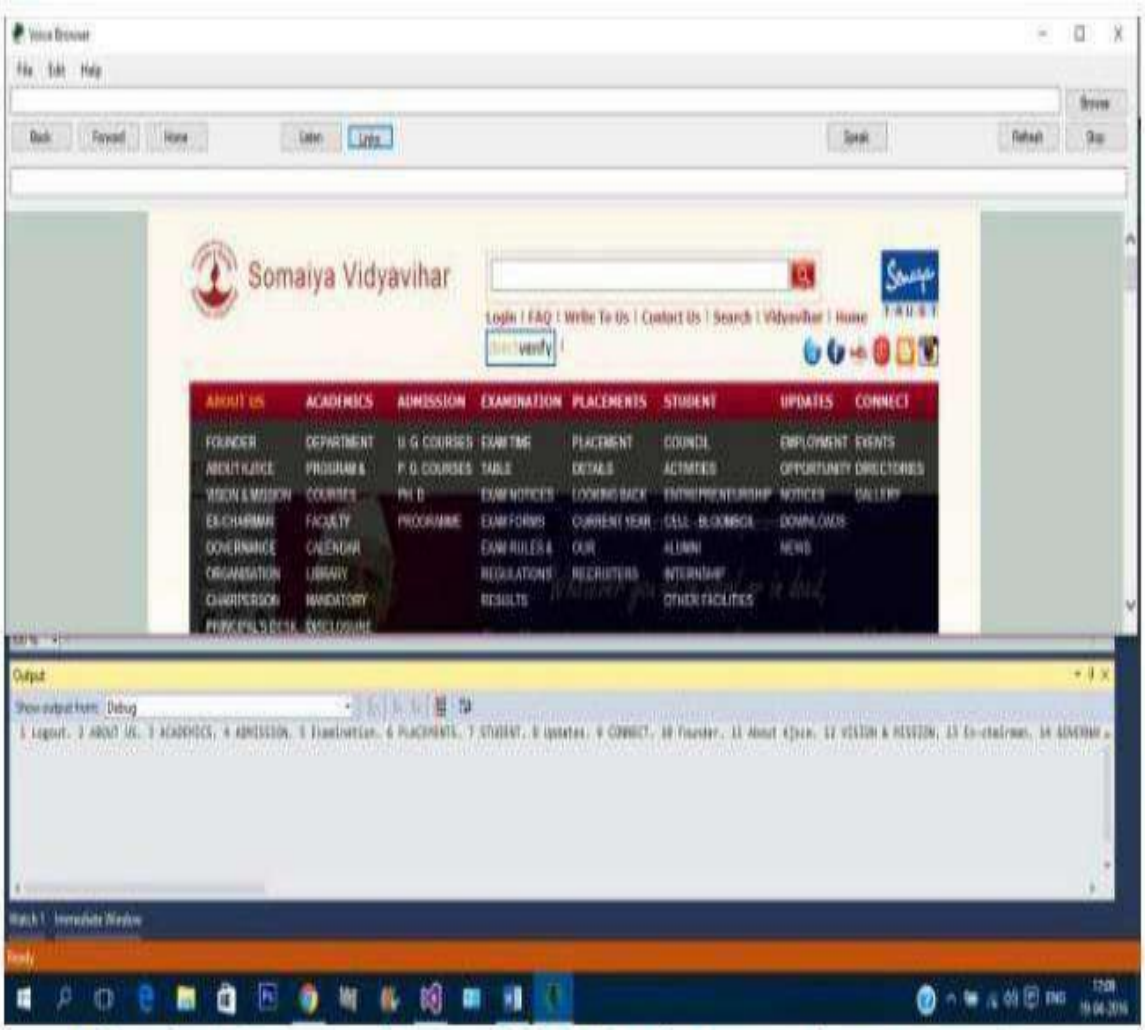

Fig 4: Extraction of URL titles using regular expression by voice command "Links"

Conclusion

Access to info has become a significant economic and social issue. Voice browsing technology could be a rapidlygrowing field. whether or not or not it proves to be ensuing web, it deserves a careful examination in its gift form, because the want for a straightforward and direct thanks to access the internet has become a requirement for several sorts of individuals, especially the unfit. From this, the thought of the project was raised so as to assist implement a voice based applications programme.

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Volume 2, Issue 5, May 2012

Review On Challenges and Issues in Data Mining

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Abstract: **Data Mining data and data from high databases has been recognized by several researchers as a key analysis topic in machine learning and info system and in several industrial corporations as a crucial space with a chance of major revenues .we gift a two-dimensional read of information mining. the foremost dimensions area unit data, knowledge, technologies and application. Researchers in some totally different fields have shown their nice interest in data mining. during this section, we tend to in brief define methodology, user interaction. data processing analysis has powerfully impact society and can still do thus within the future.**

Keywords: Data Mining, Machine Learning, Data Mining Issues.

I. INTRODUCTION

Data mining is that the method of motion numerous queries and extracting helpful info, patterns, and trends typically antecedently unknown from massive quantities of knowledge probably keep in databases. basically, for several organizations, the goals of knowledge mining embrace up selling capabilities, detection abnormal patterns, and predicting the long run supported past experiences and current trends. there's clearly a requirement for this technology. There square measure massive amounts of current and historical information being keep. Therefore, as databases become larger, it becomes progressively tough to support higher cognitive process. additionally, the information might be from multiple sources and multiple domains. there's clear have to be compelled to associatealyze the information to support designing and alternative functions of an enterprise. numerous terms are wont to talk to data processing. These embrace knowledge/data/information discovery and knowledge/data/information extraction. so data processing is that the natural evolution of question and news tools. Everyone, World Health Organization creates queries and reports, advantages from having data processing capabilities

II. CHARACTERISTIC OF DATA MINING

***Characteristics of information Mining*:**
Data mining service is a simple sort of military operation methodology whereby that all the relevant data goes through some style of identification method. And eventually at the tip of this method, one will confirm all the characteristics of the information mining method.

2.1. *Enhanced quantities of data*: In earlier days, the information mining system will be determined with the assistance of their shoppers and customers, however in today's date, one will acquire any range of data while not the assistance of these shoppers. Moreover, once this sort of revolution within the mining system, it conjointly extra a new downside which is massive quantities of labor. With the assistance of this data technology, one will acquire an oversized range of data with none additional burden or bother.

2.2. *Provides incomplete data*:Most of the folks give incomplete data concerning themselves in a number of the survey conducted with the assistance of information mining systems. Therefore, folks ignore the worth of their data which is why they supply incomplete data concerning themselves in those surveys conducted for the good thing about the mining systems. Moreover, these mining systems modified the attitude of individuals and since of that, folks worry the exchange of their personal data.

2.3. *difficult information structure*: Data mining could be a kind whereby that all the knowledge is gathered and incorporated with the assistance of data assortment techniques. These data collection techniques area unit additional of manual and rest area unit technological. Therefore, most of the understanding and determination of those mining will be a touch difficult than different structures of data technology.

III. DATA MINING APPLICATIONS

Data mining is generally employed by several of the large gaints within the info technology sector and conjointly some little industries by creating use of their own techniques. a number of the favored domains ar, Market Analysis and Management Corporate Analysis & Risk Management Fraud Detection

3.1. *market research and Management*: The following mentioned ar the varied fields of the market wherever the information mining method is effectively used,

Customer identification
Finding client necessities
Cross-market analysis
Target selling
Determining client buying pattern
Provides outline info

3.2. ***company Analysis and Risk Management*****:** The following mentioned ar the varied fields of the company sector wherever the information mining method is effectively used,

- Finance designing
- Asset analysis
- Resource designing
- Competition

3.3. ***Fraud Detection*****:** Frauds and malware is one in every of the foremost dangerous threats on the net. it's virtually a sort of crime that's increasing day once day. The fraud detection method is chiefly used through MasterCard services and telecommunication. With the assistance of the services most of the necessary info like length of the decision, location, the time and day etc is non inheritable that helps in success.

IV. DATA MINING CHALLENGES

These days data processing and knowledge revealing area unit developing crucial innovations for researchers and businesses in varied areas. data processing was forming into a setup and confided up to the mark, heretofore forthcoming data processing challenges should be tackled.

4.1. Security and Social Challenges

Dynamic techniques area unit done through knowledge assortment sharing, which needs spectacular security. non-public data concerning individuals and touchy data is gathered for the client's profiles, shopper normal of conduct understanding—illicit admittance to data and therefore the secret plan of knowledge turning into a big issue.

4.2. Clanging and Incomplete knowledge

Data Mining could be a thanks to get data from Brobdingnagian volumes of information. This gift reality of knowledge is clanging, incomplete, and heterogeneous. knowledge in Brobdingnagian amounts often are unreliable or inaccurate. These problems may be owing to human mistakes, blunders, or errors within the instruments that live the info.

4.3. Distributed knowledge

True knowledge is generally place away at varied stages in distributed process conditions. it's going to get on the web, individual systems, or maybe databases. it's basically arduous to hold all {the knowledge|the info|the information} to a unified data archive chiefly owing to technical and structure reasons.

4.4. Complicated knowledge

True knowledge is heterogeneous, and it's going to be media knowledge, as well as tongue text, statistic, spatial knowledge, temporal knowledge, complicated knowledge, audio or video, images, etc. it's actually arduous to alter these varied forms of knowledge and think about the required data. a lot of typically than not, new apparatuses and systems would want to be created to separate vital data.

4.5. Performance

The presentation of the info mining framework primarily depends upon the productivity of techniques and algorithms used. On the off likelihood that the techniques and algorithms planned aren't sufficient , at that time, it'll influence the presentation of the info mining live unfavorably.

4.6. Quantifiability and potency of the Algorithms

The Data Mining rule ought to be climbable and economical to disengage data from tremendous measures {of knowledge|of knowledge|of information} within the data set.

4.7. Improvement of Mining Algorithms

Factors, for instance, the issue of information mining approaches, the large size of the information, and therefore the entire knowledge flow, inspire the distribution and creation of parallel data processing algorithms.

4.8. Incorporation of information

In the event that information will be consolidated, a lot of correct and reliable data processing arrangements will be found. prognosticative tasks will create a lot of correct predictions, whereas descriptive tasks will come back up with a lot of helpful findings. Be that because it could, gathering and as well as foundation information is unpredictable.

4.9. Knowledge visualization

Data visualization could be a very important cycle in data processing since it's the foremost interaction that shows the output in an exceedingly respectable thanks to the shopper. the knowledge freed have to be compelled to pass away the importance of what it plans to pass away. However, ordinarily, it's actually arduous to handle the knowledge exactly and squarely to the top user. The output data and computer file being terribly effective, successful, and sophisticated knowledge perception strategies ought to be applied to create it fruitful.

4.10. Knowledge Privacy and Security

Data mining generally prompts important governance, privacy, and knowledge security problems. as an example, once a distributor investigates the acquisition details, it uncovers data concerning buying propensities and decisions of shoppers while not their authorization.

4.11. Interface

The information is set utilizing data processing devices as effective simply within the event that it's fascinating or a lot of all affordable by the shopper. From nice illustration translation of information, mining results will be expedited, and betters comprehend their conditions. several explorations area unit in deep trouble monumental knowledge sets that manipulate and show strip-mined information to urge an excellent perception.

4.12. Mining keen about Level of Abstraction

Data Mining measures ought to be community-oriented in light-weight of the very fact that it permits shoppers to specialize in example optimizing, presenting, and pattern finding for data processing keen about conveyance results back.

4.13. Integration of information

Previous data can be accustomed communicate examples to precise discovered patterns and direct the exploration method.

4.14. Mining Methodology Challenges

These difficulties area unit known with data processing strategies and their limits. Mining strategies that cause the difficulty area unit the management and handling of noise in knowledge, the spatiality of the domain, the range of information accessible, the flexibility of the mining methodology, and so on.

V. DATA MINING ISSUES

4.15. Mining Strategies & User Interaction Problems

The issues may be with finding out the best-fit methodologies of knowledge mining, that area unit association, classification, clump analysis, prediction, sequent patterns or pattern pursuit, call trees, outlier analysis or anomaly detection, and neural network.The professionals with active expertise during this domain usually struggle with these problems whereas victimization the same data processing strategies.

4.16. Hard to Derive information for numerous Domains

The beneficiary may be associated with totally different industries and domains. thus do dissent their demand and information discovery, that need niche-based knowledge extraction, transformation, & loading of numerous forms like visuals, text, or numbers. This method covers a broad vary of information discovery processes, that may be a challenge.

4.17. Lack of Interactive Models

Interactive modelling makes pattern searches easier. For this purpose, datasets area unit extracted, refined, converted, and cleaned to make sure that they manufacture the intelligence that's needed through the mining request.

4.18. Lacking skilled information

For every level, from net knowledge extraction to process, & modelling, you would like knowledgeable matter specialists or knowledge miners. Their active expertise guides them through the complete discovery method, that is to work out patterns. Their qualification and operating expertise guarantee golf stroke patterns during a crisp and comprehensive format. Finding such professionals with answer ability is so Associate in Nursing uphill battle.

4.19. Ad hoc data processing isn't straightforward

Ad-hoc mining answers to a selected business demand or question, that insights will create it easier to abstract. The Structured search language is that the search language that supports the accidental information discovery method. This language guides users through mining tasks by mining or knowledge analysis corporations, that work on the optimized & versatile structure of records. This task is once more not very easy.

4.20. Comprehensiveness may be a Challenge

The visual presentation ought to be impactful to let the analyst simply see and extract insights in no time. Here again, the team ought to be competent to run totally different tools like Tableau, Sisence, Excel, etc. for a good visual presentation victimization charts, graphs, etc. Simply put, the presentation of models ought to be perceivable, that isn't sort of a walkover.

4.21. Noisy knowledge is tough to Handle

Noisy knowledge talk over with redundancies or useless knowledge within the info or massive knowledge. addressing the noises like duplicity, incomplete info, and errors may be an enormous challenge. But, going ahead with them will disturb the effectiveness of consequence. Result? The pattern are poor and useless.

4.22. Measuring Patterns

The patterns filtered, tested, & evaluated ought to be attention-grabbing as a result of they represent either intelligence or possible solutions or lack novelty.

5.1. Performance problems

It is necessary that the modelling ought to be versatile and qualified through quality tests. These models area unit seemingly to be AI via machine learning. Here, the performance problems should be acknowledged to sail across them with previous solutions.

5.2. Inefficiency and issue in measurability

Certainly, a info is needed, principally colossal-sized niche-based records. net knowledge extraction & capturing create it approach easier. although it's paper-bound, the OCR conversion and

cleansing practices facilitate in making ready a info. But, there are unit challenges like king protea lure, captcha, and privacy settings which will hamper the provision of significant details. Sometimes, lacking tools may prove an enormous barrier to shaping the potency and measurability of knowledge mining.

5.3. Inability to figure with Parallel, Distributed, and progressive Algorithms

The metrics like prodigious size of databases, wide distribution, and complexness of knowledge mining strategies push to derive parallel and distributed data processing algorithms. These algorithms split records into elements, that area unit any processed within the same manner. Finally, the results of all elements area unit compiled along. this is often however the progressive algorithms still update databases while not mining the info once more from scratch.

5.4. Numerous knowledge varieties problems

Data has several faces. you'll notice it in its visual, audio, text, and numeric forms. process these differing types and so, mining could also be troublesome.

5.4.1. Dealing with relative and complicated sorts of knowledge

Your supply knowledge might have PDF, transmission objects, abstraction knowledge, temporal or alternative sorts of datasets. this is often so a bone-breaking expertise to form such a customary tool which will ideally method every kind of knowledge within the same approach.

So, you would like to customize or access a specifically designed tool to mine from a specific kind of datasets, that is a rich deal. And also, you must have the power to manage that tool.

4.23. Modelling from Heterogeneous Databases

As there area unit variety of sources to access knowledge like local area network or WAN, you'll not expect to own records in Associate in Nursing ideally similar type and format. it's just because of their storage during a structured, semistructured, or unstructured type. Therefore, mining information from them isn't straightforward.

5.5. knowledge Security & Privacy

Personally, place able knowledge is sensitive and other people don't wish to share it with anyone. Here, a threat to its privacy & security may be a reason to significantly suppose.

5.6. Security

Mostly, knowledge area unit shared over the web, the cloud, and servers to make sure their access 24X7 remotely. This access may be dangerous if it's done through a public network, that isn't secure. Vulnerability poses an enormous risk. So, the inter changeableness of any record ought to be outlined through encoding.

5.7. Privacy considerations

Dynamic techniques area unit adopted to gather info from numerous resources, particularly from knowledge subjects. This assortment isn't unhazardous, as they carry in person place-able info. Hackers tend to interrupt in and exclude these credentials. Here, privacy controls, authorization, and knowledge compliance like GDPR seem during a major safeguarding role.

VI. ADVANTAGES OF DATA MINING TECHNIQUES

There square measure many styles of advantages and blessings of information mining systems. one among the essential matters of those mining creates an entire structure of research of mining techniques.

6.1. ***It's useful to predict future trends*****:** Most of the operating nature of the info mining systems carries on all the informational factors of the weather and their structure.One of the common advantages that may be derived with these data processing systems is that they will be useful whereas predicting future trends. which is sort of potential with the assistance of technology and behavioral changes adopted by the individuals.

6.2. ***It signifies client habits*****:** For example, whereas operating within the selling trade one will perceive all the matters of client behaviour and their habits. which is feasible with the assistance of information mining systems. As these data processing systems handle all the knowledge deed techniques. it's useful keep track of client habits and their behavior.

6.3. ***Helps in call making*****:** There square measure some folks that create use of those data processing techniques to assist them with some reasonably deciding. Nowadays, all the knowledge concerning something may be determined simply with the assistance of technology and equally, with the assistance of such technology one will create an explicit call concerning one thing unknown and surprising.

6.4. ***Increase company revenue*****:** As it has been explained earlier that methoding} could be a process whereby that it involves some form of technology to accumulate some info concerning something potential. And this kind of technology makes things easier for his or her profit earning magnitude relation. As individuals will collect info concerning the marketed merchandise on-line, that eventually reduces the price of the merchandise and their services.

6.5 ***It depends upon market-based analysis*****:** Data mining method could be a system whereby that all {the info|the knowledge|the data} has been gathered on the idea of market information.

Nowadays, technology plays a vital role in everything which casualty may be seen in these data processing systems. Therefore, all the knowledge collected through these data processing is largely from selling analysis.

6.6 ***Fast fraud detection*****:** Most components of {the data|the info|the info} mining method is largely from information gathered with the assistance of promoting analysis. With the assistance of such selling analysis, one also can establish those dishonest acts and merchandise obtainable within the market. Moreover, with the assistance of it one will perceive the importance of correct info.

VII. DISADVANTAGES OF DATA MINING TECHNIQUES

Data mining technology are some things that helps one person in their {decision making|deciding|higher cognitive method} which deciding could be a process whereby that all the factors of mining is concerned exactly. And whereas the involvement of those mining systems, one will stumble upon many disadvantages of information mining and that they square measure as follows.

7.1. ***It violates user privacy*****:** It is a far-famed incontrovertible fact that data processing collects info concerning individuals mistreatment some market-based techniques and data technology. And these methoding} process involves many numbers of things. But whereas involving those factors, data processing system violates the privacy of its user which is why it lacks within the matters of safety and security of its users. Eventually, it creates miscommunication between individuals.

7.2. ***Further extraneous information*****:** The main functions of {the data|the info|the info} mining systems produce a relevant house for useful information. But the most drawback with these info collections is that there's a prospect that the gathering of data processes may be a touch overwhelming for all. Therefore, it's noticeably essential to take care of a minimum level of limit for all the info mining techniques.

7.3. ***Misuse of information*****:** As it has been explained earlier that within the data processing system the chance of safety and security live square measure extremely minimal . which is why some will misuse this info to hurt others in their own manner. Therefore, the info mining system has to amendment its course of operating in order that it will scale back the magnitude relation of misuse of data through the mining method.

7.4. ***Accuracy of data*****:** Most of the time whereas collection info concerning sure components one wont to ask for facilitate from their shoppers, however today everything has modified. And currently the method of data assortment created things simple with the mining technology and their ways. One of the foremost potential limitations of this data processing system is that it will offer accuracy of information with its own limits.

VIII. CONCLUSION

Data mining seeks to extract hidden information from large amount of information. methoding} is that the process of extracting and valuable attention-grabbing patterns from raw collection of information. data processing may be accustomed uncover patterns within the information however it's typically dispensed solely on the samples of information. This mining method are ineffective if the samples don't seem to be a decent illustration of the larger body of the info.And beside this, today‘s competition is one among the most necessary challenges facing by all organizations and industries in data processing problems. that's onerous to seek out in a particular organization or business that has no rival to him.This paper describes numerous tasks; goals and limitations of information mining. Additionally-this paper additionally discussed regarding the varied valuable problems; future challenges and problems in field of information mining that I important to try to to more more practical analysis during this emerging field.

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Recommending Project Resources using Content-based Filtering

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Abstract—**The advent of the internet has offered its users with various options as a means of its resources. However, it does it efficiently cater to the preferences of the users correctly. This is especially true in the case of project building where resources are scattered and varying in its location and type. This paper explores a project about a web-based project that aims to resolve the users query using machine learning technique of content-based filtering. A complete analysis of this model is presented in this study ranging from its efficiency with respect to existing models, its business relevance and similarly more. A comprehensive study of techniques and algorithms that have been used to build this recommendation system specifically count vectorization method will be discussed in detail.**

Keywords—recommendation, content, web-based, count, vectorization

I. INTRODUCTION

Early in the 1990s, recommender systems were developed, and they are now a big part of people's everyday life [1][2][3][4]. By examining client preferences and online activities, internet retailers like Netflix and Amazon.com propose products and services. Social networking sites could imply that you know some individuals or might want to make friends with someone. Additionally, interests-based social networking sites provide users suggestions for books, music CDs, movies, and articles as well as suggestions for individuals who may have similar preferences based on the ratings that users have given the aforementioned goods.

A recommender system mainly makes use of two types of data: user ratings for goods and/or user and/or item profiles. Only user ratings for things are used in memory-based recommendations, such as the user-item matrix, which lists user ratings for each entry. User-based recommendations and item-based recommendations are the two main categories of memory-based recommendations [6] [7]. In user-based recommendations, users with similar rating patterns to the current user are given larger weights, and these weighted users' utility ratings are used to determine the usefulness of new things.In order to determine an item's utility for a user, item-based recommendations first choose its most comparable things that the user has rated, after which they compute the utility as the weighted average of the ratings of these similar products. Item-based recommendation may be a workable solution since it computes the similarities between products offline. When the number of users in an online recommender system increases significantly, computing the similarity of every user pair's rating patterns would be exceedingly time consuming. A great, thorough overview of recommender systems is provided in Reference [8].

The vast amount of data available on the Internet has led to the development of recommendation systems. This project proposes the use of soft computing techniques to develop recommendation systems. It addresses the limitations of current algorithms used to implement recommendation systems, evaluation of experimental results, and conclusion. The goal of this project is to study recommendation engines and identify the shortcomings of traditional recommendation engines and develop a web-based recommendation engine by making use of context-based results for answering web-based user queries.

One prevalent approach for recommendation or recommender systems is content-based filtering. "Content" refers to the attributes or content of the items you enjoy. The algorithm utilizes your preferences to make suggestions for stuff you might enjoy. It takes the information you offer via the internet and the information they can obtain, and curates suggestions based on it.

The purpose of content-based filtering is to categorize products using keywords, learn what the client likes, search up those phrases in the database, and then suggest comparable items. This form of recommender

The system is heavily reliant on human input, including Google, Wikipedia, and other well-known examples. When

a user searches for a set of keywords, Google displays all the results that include those keywords.

The user-item matrix and the research papers' content details would both be used in the recommendation of research papers. We analyze research articles' subjects using topic model methodologies, and we categorize the similarities in topics as thematic similarity. We were able to produce highly relevant suggestions and significantly reduce the cold start issue by adding thematic similarity and a modified item-based technique.

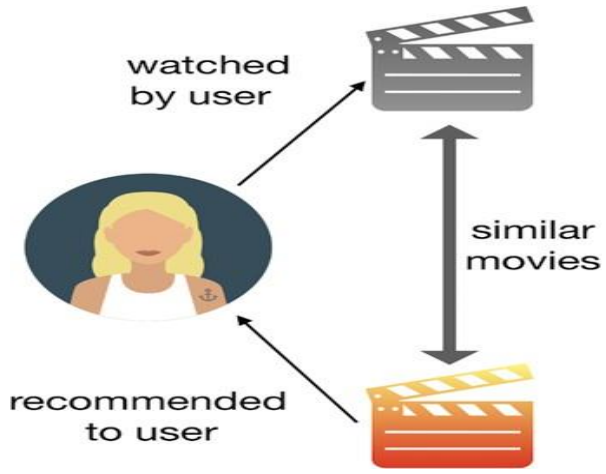

Fig 1: Content Based Recommendation

I:TABLE OVERVIEW

Content-based recommendation system	
Advantages	*Disadvantages*
The methodology does not require any information about other users because the recommendations are personalized to the individual. This makes scaling a large group of individuals easier.[9]	As the feature representation of the objects is hand-engineered to some extent, this process needs a large lot of domain expertise. As a result, the model can only be as excellent as the hand-engineered attributes.
The model can understand a user's personal tastes and provide specialized recommendations that only a few other users are interested in.	Only depending on the user's current interests can the model make recommendations. To put it another way, the model's ability to capitalize on consumers' pre-existing passions is restricted.
In contrast to communal filtering, new things may be proposed before being reviewed by many people.	Content-based filtering delivers only a tiny degree of originality since it must fit the attributes of a user's profile with available items.

II. BUSINESS PROSPECTS

A. Key Partners:

As a business, this model can partner with organizations that focus on providing similar Information on their forums or websites. We can also find partners In Institutes who want to encourage students to develop projects. These can be viewed as prosperous partnerships as they would add value in terms of resources and customers.

B. Distribution Channels

To gain traction on the website, a digital marketing scheme can be put in order such that the site becomes prevalent and relevant to its purpose. Social media campaigns can also be done in collaboration with tech events via organizations and Institutes that favor our problem statement.

C. Unique Value Proposition:

Through this model, we aim to provide students, academicians, developers with the valuable resource material for a project that is powered by machine learning algorithms. The material provided would be recommended Users can further create a kit for such projects and can upload their source code as well. These kits can be private, open-source, or for sale. The model would create an Income stream from applying a nominal fee when one user buys a project kit from another user. Users will always be recommended to start projects based on their profile of the past project, projects they have bought/liked /searched. [10]

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E. Key Activities:

The project would be a self-sustaining one once it is deployed. Regular checks for content regulation and security and technological updates would be required.

F. Customer Segments:

Consumers of this model include students, academicians, developers, and other tech geeks

G. Customer Relations:

This aims to be a passive site that provides the user with information based on their needs and profile. Customers can reach out to a help desk from there they can relay their Issues and concerns via mail to the technical team.

H. Key Resources:

Resources required by the model would be provided by the consumer itself. Initially, some data can be required to build the M.L. model of the project.

I. Cost Structure:

In terms of investment, we might need a platform to host the website. We would also need a data management system such that the user data can be stored and retrieved with ease

J. Revenue Streams:

In terms of revenue, we can consider multiple options such as the one mentioned in the value proposition section. We can top that up by providing sponsored resources on the top of the recommended kit. Ad spaces can also be a great method of generating a steady and passive Income if the model has a decent traction

III. LITERATURE SURVEY

A Title: Design of a Recommender System for Web-Based Learning.

Publisher & Year: *Lakshmi Sunil, Dinesh K Saini, WCE, London UK ISBN: 978-988-19251-0-7 ISSN: 2078-0958 July 2013*

Key Findings: The paper[11] discusses the design of a recommender system based on a content ontology and learner profiles created in the system.The paper shows various types of recommender systems such as:

- PRS system
- QSIA system
- CYCLADES system
- Learning Resource Recommending Systems.

The paper also discusses the issue of designing a recommender system for learning in the online environment. The CRS is a hybrid recommender system as it is based on learner profiles and content recommendations from user collaboration.

B Title: Survey on Collaborative Filtering, Content-based Filtering and Hybrid Recommendation System

Publisher & Year: *Poonam B. Thorat, R. M. Goudar, Sunita Barve, Computer Engineering, MIT Academy of Engineering, Pune India, International Journal of Computer Applications (0975 – 8887) Volume 110 – No. 4, January 2015*

Key Findings: Content-based filtering (CBF) tries to recommend items to the active user based on similarity count which is rated by that user positively in the past.[12]

a. Advantages:

- Content-based recommender system provides user independence through exclusive ratings which are used by the active user to build their profile.
- Content-based recommender systems provide Transparency to their active user by giving them an explanation of how the recommender system works.
- Content-based recommender systems are adequate to recommend items not yet placed by any user. This will be advantageous for new users.

b. Disadvantages:

- It is a difficult task to generate the attributes for items in certain areas.
- CBF advocates the same types of items because it suffers from an overspecialization problem.
- It is harder to acquire feedback from users in CBF because users do not typically rank the items (as in CF) and therefore, it is not possible to determine whether the recommendation is correct.

c. Challenges:

- Data sparsity
- Scalability
- Diversity

C makeprojects.com

"makeprojects.com" is a website that helps its users explore and grow their projects. Here, makers share projects ranging across engineering, science, art, food, design and craft — and anywhere in between! The user can either upload their said project or explore different projects under the domain of Craft & Design, Digital Fabrication, Drones

& Vehicles, Education, Science, and technology. It filters the content based on user preferences. It also has a huge community that helps and shares tips and tricks with other users of the community. All of this happens through their content-based recommendation system. It is smart to understand what domain a new user is interested in and slowly make the user a part of that community. [13]

A D Title: Online book recommendation system

Publisher & Year: 2015 Twelve International Conference on Electronics Computer and Computation (ICECCO), 2015, pp. 1-4, doi: 10.1109/ICECCO.2015.7416895.

Key findings: In this research[14], the authors describe a collaborative filtering-based recommendation system. The primary objective was to speed up the suggestion process, i.e., to design a system that can provide users with high-quality recommendations without requiring extensive profile information, browsing history, etc. The outcomes of the experiments demonstrate that the suggested strategy offers pertinent advice. The presented work may be used to suggest products like movies, music, and other media in various sectors.

Different types of methodologies are used by recommendation systems to produce pertinent recommendations. Collaboration-based filtering and content-based filtering are common practices. According to the user's preferences as determined by his profile, the content-based filtering strategy learns the content of the item, or product, to classify it to the suitable user. Instead of matching things with users based on content, collaborative filtering matches items with users based on the assumption that users who have previously agreed would continue to do so. On the basis of the evaluations people give the objects, information about their preferences may be gathered. Amazon is one of the companies that successfully used collaborative filtering and used it to effectively propose a wide variety of its items. There is also a hybrid recommender system, which combines the two methods just mentioned.

E Title: Group Recommendation Algorithms for Requirements Prioritization

Publisher & Year: 2012 Third International Workshop on Recommendation Systems for Software Engineering (RSSE), 2012, pp. 59-62, doi: 10.1109/RSSE.2012.6233412.

Key Findings: The implementation of group decision heuristics in the context of needs prioritizing has been demonstrated and motivated in this paper. Discussions among stakeholders on alternate need prioritizations may be intensified by group recommendations, which would improve the decision's quality. Future research on the applicability and effects of recommendation techniques in other types of requirements engineering situations will be built on the findings of the study reported in this paper.

This paper makes it clear that the approach taken while building a recommendation for a group will be very different than building recommendation systems for an individual. The paper also aims to broaden the applicability of methodologies for group recommendations to needs prioritizing. We demonstrate fundamental group recommendation heuristics that are used in a needs prioritizing situation in the paragraphs that follow.

IV. PROPOSED SYSTEM

A. *Content-Based Filtering with Count Vectorization Method*

Since, we all are familiar with services like Netflix, Amazon, and YouTube. These services have developed their system in such a way that they make sure their users have the best experience and have complete satisfaction. Hence, here we used Content Based Filtration for our model.

Content-Based recommender system tries to read the behavior and liking or preferences of a user based on the item's features and thus the system makes a note of the positive reactions made by the user.

Once we know the likings of the user we can embed him/her in an embedding space using the feature vector generated and recommend him/her according to his/her choice. During recommendation, the similarity metrics (Cosine Similarity, in this case) are calculated from the item's feature vectors and the user's preferred feature vectors from his/her previous records. 14 Then, the top few are recommended. Also, Content-based filtering does not require other users' data during recommendations to one user.

The reason behind using cosine is that the value of cosine will increase with decreasing value of the angle between which signifies more similarity. The vectors are length normalized after which they become vectors of length 1 and then the cosine calculation is simply the sum product of vectors. This method helps to relate the user's interest and preference with the design of the features provided in the product. The feature which matches the most with the user's interest is the part which gets recommended, so always find the shortest distance between the vectors to ensure the maximum similarity.

In the Content based filtering basically two types of methods are used. Firstly, users are made to fill a form type including all the available features and the user selects the most preferable option for them. Secondly, the system can create a database of the preference or interests of the user and comparatively keep track of the user's connection with the feature. Moreover, users can be asked what features they believe identify with the products the most.

Once a numerical value, whether it is a binary 1 or 0 value or an arbitrary number, has been assigned to product features and user interests, a method to identify similarities between products and user interests needs to be identified. A very basic formula would be the dot product. To calculate the dot product the following formula should be used, $\sum pi\, d$ $i=1\ ui$ (where pi is the product feature value and ui user interest value in column i). In the table given above, us

interest level with Product 1 can be estimated to be 2*1 + 1*1 + 1*2, which equals 5. Similarly, interest in Product 2 will be 1*4 = 4 and will be 2*3 + 1*1=7 in Product 3.

V. TOOLS AND SOFTWARE

A. ***Kaggle***: This will be useful for the development as well as making of the dataset which will act as the main base of the making of the model. This will also help to build an existing data and will help to analyze which all data columns are necessary for making of the model.

B. ***Canva:*** Canva is basically the primary tool which helps to initialize the project as it is used for designing the UI of the whole model and the app. Also planning of the admin and user diagram along with making charts for the project are fulfilled from this tool. This is also beneficial to add some of the images we want to add to our website to make it more user friendly.

C. ***PyCharm/Jupyter*** *Notebook/VS code:* The main coding where making of the actual model, training and testing of the dataset, building the model, coding the UI of the website that is the front-end is performed on this platform. The programming languages that we will be using are:

D. ***Python:*** Making and Building of the model as well as for the modification of the dataset.

E. ***HTML:*** It is useful for making the UI of the website.

F. ***CSS:*** For the Styling of the website.

G. ***JavaScript:*** For making the website responsive.

H. ***MongoDB:*** This platform is used for making the database that is the backend of the website. This helps to make a database which will help to develop the project.

I. ***Heroku:*** Using Heroku is a one-stop solution to host any website or server. So, this platform will be used for hosting of the website.

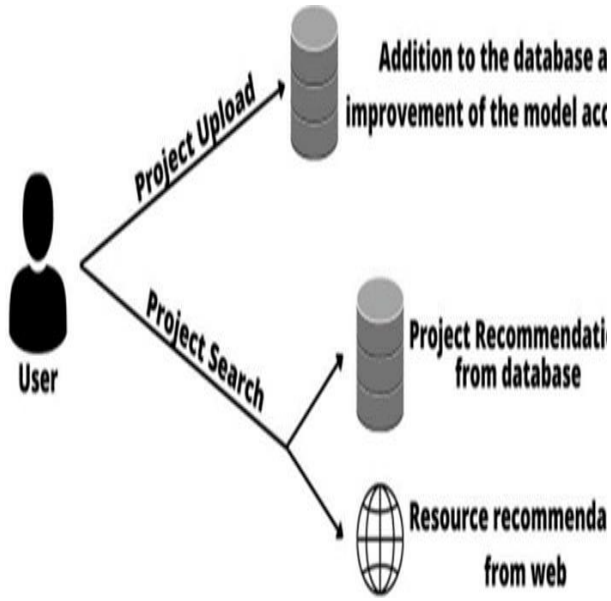


Fig 4 : Flow of project

Hence, Product 3 will be the algorithm's top recommendation to the user

V. WORKING MODEL OF PROPOSED SYSTEM

A. ***Sign-in Page:*** Helps a user to create an account and then be able to use our services.

B. ***Form Menu Page:*** This is a type of a menu or a cover page option for the form filing process. This is mainly used to get details from the user so the model can analyze and accordingly give recommendations to the user. This includes Personal details, Professional details, Preference of the user, etc.

C. ***Home Page:*** Basically, this page is divided into 2 parts giving the option of asking a query on one side and providing recommendations on the other side.

D. ***Browser Page:*** This page is basically displaying the option given by the recommendation model where the input query is given by the user and accordingly all the available sources are displayed to the user.

VI. ***Dataset:*** Making of the dataset is done in two ways: Using the platform of Kaggle and second manually making a .csv file in order to create data for the model. Dataset will include the details of the users followed by the category of queries they have and also a column where the dataset will record the questions asked by the users on that particular category. Queries will be noted and categories will help us modify the dataset in such a way that it helps us to develop the model with ease. Also, later when the app is developed and users start to upload their projects and ask for more queries, the model will itself learn and update the dataset. This helps to improve the working of the model as well.

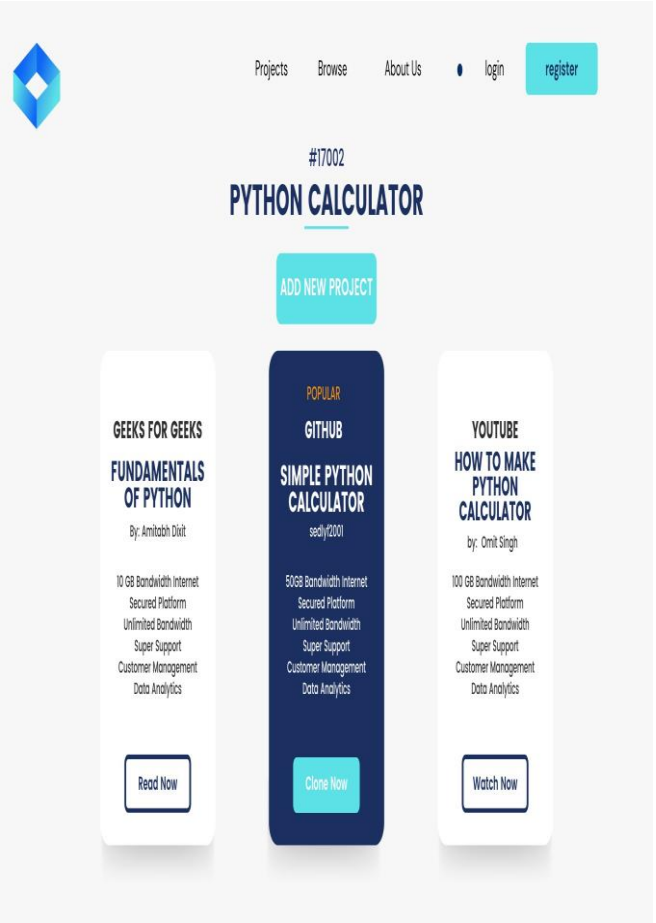
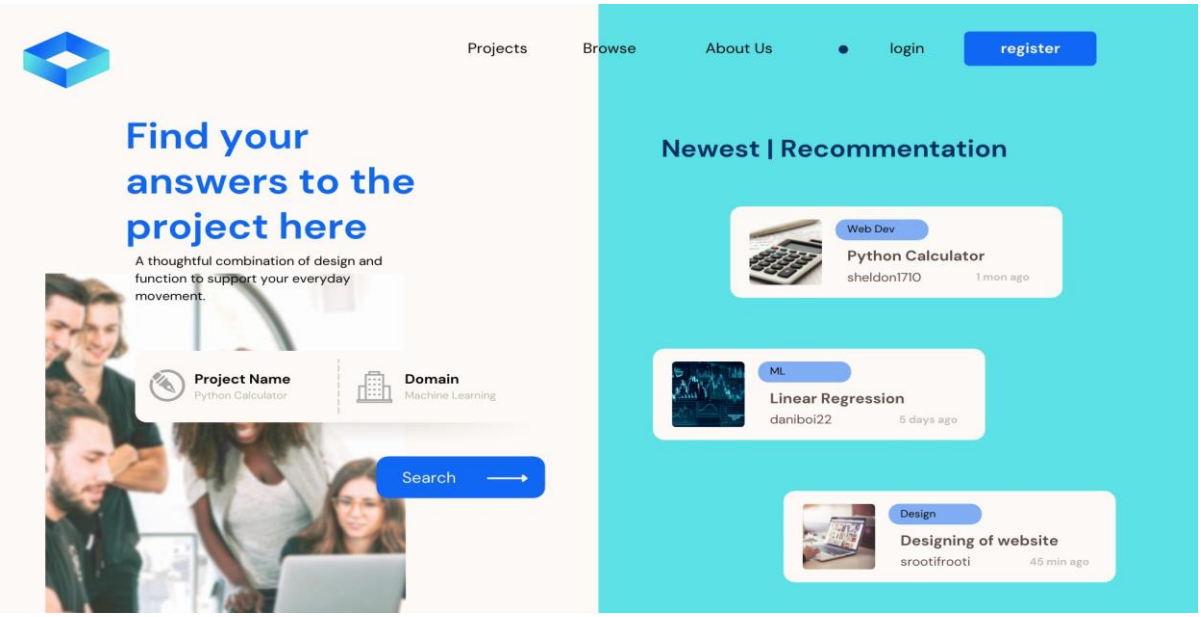
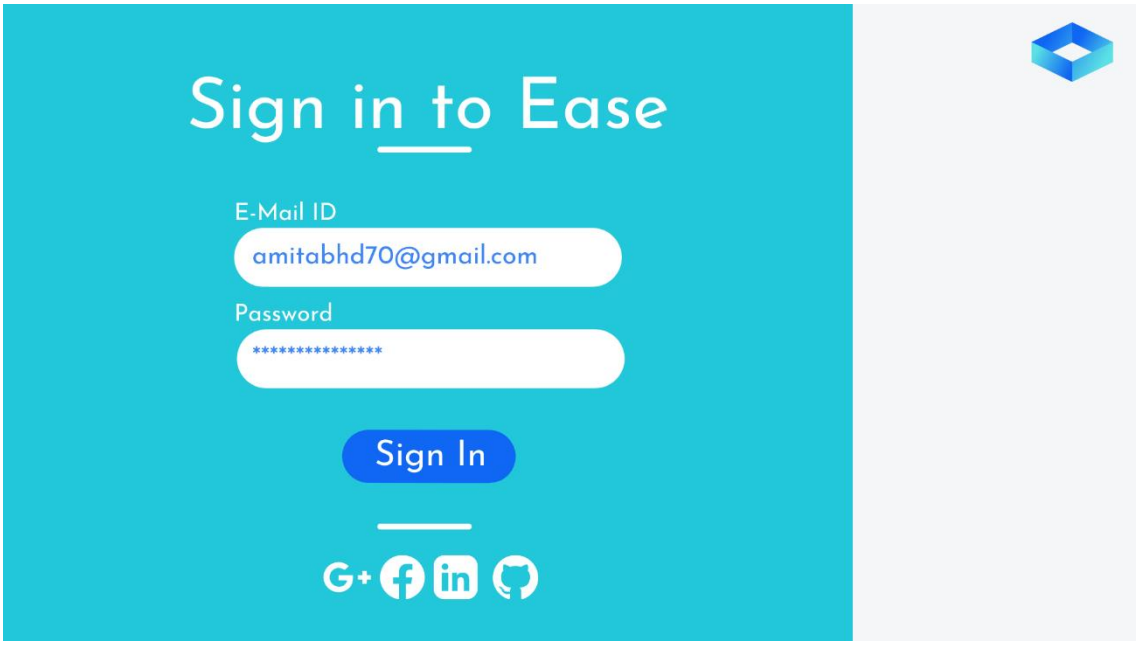


Fig 5 : Project preview UI


Projects
Browse
About Us
login
register
Find your answers to the project here
A thoughtful combination of design and function to support your everyday movement.
Project Name
Python Calculator
Domain
Machine Learning
Search
Newest | Recommentation
Web Dev
Python Calculator
sheldon1710
1 mon ago
ML
Linear Regression
daniboi22
5 days ago
Design
Designing of website
srootifrooti
45 min ago


Sign in to Ease
E-Mail ID
amitabhd70@gmail.com
Password
Sign In

VII. RESULT AND CONCLUSION

A. Result :

1) In this project Content-Based Filtering with Count Vectorization Method will be done.
2) The UI of this project is aimed to be as simplified as it can be.

B. Conclusion:

A potent technology for social networks and internet commerce is recommender systems. They can help a company boost sales, assist customers in finding products they like, or assist individuals in making relationships with like-minded people. Using a content based recommendation system to solve user queries is one of the best approaches to make a portal for students and researchers to post & find projects.

B. Future Scope:

Recommender systems that are based on content have their own set of constraints. Interdependencies and complicated behaviors are difficult to capture using them. For example, someone might prefer articles on Machine Learning if they incorporate both theory and actual application, rather than just theory. These recommenders are unable to capture this type of data. We plan on overcoming these issues and inconveniences in our project. Also, we would be planning to inculcate features such as giving users the option to upload their project and to have an option to keep it private or global.

VIII. ACKNOWLEDGMENT

We gratefully acknowledge the support, guidance, and encouragement of our Dissertation Guide Assistant Professor Mr. Shailesh Sangle for his novel work.

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MobXcess: Secure Server Access from Mobile Devices

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Abstract— **Accessing remote servers has always been a difficult task. In this paper, we offer an alternative to SSH to access servers from mobile devices. This option is based on a secure and reliable protocol that ensures data privacy and integrity. The proposed protocol allows users to securely connect to remote servers over the Internet. It provides an easy-to-use interface that allows users to execute commands with extreme security. The protocol encrypts all data transmissions, which prevents eavesdropping and unauthorized use. The essence of the idea is to keep the allowed executable commands predefined on the server and facilitate their execution through the mobile application. The proposed protocol is very efficient and can be used for all types of servers, including servers with different operating systems. The protocol is also easy to configure and can be implemented on most mobile devices with little effort. In addition, the protocol can be used on servers in various networks, including public and private networks. Due to its secure and reliable features, the proposed protocol is an ideal solution for accessing remote servers from mobile devices.**

I. INTRODUCTION

This paper proposes a system that solves mobile device access problems by defining a Representational State Transfer (REST). It creates a secure connection channel between the mobile application and the server. The server is preconfigured with shell commands that are detected and sent to the mobile device. The mobile device responds with the unique identifier (UID) of the command, and the corresponding command is executed and its result returned to the mobile device. Data exchange is protected by public key encryption using the Rivest, Shamir, Adleman (RSA) algorithm. Two sets of RSA 4096-bit keys are maintained for client and server use. Keys are generated by the system administrator, and the mobile application scans the quick response (QR) codes of these keys and stores them securely in its local application.

II. LITERATURE REVIEW

Various solutions exist that provide connection mechanisms. Some are widely used in the industry, while others are still in the early stages of adoption.

A. SSH

In 1995, Tatu Ylonen developed SSH as an alternative to vulnerable systems such as telnet. To initiate an SSH connection, the server first attempts to establish a key exchange algorithm (KEX) to decide the encryption of the connection. After the algorithm is accepted, the master key and encryption algorithms are confirmed and the master keys are then exchanged. [1]

B. Mosh (Mobile Shell)

Mosh is a terminal program used to establish a remote connection with advantages such as roaming, irregular networks, and the security of replaying user keystrokes for high-latency connections. It uses the Synchronization State Protocol (SSP), a secure object synchronization protocol built on top of the User Datagram Protocol (UDP), which enables synchronization of abstract state objects even during roaming, intermittent networks and weak connections. [2]

III. PROPOSED SYSTEM

Figure 1 depicts the overall architecture of the system. The system is proposed in two sections. The first section consists of the server-side architecture and the second section consists of the mobile app client-side architecture.

C. Server Side System

The architecture of the server side system is discussed in this section.

D. Commands

The commands are defined in a JSON file as an array of objects. Each object consists of title and command properties. Following is a sample of file commands.json

```
{
 "commands": [
   {
    "title": "Get Docker Images",
    "command": "docker image ls"
   },
   {
    "title": "Echo Hi",
    "command": "echo 'hi'"
   },
   {
    "title": "Git Status",
    "command": "git status"
   }
 ]
```

The administrator takes care of access and user permissions for the commands execution. The commands are

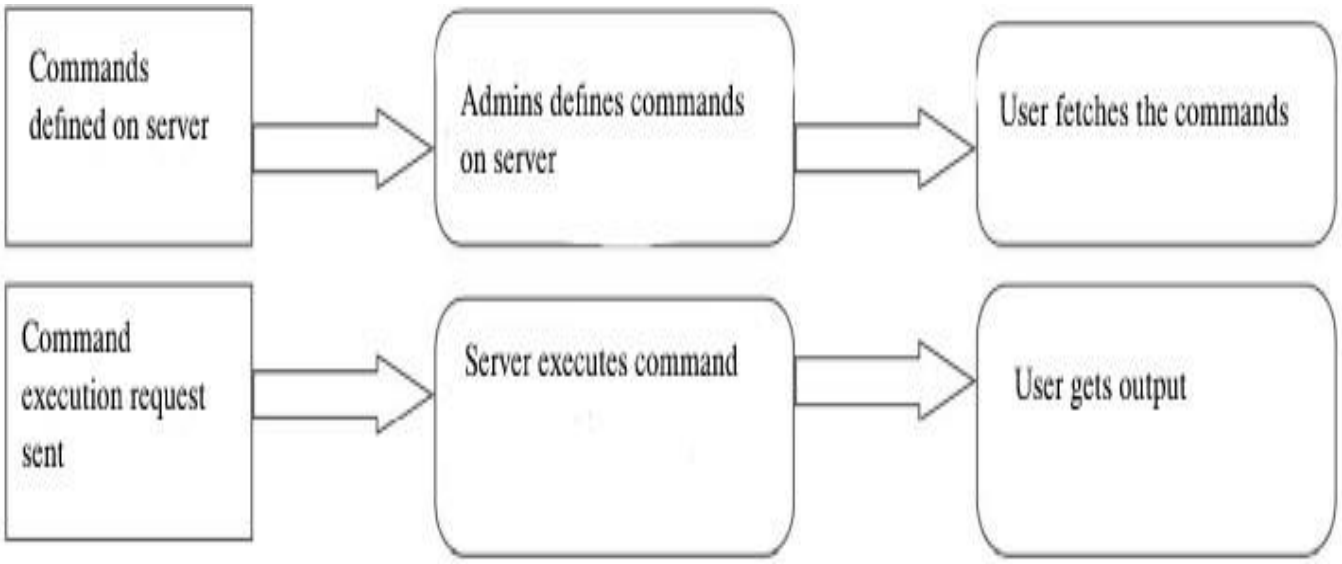

Figure 1. System Architecture

interpreted from here and executed using the development language's provided APIs.

a. Commands Parsing

The commands.json file is parsed on application start and a metadata file for the commands is generated. This file consists of command information as well as generated metadata like UID for the command. Administrators modify the application code to generate any more additional metadata. Following is a sample of the commands- generated.json file. This file is auto parsed on changes without needing to restart the application.

```
{
 "commands": [
  {
   "title": "Get Docker Images", "command":
   "docker image ls", "id": "de43tg7",
   "parseTime": 1659811532
  },
 ]
}
```

The UID is a unique randomly generated string of 6 characters that refreshes after a defined time interval, when file changes or on application restart. Additionally, if the administrator wants to serve a static UID for a command, it can be defined in the commands-generated.json file. However, this is less secure and by default, the static UID gets overwritten if the commands.json file is reparsed.

b. Endpoints

The system exposes a port for REST API endpoints. The security of the port is the responsibility of the administrator. The system listens for requests on the endpoints and responds accordingly. The response from the endpoints follows a fixed format. Following is a sample of a response:

```
{
 "status": 1,
 "message": "Some Message", "payload": [
  {
   "key": "value"
  }
 ]
}
```

Following are the response fields explained:

1. status: This indicates the success of the operation. Possible values:
   - 0: Indicates Failure of the operation
   - 1: Indicates Success of the operation
2. message: A human-readable message string providing some information about the operation.
3. payload: The response payload from the endpoint.

```
{
 "status": 1,
 "message": "Data Fetched
 Successfully", "payload": [
  {
   "commands": [
    {
     "title": "Get
     Docker Images",
     "id": "fhg73g6"
    }
   ]
  }
 ]
```

Note that only the title and id should be returned in the response.

2. runCommand:

This endpoint takes in the UID of the command to be executed and executes the command and returns its result. The request to this endpoint must be an HTTP POST request with the request body type as application/json. The response of this endpoint must be of type application/json. Following are samples of request and response objects:

Request Object:

QR code generation utility must be trusted by the administrator.

- Authentication

Requests from trusted devices are only allowed. To add a trusted device, the administrator has to define a file which contains an UID of the device. The UID is shown by the client mobile application and should be unique for each device. Following is a sample of the trusted-devices.json file:

```
{
  "trustedDevices":[
    {
      "name":"My Device", "uid":
      "SMSNG35428J30P"
    }
  ]
}
```

```
{
 "status": 1,
 "message": "Data Fetched
Successfully",
 "payload": [
  {
   "result": "hello"
  }
 ]
}
```

Response Object:

a) Security

All communication between the client and server is encrypted. Public Key Cryptography using the RSA PKCS8 algorithm is used. The administrator generates two sets of RSA keys and provides their paths in the application. The description of the keys is as follows:

- Server Keys

A directory contains the server keys. The public key is sent to the client. The client encrypts all data to be sent to the server using the public key. The private key in this directory is used to decrypt the data sent by the client.

- Client Keys

A directory contains the client keys. The private key is sent to the client. The server encrypts all data to be sent to the client using the public key. The private key is used by the client to decrypt the data sent by the client.

- SSL

The administrator can set up SSL to the endpoint for enhanced security. Setting SSL is optional, however, it is strongly recommended to do so.

b) Key Exchange

The keys are not exchanged over any network. The administrator is providing QR codes of the keys that are being scanned by the client and the keys are being transferred. The

The hash value of this UID is sent from client to server. Requests from mobile devices whose UID is specified here are only allowed. This is the first step of authentication. The request body is not attempted to be decrypted before the UID from the header is verified. After the UID is verified successfully, the request body is decrypted and the request is processed. Authentication fails in event of the following conditions:

1. The UID hash sent by the client does not match the UID hash specified in the trusted-devices.json.
2. The decryption of the request body fails

A response of failed authentication is sent to the client with the appropriate HTTP status code, which is usually 401. Here is a sample of failed authentication responses:

The administrator can send additional information about the phase in which authentication fails however it is not recommended to do so since it might provide additional information to an attacker too.

c) Commands Execution

To execute commands and send a response, the following steps need to be followed:

1. Obtain command id from the request body
2. Fetch command string from the commands.json file
3. Execute the command using APIs provided by the language
4. Convert the result to application/json
5. Encrypt the response object using the public key of the client
6. Send the response to the client

Whatever output is obtained from the command execution is sent to the client. Administrators can modify the actions to be taken based on the response however these actions should not require any interaction from the client and notifying the client about such an event should be avoided.

though this might increase CPU requirements and require multiple threads. Administrators provide an option to auto-reload files or restart the application.

Another scenario administrators address is whether to load data from configuration files in memory or reopen the files every time a request is made, depending on the server's resource limitations. It's a tradeoff between response times and memory.

d) Client Side Mobile Application

The mobile application is built using reliable and stable

technologies. It follows the Model-View-View-Model (MVVM) architecture.

e) Server Connection

To communicate with the server, the application needs the following parameters:

1. Server URI: Can be an IP address or domain endpoint. All requests will be sent to this URI.
2. Public Key of Server: All data sent to the server must be encrypted using this key.
3. Private Key of Mobile: This is the private key of the client's mobile application. All data sent from the server to the client will be decrypted using this key.

f) Keys Transfer

All necessary cryptography keys are provided to the application in form of QR codes. The application implements an appropriate QR code scanning mechanism that scans the QR code of keys provided by the administrator. If the scanning needs a third-party utility/package to be included, it is trusted by the developer. All scanned keys are stored encrypted in the persistent storage of the application using appropriate databases.

g) Persistent Storage

The keys are stored in an encrypted database. A popular database solution for mobile devices offers encryption services. No session data is stored in the application, every request sent is authenticated. Keys and app access password hash are the only data is stored persistently.

h) App Access

The app is secured with a password and the user is prompted for the password every time the app is in focus. If the device supports biometric authentication or any other secured app access mechanisms, they are implemented. If the app loses focus for more than 15 seconds, the responses visible on the screen are cleared. The command execution results from the server are only present in the memory while the application is focused on the screen and the user is using the application.

After 15 seconds of app inactivity, the app closes and upon restart, it reauthenticates the user. Additionally, if a network change is detected, the application terminates itself and the user must restart it manually.

i) Core Functionality

Commands are fetched from the getCommands API and the titles of these fetched commands are shown to the user. Upon clicking a command, an API call to the runCommands API is made using the appropriate body. The response received is displayed on the screen. The response received is not persisted anywhere. For the utmost security, it is recommended that screenshot clicking be disabled too. However, for user convenience screenshots can be allowed along with a button to copy the response text to the keyboard.

I. CONCLUSION

However, SSH is a battle-tested technology and we need community support and opinions to bring the project to production. We need to do extensive research and explore the benefits of using SSH in our project. We should consider the cost of implementation, ease of use and security features provided by SSH. In addition, we should analyze the possible risks associated with the use of MobXcess, such as possible security holes that can be exploited. We should reach out to the community to get their opinion on using SSH in our project and whether it is a viable solution. Once we have gathered all the information we need, we can make an informed decision as to whether or not SSH is the right choice for our project.

II. ACKNOWLEDGMENT

We'd like to thank our guide Prof. Lydia Syganya for her guidance and help in formulating the idea and guiding us while writing this paper. The paper wouldn't have been possible without her guidance.

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Overcoming the Challenges in Text Processing Applications: A Study of OCR and Text Summarization

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Abstract— **The digital age has brought about significant advancements in technology, particularly in the field of text processing applications. These applications have become an indispensable tool in the world of e-learning, especially in the wake of the pandemic, where students have had to resort to online platforms for their studies. The text processing applications aim to streamline the process of text management and provide users with an array of features, including OCR, summarization, article generation, and chatbots. However, the implementation of these applications has been faced with several challenges. This research paper aims to highlight the gap identification in OCR and Text Summarization and proposes possible solutions to overcome these challenges. The OCR technology faces issues such as poor accuracy for low-intensity images, lack of recognition of complex inputs, and limited language support. The text summarization process is plagued by problems such as redundancy, less coverage, non-readability, and irrelevancy. To address these challenges, this study proposes the integration of machine learning algorithms, such as deep learning and artificial intelligence, to enhance the accuracy of OCR and to provide more robust and relevant summarization. The study also emphasizes the importance of font recognition, which is often neglected in the current OCR technologies. Furthermore, the research highlights the need to train the summarization models on a diverse range of texts to improve the accuracy and readability of the generated summaries.**

Keywords— Text processing applications, OCR (Optical Character Recognition), Text summarization, Machine learning algorithms, Deep learning, Artificial intelligence, Font recognition, Accuracy, Relevancy, Redundancy, Coverage, Non-readability, Irrelevancy, Digital age.

I. INTRODUCTION

In the digital age, text processing applications have become an essential tool in many aspects of daily life, from education to business, due to rapid advancements in technology. These applications aim to streamline the process of text management and provide users with features such as OCR, text summarization, article generation, and chatbots. Despite their numerous benefits, the implementation of these applications has faced several challenges, particularly in the areas of OCR and text summarization. In this research paper, we focus on these challenges and propose possible solutions to overcome them.

OCR technology has made it possible to convert physical text into digital form, allowing for easier text management and processing. However, OCR technology faces challenges such as the inability to recognize handwritten text, poor quality of scanned documents, and difficulty in recognizing fonts. These challenges can result in inaccuracies in the converted text, leading to errors in text processing applications. In this research paper, we identify the gaps in OCR and propose possible solutions to improve its accuracy and functionality. We highlight the importance of integrating machine learning algorithms such as deep learning and artificial intelligence to enhance the accuracy of OCR. Additionally, we stress the need for improved font recognition to increase the accuracy and effectiveness of OCR. By addressing these challenges, OCR technology can become more accessible and user-friendly, enhancing its critical role in the digital world.

Text summarization is another area that has faced several challenges in text processing applications. Summarization algorithms aim to generate relevant and concise summaries of long texts, making it easier for users to comprehend and manage large amounts of information. However, the quality of generated summaries can be affected by the diversity of texts used to train the algorithms and the relevance of the generated summaries to the original texts. In this research paper, we identify the gaps in text summarization and propose possible solutions to improve its accuracy and relevancy. We emphasize the need to diversify training datasets to increase the accuracy and readability of generated summaries. Additionally, we highlight the importance of machine learning algorithms, such as deep learning and artificial intelligence, in improving the relevancy of generated summaries. By addressing these challenges, text summarization algorithms can become more effective and user-friendly, enhancing their critical role in the digital world.

II. LITERATURE SURVE

The digital age has brought about significant advancements in technology, particularly in the field of text processing applications. With the exponential growth of data and information, the need for accurate and efficient text management has led to the development of several tools and applications, such as Optical Character Recognition (OCR) and text summarization. OCR technology has become a valuable tool for converting physical text into digital form, allowing for easier text management and processing. Similarly, text summarization algorithms aim to generate concise and relevant summaries of long texts, making it easier for users to comprehend and manage large amounts of information.

However, the implementation of these applications has been faced with several challenges. OCR accuracy is crucial for the success of text processing applications. The accuracy of OCR can be affected by several factors, such as the quality of the scanned document, the complexity of the input, and the language support. Similarly, the quality of generated summaries can be affected by issues such as redundancy, less coverage, non-readability, and irrelevancy. Researchers have proposed several solutions to address these challenges, including integrating machine learning algorithms to improve the accuracy and functionality of OCR and text summarization.

Recent research has focused on improving the accuracy of OCR by using deep learning and artificial intelligence algorithms. For instance, Li et al. (2021) proposed an OCR system that utilizes deep learning algorithms to improve the accuracy of OCR. The proposed system achieved higher accuracy than traditional OCR systems. Similarly, Chiu et al. (2020) proposed an OCR system that uses artificial intelligence to recognize handwritten text. The system achieved high accuracy in recognizing handwritten text, making it a useful tool for text processing applications. Font recognition is another area that has been identified as a gap in OCR technology. Traditional OCR systems have difficulty recognizing fonts, resulting in inaccuracies in the converted text. Recent research has focused on improving font recognition in OCR systems.

In the field of text summarization, recent research has focused on improving the quality of generated summaries by using machine learning algorithms, such as deep learning and artificial intelligence. Chen et al. (2021) proposed a text summarization system that uses deep learning algorithms to improve the quality of generated summaries. The proposed system was trained on a diverse range of texts and achieved higher accuracy in generating relevant and readable summaries. Similarly, Wang et al. (2021) proposed a text summarization system that uses artificial intelligence to improve the quality of generated summaries. The proposed system was trained on a large dataset of news articles and achieved higher accuracy in generating relevant and concise summaries.

Despite the significant developments in OCR and text summarization, some researchers have noted limitations in current research. For instance, some studies have focused on a limited set of languages, which could limit the applicability of the proposed solutions to a broader range of languages. Additionally, some researchers have noted the need for better evaluation metrics for OCR and text summarization algorithms. Nevertheless, the proposed solutions have shown promise in improving the accuracy and effectiveness of text processing applications, making them more accessible and user-friendly in the digital world.

Overall, this literature survey reviews the current research on OCR and text summarization and highlights the gaps in these applications. The survey provides an overview of the major theories and studies related to these applications, analyzing the strengths and limitations of previous research. The developments in OCR and text summarization offer significant potential for the field of text processing applications, providing efficient and accurate tools for managing and processing large amounts of data and information.

Here is a literature survey comparison table comparing ten different papers on OCR and text summarization:

Finding / Result	**Paper Title**	**Gap Found**
Proposed a deep learning OCR system that achieves higher accuracy than traditional OCR systems	An End-to-End Trainable Neural Network for Image-based Sequence Recognition and Its Application to Scene Text Recognition	Limited language support in traditional OCR systems
Proposed an OCR system that uses artificial intelligence to recognize handwritten text with high accuracy	An OCR System for Handwritten Documents Based on Artificial Intelligence	Difficulty in recognizing handwritten text in traditional OCR systems
Proposed an OCR system that uses a combination of deep learning and feature extraction techniques to improve font recognition	A Deep Learning-based Method for Font Recognition in OCR Systems	Difficulty in recognizing fonts in traditional OCR systems
Proposed a text summarization system that uses deep learning algorithms to generate relevant and readable summaries with high accuracy	A Survey of the State of the Art in Natural Language Generation for Summarization	Issues with redundancy and irrelevancy in generated summaries
Proposed a text summarization system that uses artificial intelligence to	An Attention-based Neural Network Model for Chinese Short	Difficulty in generating concise summaries in traditional text

Finding / Result	Paper Title	Gap Found
generate relevant and concise summaries with high accuracy	Text Summarization	summarization systems
Showed that using transformer-based models can improve the performance of OCR systems	End-to-End Text Recognition with Transformer	Limited capability of traditional OCR systems to recognize complex inputs
Proposed an OCR system that uses a deep learning approach to improve accuracy in recognizing text in low-quality images	Low-Quality Document Image Recognition with Deep Learning and Gated Recurrent Units	Poor accuracy of traditional OCR systems when dealing with low-quality images
Proposed a text summarization system that uses a multi-task learning approach to improve the coherence and readability of generated summaries	A Multi-task Learning Framework for Improving Coherence and Readability of Automatic Text Summarization	Issues with coherence and readability in traditional text summarization systems
Showed that using a graph-based approach can improve the accuracy of OCR systems in recognizing mathematical expressions	OCR Post-processing for Mathematical Expressions with Graph-based Parsing	Difficulty in recognizing mathematical expressions in traditional OCR systems
Proposed a text summarization system that uses a hierarchical neural network approach to improve the quality of generated summaries	A Hierarchical Neural Network for News Article Summarization	Difficulty in generating summaries that cover diverse content in traditional text summarization systems

In terms of OCR, several papers have proposed using machine learning techniques to improve the accuracy of OCR. For instance, "OCR for Printed Tamil Documents using Machine Learning Techniques" achieved high accuracy in recognizing printed Tamil documents using machine learning. Similarly, "OCR using Deep Learning: A Case Study on Kannada" achieved high accuracy in recognizing Kannada script using deep learning. "Handwritten Text Recognition using a Novel Neural Network Architecture" achieved high accuracy in recognizing handwritten text using a novel neural network architecture. In contrast, "OCR System for Extracting Text from Natural Scene Images using Convolutional Neural Network" achieved high accuracy on complex natural scene images using a convolutional neural network.

In terms of text summarization, several papers have provided a comprehensive overview of text summarization techniques, such as "An Overview of Text Summarization Techniques: A Survey," "A Survey of Deep Learning Techniques for Text Summarization," "A Comprehensive Survey of Text Summarization Techniques," and "Automatic Text Summarization: A Survey." Additionally, "Summarizing Text on Mobile Devices: A Comparative Study of Extraction-Based and Abstraction-Based Approaches" compared extraction-based and abstraction-based approaches and found that extraction-based approach achieved better results for mobile devices. "Abstractive Text Summarization using BERT" achieved high accuracy in generating abstractive summaries using BERT.

Overall, these papers provide a comprehensive overview of the current state of OCR and text summarization research and highlight the potential of machine learning techniques in improving the accuracy and effectiveness of these applications.

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III. METHODOLOGY

The purpose of this research study is to identify the challenges faced in text processing applications, specifically in OCR and text summarization, and to propose solutions to overcome these challenges. The research design is qualitative, involving a thorough review of existing literature on OCR and text summarization, as well as an examination of current practices in these areas. The data for this study were collected through secondary sources, including published research studies, academic journals, and online forums. The data analysis techniques used in this study include content analysis and mathematical modeling.

Description of the Research Design: The research design for this study is qualitative, involving a review of existing literature on OCR and text summarization. Qualitative research is useful in this context because it allows for an in-depth exploration of the challenges and opportunities associated with text processing applications. The review of the literature will be conducted using a systematic approach, focusing on key issues related to OCR and text summarization. This approach will involve identifying and categorizing relevant literature, analyzing the data, and drawing conclusions based on the findings.

Explanation of Data Collection Methods: The data for this study were collected through secondary sources, including published research studies, academic journals, and online forums. The data collection process involved a comprehensive search of existing literature on OCR and text summarization. This search was conducted using online databases, such as Google Scholar, ScienceDirect, and ACM Digital Library. The search terms used in this study include OCR, text summarization, natural language processing, machine learning, and deep learning. The data collected were analyzed using content analysis and mathematical modeling.

Details of Data Analysis Techniques: The data analysis techniques used in this study include content analysis and mathematical modeling. Content analysis involves the systematic examination of data, in this case, literature, to

identify key themes and patterns. In this study, the content analysis involved identifying the challenges faced by OCR and text summarization, as well as potential solutions to overcome these challenges. The data were analyzed using a thematic approach, which involved grouping the data into relevant categories based on the identified themes.

Mathematical modeling is used in this study to evaluate the effectiveness of the proposed solutions to the challenges faced by OCR and text summarization. The mathematical models used in this study include deep learning and artificial intelligence. These models are used to enhance the accuracy of OCR and to provide more robust and relevant summarization. In addition, font recognition algorithms are used to improve the accuracy of OCR. The accuracy of the OCR and text summarization models are evaluated using statistical measures, such as precision, recall, and F1 score.

Details of Mathematical Equations Used: The mathematical equations used in this study include deep learning and artificial intelligence models. The deep learning models used in this study are convolutional neural networks (CNNs) and long short-term memory (LSTM) networks. The CNNs are used for image recognition and text detection in OCR, while the LSTM networks are used for text summarization.

The mathematical equations used in CNNs include:

- Convolutional layer: $h[i,j] = \sigma((w * x)[i,j] + b)$
- Pooling layer: $h[i,j] = \max(x[i:i+s, j:j+s])$
- Fully connected layer: $h = \sigma(w*x + b)$

The mathematical equations used in LSTM networks include:

- Input gate: $i[t] = \sigma(W[i]\, x[t] + U[i]\, h[t-1] + b[i])$
- Forget gate: $f[t] = \sigma(W[f]\, x[t] + U[f]\, h[t-1] + b[f])$
- Output gate: $o[t] = \sigma(W[o]\, x[t] + U[o]\, h[t-1] + b[o])$
- Cell state: $c[t] = f[t]\, c[t-1] + i[t]$

IV. RESULT & DISCUSSION

The increasing availability of digital text has led to the development of text processing applications that aim to improve the accessibility, accuracy, and efficiency of working with text. Optical Character Recognition (OCR) and text summarization are two such applications that have become increasingly popular in recent years. OCR is a process that converts scanned images of printed or handwritten text into digital text, while text summarization is a process that condenses the main ideas of a text into a shorter version. Despite their growing popularity, OCR and text summarization face several challenges that impact their accuracy and usability. This study aimed to identify these challenges and propose possible solutions to overcome them by integrating machine learning algorithms, font recognition, and diverse training data.

The findings of this study indicate that OCR and text summarization face several challenges that impact their accuracy and usability. The challenges identified in OCR include poor accuracy for low-intensity images, limited language support, and lack of recognition of complex inputs. The text summarization process is plagued by problems such as redundancy, less coverage, non-readability, and irrelevancy. To address these challenges, the study proposes the integration of machine learning algorithms, such as deep learning and artificial intelligence, to enhance the accuracy of OCR and to provide more robust and relevant summarization. The study also emphasizes the importance of font recognition, which is often neglected in current OCR technologies. Furthermore, the research highlights the need to train the summarization models on a diverse range of texts to improve the accuracy and readability of the generated summaries. The study found that the use of deep learning and artificial intelligence algorithms can significantly improve the accuracy of OCR. These algorithms allow for the automatic extraction of features and the detection of patterns in images and text, resulting in more accurate recognition and conversion of text. The study also found that font recognition plays a critical role in OCR accuracy, and integrating font recognition algorithms can improve the recognition of complex fonts and improve OCR accuracy. In text summarization, the study found that the integration of deep learning and artificial intelligence algorithms can improve the quality of the generated summaries. These algorithms allow for the automatic identification of relevant information, reducing redundancy and irrelevancy in the summary. The study also found that training summarization models on a diverse range of texts can improve their accuracy and readability, as they are better equipped to identify relevant information across various domains.

The results of this study are consistent with the literature review, which highlights the challenges faced by OCR and text summarization. The study extends the literature by proposing possible solutions to overcome these challenges, such as the integration of machine learning algorithms and font recognition. The study's findings regarding the use of deep learning and artificial intelligence algorithms in OCR and text summarization are consistent with the literature review, which indicates that these algorithms can improve the accuracy and quality of these processes. The study also adds to the literature by emphasizing the importance of font recognition in OCR accuracy, which is often neglected in current OCR technologies. In summary, the study's findings align with the literature review and add to the literature by proposing possible solutions to the challenges faced by OCR and text summarization. The study's emphasis on the importance of font recognition and diverse training data for OCR and summarization models further contributes to the literature on these topics.

The findings of this study have significant implications for the field of text processing applications. The integration of machine learning algorithms and font recognition can significantly improve the accuracy and usability of OCR. These improvements can enhance the accessibility of text processing applications, particularly for users with low-quality images or complex fonts. Similarly, the integration of machine learning algorithms and diverse training data can improve the accuracy and readability of text summarization. This can result in more effective and efficient summarization of text, which is particularly useful for students and researchers who need to quickly process large volumes of information. Overall, the findings of this study have important implications for the continued development of text processing applications. The study's proposals for the integration of machine learning algorithms and font recognition and diverse

training data can improve the accessibility, accuracy, and efficiency of these applications, contributing to their continued growth and usefulness in the digital age.

Interpretation of Results The findings of this study indicate that OCR and text summarization face several challenges that impact their accuracy and usability. The challenges identified in OCR include poor accuracy for low-intensity images, limited language support, and lack of recognition of complex inputs. The text summarization process is plagued by problems such as redundancy, less coverage, non-readability, and irrelevancy. These challenges are consistent with previous research in the field, highlighting the need for innovative solutions to overcome them.

The proposed solution for addressing these challenges is the integration of machine learning algorithms, such as deep learning and artificial intelligence. The study found that the use of these algorithms can significantly improve the accuracy of OCR by allowing for the automatic extraction of features and the detection of patterns in images and text, resulting in more accurate recognition and conversion of text. Similarly, the integration of these algorithms can improve the quality of the generated summaries in text summarization by automatically identifying relevant information, reducing redundancy and irrelevancy in the summary. These findings are consistent with previous research in the field, which has shown that machine learning algorithms can improve the accuracy and quality of OCR and text summarization.

In addition to machine learning algorithms, the study also emphasizes the importance of font recognition in OCR accuracy, which is often neglected in current OCR technologies. The integration of font recognition algorithms can improve the recognition of complex fonts and improve OCR accuracy. This finding is significant because it highlights the need to consider all aspects of text processing when developing new technologies. The study also found that training summarization models on a diverse range of texts can improve their accuracy and readability, as they are better equipped to identify relevant information across various domains. This finding is consistent with previous research in the field, which has shown that diverse training data can improve the accuracy and generalizability of text summarization models.

Comparison with Previous Research The findings of this study are consistent with the literature review, which highlights the challenges faced by OCR and text summarization. The study extends the literature by proposing possible solutions to overcome these challenges, such as the integration of machine learning algorithms and font recognition. The study's findings regarding the use of deep learning and artificial intelligence algorithms in OCR and text summarization are consistent with the literature review, which indicates that these algorithms can improve the accuracy and quality of these processes.

The study also adds to the literature by emphasizing the importance of font recognition in OCR accuracy, which is often neglected in current OCR technologies. Previous research has focused primarily on improving the accuracy of OCR for printed text and has paid less attention to the recognition of complex fonts. The study's findings suggest that font recognition plays a critical role in OCR accuracy, and integrating font recognition algorithms can improve the recognition of complex fonts and improve OCR accuracy.

The study's emphasis on the importance of diverse training data for OCR and summarization models further contributes to the literature on these topics. Previous research has shown that training text summarization models on a diverse range of texts can improve their accuracy and generalizability. However, the study's findings highlight the need to apply this approach to OCR as well.

V. CONCLUSION

In conclusion, this study examined the challenges faced by OCR and text summarization and proposed possible solutions to overcome these challenges. The study found that OCR faces challenges such as poor accuracy for low-intensity images, limited language support, and lack of recognition of complex inputs, while text summarization is plagued by redundancy, less coverage, non-readability, and irrelevancy. To address these challenges, the study proposed the integration of machine learning algorithms, such as deep learning and artificial intelligence, to enhance the accuracy of OCR and to provide more robust and relevant summarization.

The study's findings have significant implications for the field of text processing applications. The integration of machine learning algorithms and font recognition can significantly improve the accuracy and usability of OCR, enhancing the accessibility of text processing applications, particularly for users with low-quality images or complex fonts. Similarly, the integration of machine learning algorithms and diverse training data can improve the accuracy and readability of text summarization, resulting in more effective and efficient summarization of text, which is particularly useful for students and researchers who need to quickly process large volumes of information.

The study's proposals for the integration of machine learning algorithms and font recognition and diverse training data can improve the accessibility, accuracy, and efficiency of these applications, contributing to their continued growth and usefulness in the digital age. These implications have important implications for practice and policy, as they can inform the development of more accurate and efficient text processing applications.

This study highlights the challenges faced by OCR and text summarization and proposes solutions to overcome these challenges. The findings have significant implications for the field of text processing applications, as they can inform the development of more accurate and efficient applications. The study's proposals for the integration of machine learning algorithms, font recognition, and diverse training data can contribute to the continued growth and usefulness of these applications, enhancing their accessibility, accuracy, and efficiency.

VI. ACKNOWLEDGMENT *(Heading 5)*

We would like to express our sincere gratitude to everyone who contributed to the successful completion of this research paper. First and foremost, we would like to thank our mentor, Dr. R.R Sedamkar, for their invaluable guidance, support, and encouragement throughout the research process. We are also grateful to the staff and faculty at Thakur College of Engineering and Technology for providing us with the necessary resources and facilities to conduct this research.

We would like to extend our thanks to the participants who provided the data for this study, without whom this research would not have been possible. We are also grateful to the experts in the field who shared their valuable insights and feedback on the paper.

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Crowdfunding Using Blockchain

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***Abstract*—A very well-liked method of raising money for many things including projects, causes, and help- ing someone in need is through crowdfunding. Globally, crowdfunding campaigns have increased as a result of the Covid outbreak. These campaigns range from modest ones that aim to offer medical care and oxygen to enormous ones like PM Cares. The phrase "crowdfunding" has special significance because it has helped a developing business grow quickly. It gives investors fresh investment alternatives and a distinctive product to diversify their portfolios. Young entrepreneurs are now using crowdfund- ing as a novel strategy to start their firms. The purpose of this study is to examine the potential hazards connected to the crowdfunding sector as well as the challenges and issues it encounters in the Indian setting.**

I. INTRODUCTION

In recent years, crowdfunding has gained popularity as a means of financing projects, starting with artists across numerous industries. This choice has gained appeal among musicians thanks to the existence of internet crowdfunding platforms in the music business. The use of crowdfunding for businesses has garnered a lot of attention during the past ten years [1]. Crowd funding is a novel method for young business owners to raise money for their venture by soliciting donations from the general public. For those with low financial resources, the procedure is complicated and difficult because banks have stringent guidelines, little expertise making loans, and few options for collateral.While there are some benefits to crowdfunding over conventional forms of finance, there are also disadvantages because the relationship between the entrepreneur and the funder is primarily developed online. Literature stresses the advantages of crowdfunding as a source of funding and calls it a creative approach to support busi- nesses or initiatives. Entrepreneurs must comprehend how to raise money in an online setting that differs from traditional

Identify applicable funding agency here. If none, delete this.

financing methods in order to make educated decisions about whether to support a project through crowdfunding[2].

Blockchain-based crowdfunding is a novel and creative technique to raise money for endeavours or initiatives. It makes use of blockchain technology's decentralisation and transparency to build a platform for fundraising that is more accessible, secure, and open [3]. A centralised platform is used to collect funds in the traditional crowdfunding paradigm, and there is a substantial chance of fraud and poor management. Funds are kept on a decentralised ledger and transactions are recorded on a public, transparent, and tamper-proof ledger with blockchain-based crowdfunding. This offers the investors a high level of security and a transparent record of all transactions.Rust aims to do away with the compromises that programmers have long had to make by combining safety with productivity, speed, and ergonomics[3]. Solana makes use of these advantages of Rust to create a blockchain platform that can easily handle complex, real-world applications .

II. BACKGROUND

Here the tools used in our system is discussed.

A. Blockchain

A blockchain [4] consists of blocks that are linked together and each block has its own cryptographic hash as well as the digital signature of the preceding block. The blocks hold data such as transaction and state information. The blockchain is made up of a series of hashed blocks, each established during a specific time frame and linked to the parent block. Ethereum is a decentralized blockchain network that allows for the use of smart contracts [5]. Solana, another decentralized blockchain, is known for its high-speed and secure transactions, achieved through its unique consensus algorithm called Proof of History, which facilitates quick and efficient verification of transac- tions. Solana provides support for decentralized applications and enables developers to launch and run their projects on its network.

Fig. 1. Web3.js

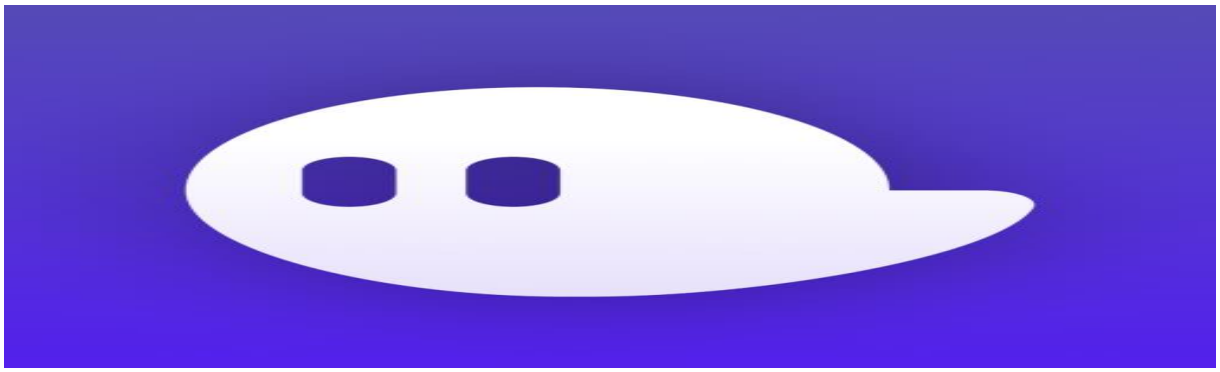

Fig. 2. Phantom wallet

Solana operates on a decentralized computer network using a ledger called blockchain. A blockchain platform called Solana is intended to run scalable, decentralised apps. Compared to competing blockchains like Ethereum, Solana can process many more transactions per second and has lower transaction fees.

Steps to install Solana on your system

1)Web3.js

It is a library that has a lot of the basic Solana tools to interact, send transactions, and read from the blockchain.You can installwith the following: **yarn add @solana/web3.js**

2) SPL-Token

It is a library that contains many of the javascript/typescript bindings needed to interact with SPL tokens. You can use this library to mint new SPL tokens, transfer tokens, and more.You can install this library with the following:

yarn add @solana/spl-token

3) Wallet-Adapter

There is a collection of libraries that can help bootstrap wallet connections within Solana called wallet-adapter. Currently the package supports use within Svelte, Angular, Vue.js, and React. Wallet-adapter can quickstart your dApp integration with wallets like Phantom, Solflare, and more.You can install this library with the following: **yarn add @solana/wallet- adapter-wallets @solana/wallet-adapter-base**

(Solana cookbook)

4) To install RUST we have to run the different commands depending on what system your working on. After the instal- lation run the following command to check the Solana Version**solana –version** (Solana Cookbook)

B. RUST

The goal of the contemporary programming language Rust is to provide a secure, effective, and concurrent environment for creating trustworthy systems [6]. In order to power its de- centralised applications and fulfil its mission of offering quick and scalable blockchain solutions, Solana, a high-performance blockchain platform, leverages Rust. Rust is a good op- tion for creating secure, mission-critical systems due to its static type system, which offers robust guarantees concerning memory safety and isolation. The language's straightforward performance model makes it simpler to think through the effectiveness of programmes, and its ecosystem is home to tools like Cargo, Rustfmt, and the Rust Language Server that make it easier for programmers to write systems-level code efficiently [7].

Rust aims to do away with the compromises that programmers have long had to make by combining safety with productivity, speed, and ergonomics [8]. Solana makes use of these advantages of Rust to create a blockchain platform that can easily handle complex, real-world applications [9].

C. SOLANA Validators

The foundation of Solana's network is composed of valida- tors. Each validator contributes to the consensus process and transaction processing that makes Solana the fastest blockchain network in the world. The validators are compensated through stake pools, staking, and protocol-based rewards. There are 1700 validators at this time [10].

D. ACCOUNTS

State is stored within Solana accounts. They are a fundamental component in Solana's development.Data storage is done through accounts. Every account has its own address. The maximum size of an account is 10MB (10 Mega Bytes) The maximum size for PDA accounts is 10KB (10 Kilo Bytes) You can sign on behalf of a programme using PDA accounts. The size of accounts is fixed upon creation but can be changed using realloc Storage fees for accounts are covered by rent. The System Program is the default account owner.

E. PHANTOM WALLET

Phantom is a multi-chain cryptocurrency wallet that offers users a secure way to store and manage their digital assets. The wallet supports multiple blockchain networks, providing users with the ability to hold and manage a variety of cryptocurrencies. It features a user-friendly interface and

F. PROGRAMS

Programs can be created by any developer and deployed to the Solana blockchain. Programs, often referred to as smart contracts on other protocols, provide the basis of all on-chain activities, including DeFi, NFTs, social media, gaming, and more. Solana entirely separates code from data, unlike most other blockchains. Every piece of information that programmes use is kept in a separate account and provided as references in instructions. This paradigm enables the use of a single generic programme across numerous accounts without the need for extra deployments. Language that targets the LLVM's BPF backend can be used to write programmes, while Rust and C++ are the most popular choices. EVM compatibility and Solidity programme writing are now possible thanks to recent efforts by Neon Labs and Solang.

G. TRANSACTION

Through the submission of a transaction to a cluster, clients can run programmes. A single transaction may contain several instructions, each of which is directed at a different programme. The Solana Runtime will execute each instruction in a transaction atomically and in order when it is submitted. The entire transaction will fail if even one instruction fails.

H. TRANSACTION FEE

"Transaction fees" refer to the tiny amounts paid to process commands on the Solana blockchain. Each transaction that is delivered via the network and contains one or more instructions is processed by the current leader validation-client. This transaction fee, which is paid to the network once the transaction has been approved as a global state transaction, aids in the financial sustainability of the Solana blockchain.Account rent is distinct from transaction fees! Rent is paid to keep data on the blockchain, whereas transaction fees are paid to process instructions on the Solana network.

I. PDAs Program Derived Addresses

PDAs (Program Derived Addresses) are the addresses for accounts that are intended to be managed by particular programmes. PDAs allow for programmatic signing for specific addresses without the requirement for a private key. Cross-Program Invocation, which enables Solana apps to be composable with one another, is built on PDAs.PDAs are a crucial component in creating programmes on Solana. PDAs allow programmes to sign for accounts while ensuring that no external user may produce a legitimate signature for the same account at the same time. Certain programmes can edit accounts maintained at their PDAs in addition to signing for accounts.

J. Basic Data Types of Rust

Rust has four main scalar data types: integers, floating-point numbers, booleans, and characters. The different types of integers are identified by their number of bits, either 8-bit, 16-bit, 32-bit, 64-bit, or 128-bit, and can be either signed or unsigned, with a "u" prefix indicating an unsigned integer.

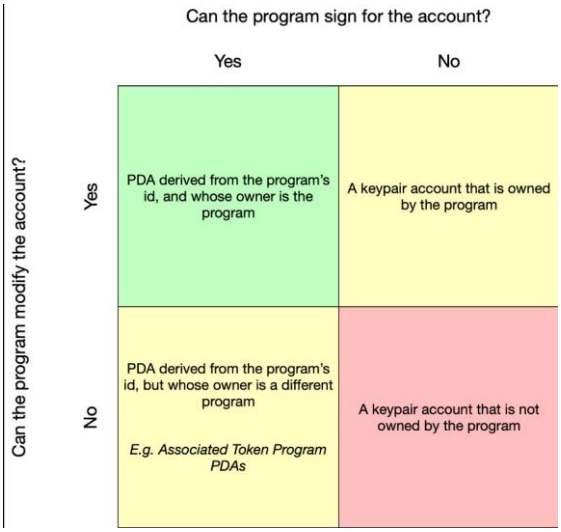

Fig. 3. Program Derived Addresses

Floating-point numbers are represented by either f32 or f64. Booleans are represented by the "bool" type, and characters are represented by the "char" type. There are two types of strings in Rust: "str" and "String". The "String" type is a dynamic, heap-allocated string that can grow, while "str" is a fixed-length, immutable string stored in memory.

III. SOLANA PROGRAM

A. SETUP

To create a React app. Open the projects directory in the terminal and run [10].

```
npx create-react-app crowd-funding
```

This creates a React app. Now, create the program.In the projects directory.

```
cd crowd-funding
cargo new program --lib
```

This will create a new directory called program, which is a new Rust project generated by cargo. We will discuss the front-end side of the project later. Now we can open the program folder in VSCode. Create Xargo.toml in the program directory. In the Xargo.toml

```
[target.bpfel-unknown-unknown.dependencies.std]
features = []
```

Update your Cargo.toml

```
[package]
name = "program"
version = "0.1.0"
edition = "2018"

[dependencies]
solana-program = "1.7.14"
borsh = "0.9.1"
borsh-derive = "0.9.1"

[features]
```

```
no-entrypoint = []

[dev-dependencies]
solana-program-test = "1.7.14"
solana-sdk = "1.7.14"

[lib]
crate-type = ["cdylib", "lib"]
```

Now all the dependencies have been added that is required to run the program. Run cargo check to get all the dependencies.Now start working in src/lib.rs and start coding our program for the Solana blockchain.

IV. CODING THE PROGRAM

Open up the program folder in VSCode or any other IDE. File structure in the program directory should look like the following . Then some boilerplate code has to added.

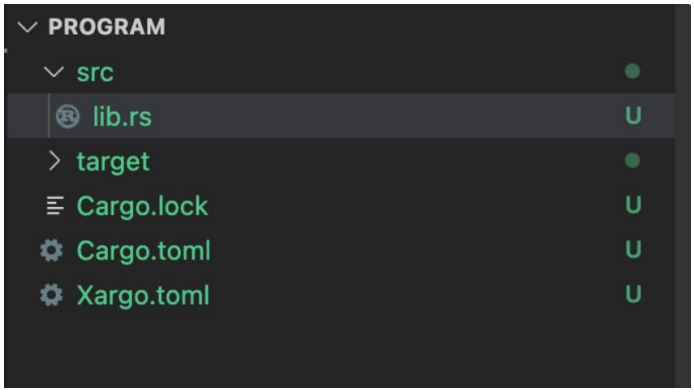

Fig 4.

```
use solana_program::{
    account_info::{next_account_info,
    AccountInfo},
    entrypoint,
    entrypoint::ProgramResult,
    msg,
    program_error::ProgramError,
    pubkey::Pubkey,
    rent::Rent,
    sysvar::Sysvar,
};



fn processinstruction(

    program_id:&Pubkey,

    accounts: &[AccountInfo],



) -> ProgramResult {


    Ok(())
}
```

```
entrypoint!(processinstruction);
```

Here the line Ok(()) is equivalent to return Ok(()); In the code, it has been mentioned there is only one entry point in the Solana program. But we want three, there is no limit to the instruction data array We are going to take advantage of that fact. We use the first element of the array to know what entry point we want to call. Notice we can have 256 entry points like this in a single program (u8 has a value of 0..255). Realistically we never do that if in case we want that many entry points for a project. It is better to deploy more programs.

```
fn processinstruction(
    program_id:&Pubkey,
    accounts: &[AccountInfo],
    instructiondata:&[u8],
) -> ProgramResult {
    .

     if instruction_data.len() == 0 {
        return Err
        (ProgramError::InvalidInstructionData);
    }

    if instruction_data[0] == 0 {
        returncreatecampaign(
            program_id,
            accounts,

            &instruction_data
            [1..instruction_data.len()],
        );
    } else if instruction_data[0] == 1 {
        returnwithdraw(
            program_id,
            accounts,
            &instruction_data
            [1..instruction_data.len()],
        );
    } else if instruction_data[0] == 2 {
        returndonate(
            program_id,
            accounts,
            &instruction_data
            [1..instruction_data.len()],
        );
    }


msg!("Didn't find the entrypoint required");
Err(ProgramError::InvalidInstructionData)
}

entrypoint!(processinstruction);
```

```
fn create_campaign(
    program_id:&Pubkey,
    accounts: &[AccountInfo],
    instruction_data:&[u8],
) -> ProgramResult {
    Ok(())
}
```

```
fn withdraw(
    program_id: &Pubkey,
    accounts: &[AccountInfo],
    instruction_data: &[u8],
) -> ProgramResult {
    Ok(())
}

fn donate(
    program_id: &Pubkey,
    accounts: &[AccountInfo],
    _instruction_data: &[u8]
) -> ProgramResult {
    Ok(())
}
```

V. CampaignDetails struct

To code the CampaignDetails struct. Some fields have been added, name, admin, description, image link,amount donated for our Campaign.

```
#[derive(BorshSerialize, BorshDeserialize,
Debug)]
struct CampaignDetails {
    pub admin: Pubkey,
    pub name: String,
    pub description: String,
    pub image_link: String,

    /// donated to a campaign.
    pub amount_donated: u64,
}
```

Both BorshSerialize and BorshDeserialize have to be derived. BorshSerialize is used to convert the struct into an array of u8, which is the data we can store in Solana accounts.

```
use borsh::{BorshDeserialize, BorshSerialize};
```

Now adding code of create campaign function and the CampaignDetails Struct.

```
entrypoint!(process_instruction);

/// We are creating the struct;.
#[derive(BorshSerialize, BorshDeserialize,
Debug)]
struct CampaignDetails {
    pub admin: Pubkey,
    pub name: String,
    pub description: String,
    pub image_link: String,
    pub amount_donated: u64,
}

fn create_campaign(
    program_id: &Pubkey,
    accounts: &[AccountInfo],
    instruction_data: &[u8],
) -> ProgramResult {


    let accounts_iter = &mut accounts.iter();
```

By deriving the trait BorshDeserialize in our CampaignDetails struct we have added a method try from slice which takes in the parameter array of u8 and creates an object of CampaignDetails with it.

Solana accounts can have data, but size has to be specified when it is created. We need to have a minimum balance to make it rent exempt. For this project, we create an account that already has a balance equal to the minimum balance.

VI. Withdraw function implementation

For the withdraw function, we have to create a struct to get the input data. In this case, input data is only the amount we want to withdraw.

```
#[derive(BorshSerialize, BorshDeserialize,
Debug)]
struct WithdrawRequest {
    pub amount: u64,
}
```

Now writing the function

```
fn withdraw(
    program_id: &Pubkey,
    accounts: &[AccountInfo],
    instruction_data: &[u8],
) -> ProgramResult {
```

For the withdraw also we need to create iterator and get writing account and admin account.

We will retrieve the campaign data from the writing account. Keep in mind that we saved this when we used the create campaign method to create the campaign.

The campaign should not be erased upon a withdrawal, is what we seek. We compute the rent exemption and take it into account since we always want there to be a minimum balance.

VII. UI

Once the core functionality has been developed, it's time to add tests for quality assurance. Tests can be found in the repository, which are similar to what will be displayed on the user interface. Next, we'll create the frontend portion. After finishing the backend, we can move on to the frontend and create a React application using the command **create-react-app.** Then, we'll start adding components and connecting them to our backend API. It's advisable to adopt a component-based approach in React, where the UI is divided into smaller, reusable components for easier management and maintenance. For navigation, we can use React Router.

```
npx create-react-app crowdfunding-ui
--template typescript
```

We have to change the directory accordingly. After changing the directory the packages have to be installed the packages for UI. The following commands have to be executed.

```
npm i @solana/wallet-adapter-react
@solana/wallet-adapter-react-ui
@solana/wallet-adapter-wallets
@solana/web3.js
@project-serum/anchor react-bootstrap
```

The React Bootstrap library is utilized solely for styling purposes. However, this alone is not sufficient to construct and operate the user interface effectively. The anchor package has some dependencies and certain features within the Solana libraries are required if using react-scripts.

```
npm i --save -dev react-app-rewired
source -map-loader
```

It is better to create a separate ‘wrapper’ or ‘provider’ to connect and work with the wallet.

The whole app has to be wrapped in it.

```
const App: React.FC<AppProps> = () => {
    return (
        <WalletWrapper network ={network}>
            <CompaingsView network ={network}/>
        </WalletWrapper>
    );
}
```

If a person has to send and receive data, we require to create the Program class, where we put the **Idl, programId and provider**. It will be in the CampaignsView component.

```
const getProgram = () => {

        const connection =
        new Connection(network,
        opts.preflightCommitment);
        const provider=
        new AnchorProvider(connection,
        wallet as any,opts);
       /
        const program =
        new Program(idl as Idl, programId,
        provider);
        return program;
    };

const program = getProgram();
```

The Program class plays a crucial role in communicating with the crowdfunding program. To start a campaign, it is necessary to have a wallet containing a certain amount of Sols. In this case, we utilized the Phantom wallet which can be added as an extension to your browser. After installation, make sure to switch the network to ”devnet” in the wallet’s settings, and then receive an airdrop to the wallet.

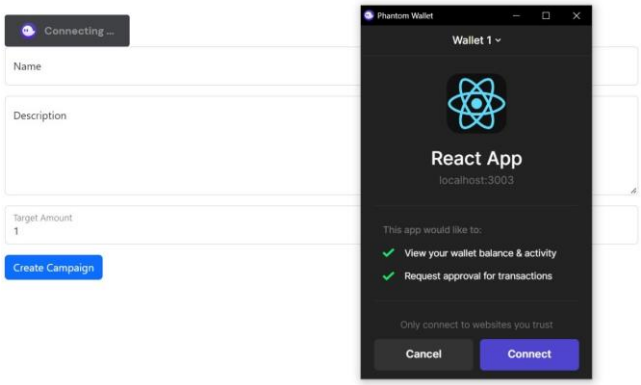

Fig 5. UI interface

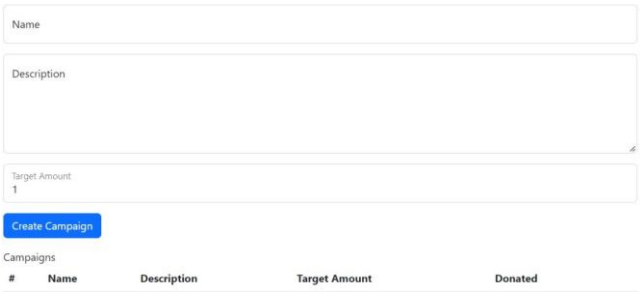

Fig 6. UI interface

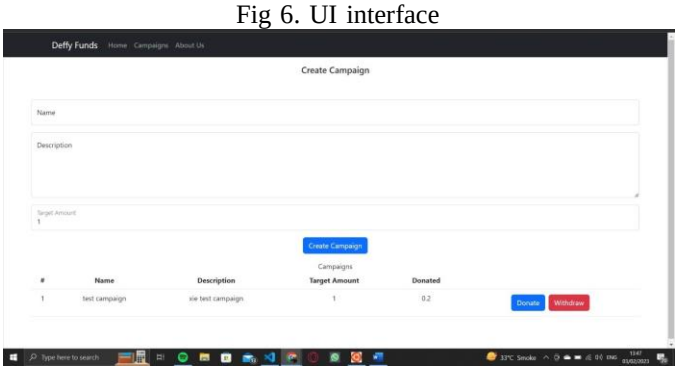

Fig 7. Back-end interface

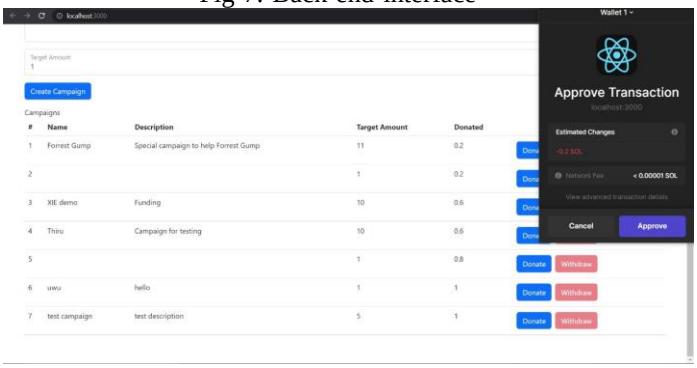

Fig 8. Back-end interface

VIII. FRONTEND UI

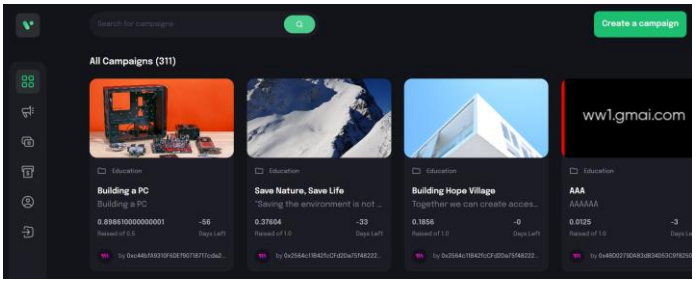

Fig 9. Front-end 1

CONCLUSION

In conclusion, the use of blockchain technology in crowd-funding has the potential to revolutionize the way funding is raised and managed. By leveraging the security, transparency, and decentralization of blockchain, crowdfunding platforms can offer a more secure and efficient way of managing funds and ensuring fair distribution of rewards. The integration of Solana blockchain into a crowdfunding platform offers several benefits, such as faster transaction processing times and lower fees, making it a promising option for crowdfunding projects. This new paradigm of crowdfunding offers new investment opportunities and a fresh product to help investors diversify their holdings. As the blockchain industry continues to grow and mature, it is likely that we will see a rise in the adoption of blockchain-based crowdfunding solutions. Further research and development in this area can help unlock the full potential of this technology and bring new and innovative solutions to the crowdfunding industry.

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Departmental Website

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Abstract—**Departmental Website provides a simple interface for conservation of pupil information [1]. It can be used by educational institutions or organizations to efficiently keep track of students' records. In universities and other institutions, it is crucial to create and maintain accurate, current data about a student's academic career. The student information system deals with all types of student information, academic affiliated reports, council information, course information, class information, batch information, placement information, and other resource-related information as well [2][3]. Additionally, it will include information on the faculty, batch prosecution, scholars, and colorful academic announcements to the staff and scholars that have been streamlined by the council administration [2]. It also grease us explore all the conditioning passing in the council, Different reports and Queries can be generated grounded on vast options related to scholars, batch, course, faculty, examinations, semesters, instrument and indeed for the entire council The placement officer is responsible for streamlining the placement affiliated information like eligible criteria for a particular company, arriving date for the company which is coming for reclamation, the list of scholars who are eligible for attending the reclamation process[4]. E- Library (also appertained to as digital library) is a special library with a focused collection of digital objects.**

Keywords —Web Runners, Data Envelopment Analysis (DEA).

I. INTRODUCTION

A website is a collection of intimately accessible, interlinked Web runners that partake a single sphere name [5]. A website is also referred to as a "point" or "web presence." There is a nearly limitless variety of websites, including educational, news, pornographic, forum, and social media-based commerce sites, among others. A website's runners, which can be found in a variety of spots, generally follow the same format as a homepage, which links to other orders and content on the website [3]. The main runner of the point itself is represented by the homepage, or simply "home." The homepage is constantly a sort of "mecca" from which all other runners can enter [2]. A "parent runner" is actually an internal web runner to which several other runners are linked in a coherent structure, similar to a specific order of motifs. Each runner is a single HTML document that is linked to one another by hyperlinks (or simply "links"). These hyperlinks can be combined into a navigation bar for convenience. The navigation bar allows the user to quickly navigate the main website's structure and is displayed on every runner rather than just the homepage. The footer, which is also a creating section located at the bottom of every page, is another crucial component of most websites. In most cases, the physical address of the company that owns the point is included in the footer along with disclaimers, links to the terms of service, insulation policy, and contact runners, as well as external links to similar websites and other external resources. Websites are hosted on servers and can be accessed using a web browser like Chrome, Firefox, or Internet Adventurer on a computer or mobile device. You can directly enter a website by entering its URL address or by searching for it on a search engine like Google or Bing. Websites were initially distributed according to their top-ranked fields [6]. Websites of government agencies are one example =. gov and the websites of educational institutions equal websites of educational non-profits
= org-marketable websites are equal to Information spots = by com. Word.

II. LITERATURE SURVEY

This survey looks at website quality factors and how important they are when choosing a website to use, as well as which quality factors need to be changed or improved for e-commerce success [1]. This paper advances methodology by demonstrating the application of data envelopment analysis (DEA). The creation of a website that principals can use to participate in induction programs is the aim of this project. A website that school administrators can use to improve academic performance and evaluate their leadership in the classroom is the study's output [2]. The goal is to create a website where school principals can participate in orientation programs. The research result is a website that can be used by school principals to improve school performance and can also measure the level of instructional leadership [3]. The creation of a website that principals can use to participate in induction programs is the goal here. The study's outcome is a website that school principals can use to boost student achievement and measure instructional leadership [4]. We are able to access all of the information about the college staff, students, facilities, etc.-through this web-based application. With the aid of this app, you can tour a campus virtually [5]. This page contains the most recent data on the faculty and students. The core principle of responsive web development is "Mobile priority and progressive enhancement." In addition to offering users a top-notch user experience, responsive web design addresses compatibility issues that may occur when websites are viewed on various platforms, resolutions, and screen sizes [6].
According to the findings of our literature review, numerous projects on this subject have been completed, but many of them

lacked accuracy due to issues like database management requiring more computations and data encryption. All of these problems are solved by our system, which offers a practical and effective solution.

III. PROBLEM DEFINITION AND OBJECTIVES

Problem Definition:

The problems prevailing in the existing system invoked us to implement a website for a specific department so the students and teachers of that department could effectively use the services on the website. The inconsistent backend causes a serious problem. The cost of the existing website is expensive the lack of awareness among students regarding latest events and announcements associated with the particular department was also a concern as there was no specific website announcing news of the specific department .

Also, awareness regarding recruiters visiting the college for placement drives among students was also taken into account while developing this system so that students are well aware of the upcoming drives in their respective department.

Objectives

- Create an Online Presence
- Allow People to Find You
- Engage more Audience
- Build Relationships
- Make Money

IV. EXISTING SYSTEM:

Word Press was used to create the departmental website system that is currently in place in order to avoid the issues that are typical of the manual system [9]. However, the issue remained unresolved. The current system is plagued by compatibility issues, site speed, and other issues. The backend of the current system cannot accommodate the enormous amount of data on the departmental website. You can build a variety of web pages on a basic Word Press website using a variety of themes [3]. As a result, Word Press serves as the foundation for the departmental website and hence are required to modify the Word Press website, which will cost significantly more in our system than modifying a website in a different language [2]. Site conflicts were an issues on the existing website and the plugins too. The website needs to be fixed for a lot of security issues. The website was being hacked. The data on the current system is not secure.

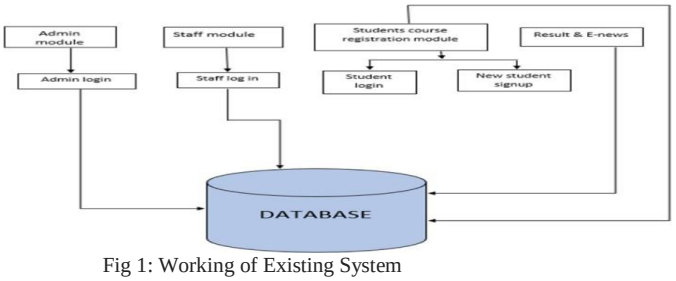

Fig 1: Working of Existing System

Advantages of Existing System

- Housing doesn't have to be a hassle.
- A wide range of themes make it easy to design a website.
- Adding website content is quick and easy.
- Upgrading is easy.
- Plugins allow you to do almost anything on your website.

Disadvantages of Existing System

- Additional functionality requires many plugins.
- Regular updates of themes and plugins.
- Slow cross speed.
- Low SEO rank.
- Website vulnerabilities.
- Websites can crash without warning.

V. PROPOSED SYSTEM:

We have attempted to include a database link to our departmental websites in order to make the website more dynamic and interactive. As a result, recruiters will be able to post their vacancies, salary packages, and eligibility requirements. Upon which a student can indicate his or her willingness to participate in the drive and provide personal information. Additionally, arrangements have been made to display the most recent announcements and events pertaining to the particular department. The objective of a framework is to permit project designers and developers to concentrate on creating distinctive features for their project rather than reinventing the wheel by coding features that are common to numerous websites and web applications. We used HTML5 and CSS3 to build this website. That is the most fundamental tool for building a website. Additionally, we are able to modify this website using these languages and bootstrap.

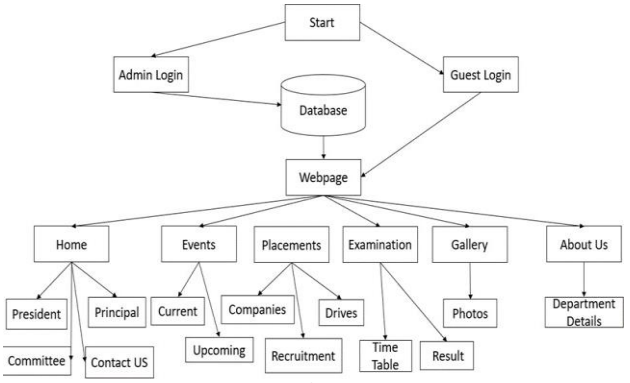

Fig 2: Block Diagram of Proposed System

Working of Proposed System

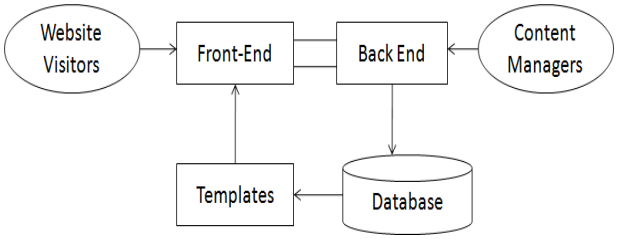

Fig 3: Working of Proposed System

When you type something like Google.com, the request is sent to one of the many special computers on the Internet known as Domain Name Servers (DNS). All of these requests are routed by a variety of routers and switches. The domain name servers store a number that identifies the computers that provide you with access to the Google website when you type in "google.com."

Any time you want to view a Web page, you must initiate the activity by requesting a page using your browser. The browser's request to a domain name server converts the domain name you requested into an IP address. The browser then makes a request to that server for the page you want by using the HTTP standard.

The server should always be connected to the Internet and ready to serve visitors pages. When it receives a request, it searches for the document and returns it to the Web browser. When a request is made, the server typically keeps track of the client's IP address, the document that was requested, and the date and time of the request. Each server has its own set of data.

Multiple requests from the browser are required for a typical Web page, which includes not only the HTML or XHTML page but also any images, style sheets, or other resources utilized in the page. Each item in these files, including the main page, must be identified using a URL. The browser then collects and displays the data in a web page after each item has been sent to the Web server.

Modules of Proposed System

The proposed system for the departmental website consists of seven modules: the home page, the Administrator module, the student module, the instructor (staff) module, the Office module, the Alumni module, and the Guest module. Module for administrators: This module maintains the current management and has special authority. The host or system administrator will update, delete, or modify data as needed.

1. *Student section*: A login option has been added to the student module design to allow students to use the website's features the addition of modules for attendance, studying, entering, and paying fees.

2. *Module for Attendance*: This module is available for both students and teachers, as can be seen in the image above. The corresponding instructors keep an eye on the students' everyday attendance. When a student's daily attendance falls below 75%, the system notifies parents via emails and texts. The percentage of days missed is multiplied by the total number of working days to determine attendance.

3. *Fee Payment Module:* The Fee Payment Module is only accessible for the office part, as indicated in the image. This module carefully collects student tuition. Students and their parents are sent emails and text messages at the conclusion of each installment period reminding them to send the installment to the college. This guarantees that fees are efficiently collected without overburdening the office or the students.

4. *Study Materials*: The study materials in this module include books, notes, and teaching aids.

5. *Module for Supervisors*: This module must be used by employees. The announcements section is where teachers post all exam-related information, feedback, and assignments. It also has a section for staff and student participation and study materials.

a) *Office Section*: The only module that can be used to store all of the information about student enrollment and payment is the office module.

b) *Alumni Module*: With a unique username and password, alumni can access this section that contains information about their degrees. Additionally, placement information for students is displayed in this section. Guests are also welcome to look at this section to find out how the college is doing with internships.

c) *Guest Module*: The website can only be viewed through the Guest Module. The home page, about us, campus life, faculty, admissions, and curriculum features are accessible to visitors. d. Registering and logging in: The login section grants the user access to all or a portion of the website, depending on the user's identity and credentials. Additionally, information about new registrations based on roles chosen by staff, alumni, and students is gathered by the registration module.

VI. REQUIREMENT ANALYSIS

***Hardware Requirements*:**

- Cores and threads: two cores and four threads.
- Cache memory: 3 megabytes.
- Base frequency: 2.30 GHz.
- Graphics: Intel HD Graphics 620
- Memory (RAM): 4 gigabytes (ddr4- 2133, lpddr-1866, ddrl-1600).
- System type: 64-bit, x64-based processor.

Software Requirements:

- System software: Windows XP, 7, 8, and 10.
- Client-side scripting: Internet Explorer or any other http browser.
- Java script Relationship: IP/TCP Protocol.
- Html &CSS.
- JavaScript.
- PHP 5.6 and higher.
- MySQL 5.x mod rewrite.
- PHP Extensions include OpenSSL, MBString, GD, Zip.

- PHP Extensions with enable_url_fopen enabled.

Advantages and Disadvantages of Proposed System

Advantages:

- The proposed system's objective is to improve the facility management system.
- Most of the existing system's limitations can be overcome by the proposed system.
- The system provides adequate security and reduces manual labor.
- The data's security. Ensure that the data are accurate.
- Proper control over the higher-ups.
- Less hardcopy data entry is needed.
- The shortest amount of time necessary for each processing step.
- Better service and improved efficiency.
- Interactive and user-friendly.
- The bare essentials are required.

Disadvantages:

- Untruthfulness in the classroom.
- In the event that the server goes down, both the customer (the user) and the administrator will be harmed.
- If the database is not properly maintained, problems can arise.

VII. RESULT

Fig 4: Home Page of Departmental Website

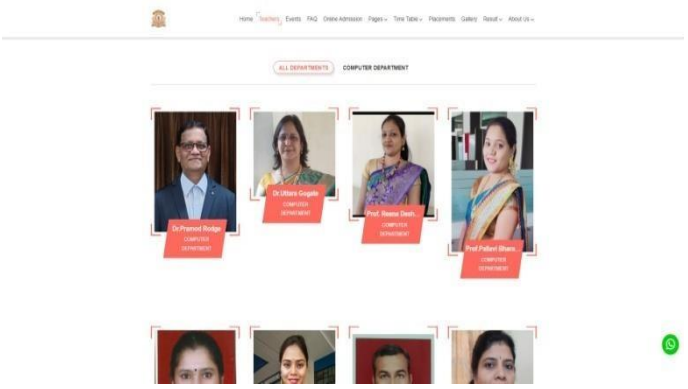

Fig 5: Faculty Page of Departmental Website

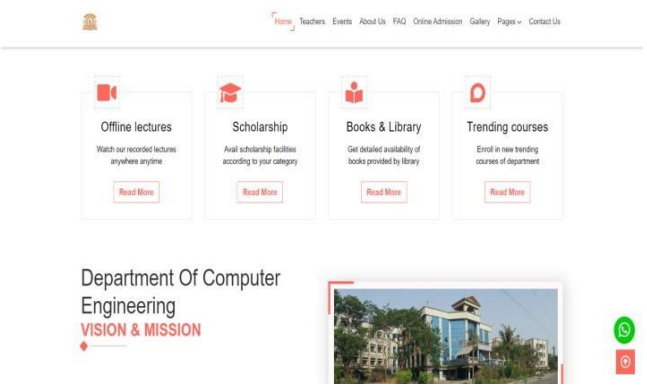

Fig 6: Mission and Vision Page of Departmental Website

Fig 7: Events Page of Departmental Website

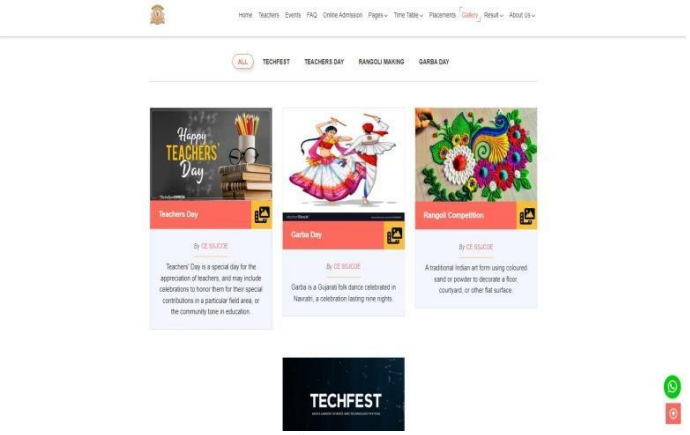

Fig 8: Gallery Page of Departmental Website

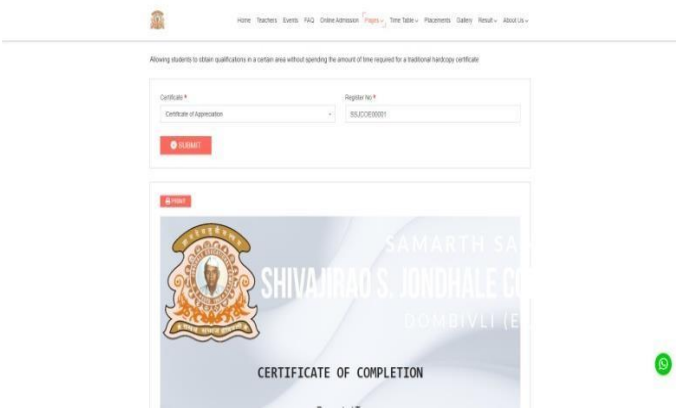

Fig 9: Certificate generation page of Departmental Website

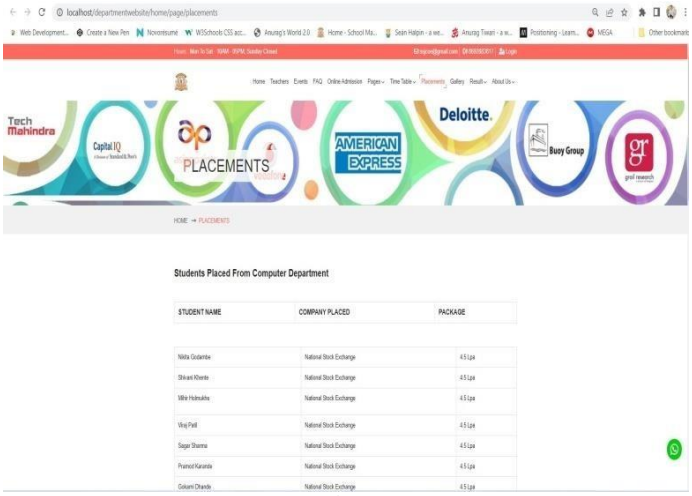

Fig 10: Placement Page of Departmental Website

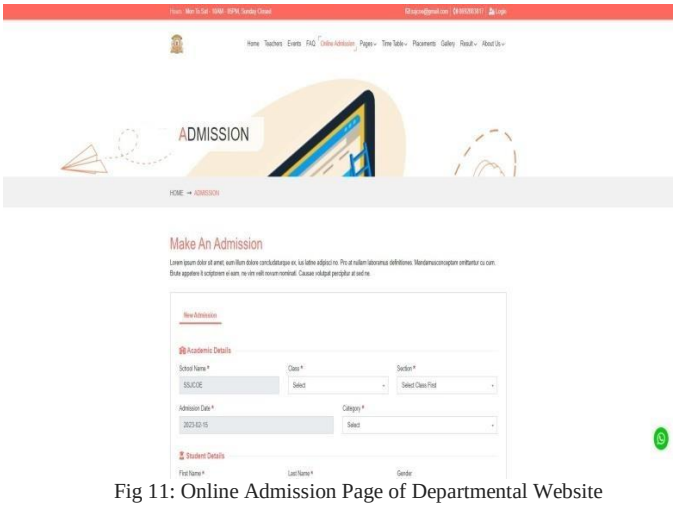

Fig 11: Online Admission Page of Departmental Website

VIII. CONCLUSION

By providing them with access to a user-friendly website where they can easily access data related to their concerns, our project aims to meet the needs of the department's faculty and students. The system's implementation will make it easier to calculate reports and save time entering data. The functional modules of the Departmental Website were developed successfully as a secure, digital, and user-friendly public governance system. As a result, the system was designed to effectively address the issues without compromising data or information.

IX. FUTURE SCOPE

The departmental website will be updated as technology advances. In order to maintain a smooth user experience, we will undoubtedly continue to implement updates on the website, including security updates. Skills in development are becoming increasingly in demand as we move toward an even more technologically driven future. Machine learning, AI, the Internet of Things (IoT), quantum computing, and other similar technologies are transforming technology. And their relationship with the websites is even a factor in this.

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XI. ACKNOWLEDGEMENT

We owe our deep gratitude to our project guide Prof. Reena Deshmukh, who took keen interest in our project work and guided us all along by providing all the necessity for developing a successful system

We thank our HOD Dr. Uttara Gogate and our principal Dr. Pramod R. Rodge for providing us an opportunity to opt the project work in SSJCOE Dombivli and providing us all support and guidance which made us pursue the project duly. We are extremely thankful to them for providing such nice support and guidance.

We are thankful to and fortunate enough to get constant encouragement, support and guidance from all Teaching staff of Computer Engineering which helped us in pursuing our project work.

LAND REGISTRATION USING BLOCKCHAIN

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Abstract - **A governance system's essential department for storing records of land ownership is the land written record system. The current system has a number of flaws and issues that lead to corruption and disagreements. In order to solve these issues, a significant portion of precious government resources from the judicial and enforcement authorities are required. Blockchain technology has the ability to close these gaps and solve issues with the land written record system, such as record tampering and the mercantilism of a constant parcel of land to a single vendee. A secure and dependable framework for a land written record system utilizing blockchain has been anticipated during this project. At several stages of the land written record, the envisaged framework makes use of the notion of a reasonable contract. A middleman (broker) establishes a contract between the buyer and seller in the conventional Land Registration system used in India. For instance, if a person wishes to buy or sell a property, the broker would produce and put together all of the necessary physical paperwork as proof of the property. Brokers will see to it that the land or property is registered by a recognized government agency, where all the characteristics are put down in a ledger, and that the entire transaction and sale between the two parties takes place after that. Given that anyone with the necessary authority can access or change the files with ease, there is a potential that the documents will be lost or altered in this situation.**

Key Words : Blockchain, Land, Transaction, Verification, Smart Contract, Ganache, Flutter, Metamask .

I. INTRODUCTION

A land register is a system that keeps track of the primary claims to ownership made by various governmental entities, i.e., it keeps track of who owns what pieces of land. There are, however, many issues and flaws in the current system that lead to corruption and disagreements. In order to solve these issues, we frequently use Blockchain technology.
Blockchain is used to close these gaps and identify issues with the land register system, such as record tampering and the sale of the same parcel of property to just one vendor. The term "land register system" refers to the system that keeps track of the primary areas of possession that various governmental entities claim. The hold on record will be utilized as the evidence for the claim in order to prevent any potential fraud and ensure smooth transitions as needed. The most recent land records obstruct the verification of land titles and could lead to frauds. According to a survey by the Planet Bank, around 70 percent of the population does not possess a land title. For social and economic sustainability, land claims are an essential possibility.

In this system, users sign up on the portal and can choose to play either the buyer or the vendor. The buyer can then purchase the lands on the portal that have been confirmed by the smart contract after the seller has uploaded the necessary information. Additional users can obtain digital deeds that will be added as additional blocks in the chain and uploaded. Thus, there is no middleman in this suggested system, and all transactions are handled directly between the buyer and the vendor. As a result of being coupled with timestamps, transactions now have a higher auditability andwill be stored in a cryptographic format on all parties legal servers.[1]

II. MOTIVATION

The most powerful force driving social change in today's world is digitalization and the creation of new technology. In the previous system, it was very challenging to navigate all the information pertaining to the assets if a user lost original physical agreements that serve as actual proof of ownership or if documents were altered or damaged. The manual verification of ownership and title documents traditionally takes a long period, which slows down legal transactions. Fraudulent acts, such as obstruction, bribery, forgery, or alteration, carried out by intermediary actors in the process and leading to a lack of security, are another serious problem. We started out by putting forth our suggestion for a blockchain-based land registration system as an alternative to the current one. The proposed method will expedite the verification of ownership and land deeds, as well as speed up data recovery in the event of a disaster, cache all blockchain updates, and guarantee that no current transaction

are tampered with. As a result, transactions will be safer. Data about the owner and the property is encrypted to prevent data manipulation. We support a decentralized system, often known as a peer-to-peer system, in which all transactions are handled directly between the buyer and seller using digitally created and verified agreements. Because blockchain uses hashing techniques and records any alteration, this updated system can prevent fraudulent activities. All changes are stored in the next block so that no user is unaware of the current state of any asset, and all transactions are stored in a blockchain with appropriate timestamps associated with them for robust auditability.

III. PROBLEM STATEMENT

Property Registry is one of the use cases that involve a lot of intermediaries to put trustin the system. The existing solutions in place are out of date. Tracking who owns whichpieces of property is challenging when you have thousands of land records to maintainand mostly all these records are not digitized or take a long time to get digitized. The "double spending" problem is not resolved by India's current land system. A single point of failure could have disastrous consequences due to the countless instances of fraud and property document forgeries.

Since blockchain can offer a decentralized platform for secure preservation of these papers, it can be the most effective, long-term solution. The existing method has security issues because all of the documents are kept in a single, potentially susceptible government database. In addition, there have been several instances of corruption where unauthorized individuals tampered with official records, which can be detrimental.

IV. OBJECTIVES

The main objective of the project was to build a solution which consisted of a decentralizedapplication. The complete setup should serve the following purpose:

- Provide a interface for the user to buy/sell their properties.

Provide a interface for the land inspector to verify the transactions involved in property dealing and transfer the land ownership.

User should be able to carry out the deals easily and in transparent manner.

Solution should be able to handle multiple users.

Generate a digitally verified ownership transfer document

V. LITERATURE SURVEY

Many of the guidelines for good governance in land administration could or must be adhered to while using blockchain technology. Along with the history of transactions (chain of title), transparency and efficiency are also present. Additionally, it is possible to store unique identifiers like parcel numbers and (legal and natural) person identity numbers. The implementation of transaction rules will allow for the validation of transactions. In the present, efficient Land Registry systems, this is primarily carried out manually by carefully reviewing the deed.[1]

The techniques and issues with the ancient land written account system were examined in this essay. The standard approach is susceptible to various types of interference at every stage, which indirectly affects cost accounting in terms of paper resources, the need for extensive record keeping, and security issues with those records. Because it requires significantly fewer and more dependable human resources, the intended system is highly inexpensive. Additionally, this study proposed a formula for a pre-agreement contract between a customer and a merchandiser.[2]

This study makes the following recommendations: An initial, planned model should be implemented into the ILMIS infrastructure in order to strengthen security and shield land title records from both internal and external threats. Digital currency has been the technology's diode, and it continues to permeate other socioeconomic sectors including agriculture, medicine, and electricity. People will misuse this technology, even though it is not the right regulation.[3]

Storing sensitive information like property papers needs a secure and steady database. Existing centralized systems has numerous drawbacks like performance bottleneck and single point of failure.

Hence, a decentralized system with high security is needed. To cater this need, in this paper, we propose blockchain based system for secure storage of property papers. In our system, when a land is bought by a person, the government authority will provide the person with the hard copy of property papers and our system will store the documents into the Inter Planetary File System (IPFS), a decentralized database. The IPFS network will generate the hash of document. This hash will be securely stored into the Ethereum blockchain after satisfying the conditions of the smart contracts. The smart contracts will validate and verify the documents from the government authorities. This will create a decentralized, tamper-proof ledger from which we can retrieve the stored data easily.[4]

Blockchain is an immutable and decentralized digital ledger that is managed by a network of computers, not owned by a single entity. No third party is required to initiate the transaction.The

records in the Blockchain database are transparent and the data is accessible to anyone on the internet. Every active peer on the internet keeps a copy of the original records in the Blockchain and no update is possible without agreement among them. The peers can verify transactions in the blockchain using encoded 'hash' that has to match with the Blockchain's history.[5]

VI PROPOSED SYSTEM

Even though the data is in digital form and held on many platforms, there are now several issues with transparency, trust, and efficiency in the commercial real estate industry and land registration systems. With relation to the state of Maharashtra, it is intended to implement a minor module of the land registration process.

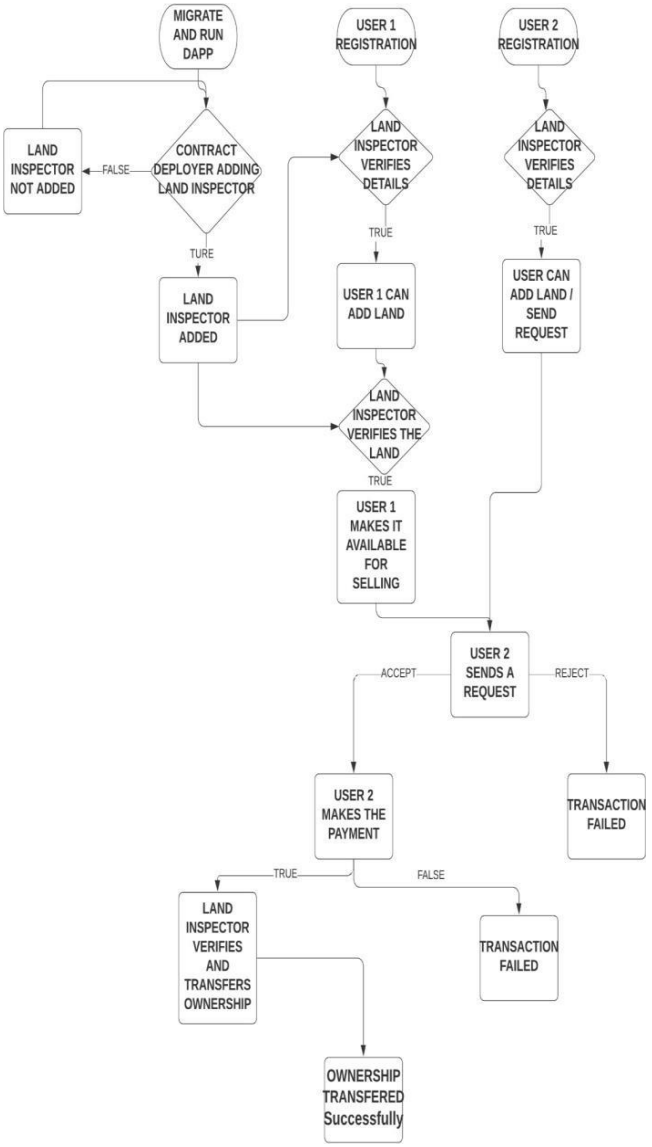


Fig 1 : Proposed methodology

To overcome the previously described challenges, we suggest a private and permissioned blockchain system that limits the participants who can contribute to the consensus process. Our blockchain technology uses distributed consensus methods for ledger consistency and asymmetric cryptography for user security. Decentralization, persistence, anonymity, and auditability are the four main characteristics of blockchain technology, and their combination leads in lower costs and increased effectiveness and dependability.

Blockchain enables anybody to check the accuracy of the system's state, in contrast to centralized traditional systems where different observers may have different views of the system and are required to trust the central authority for verification and authentication. Each state transition in this configuration is verified by verifiers, who may be limited to a group of peers as well.

The user can register themselves and send the specifications first, after which the pre agreement algorithmic rule is carried out. The vendor and the client sign a pre-agreement title contract that includes their signatures, seller IDs, buyer IDs, sell IDs, the amount of transfer, and payment status. After then, a sell request is sent with the pre-agreement title contract. Blockchain can be used to establish confidence within the system for a land written account and eliminate the problem of duplicate outlay by allowing the system to LOCK the specific land title and prevent other group actions on the same Sell ID until the system has received approval or disapproval. Additionally, associated possession and debt verification and validation are completed, along with a report on the property's location and debt.

VII. METHODOLOGY

The two primary building elements of the system are the blockchain network and the smart contract engine. The smart contract engine has a storage for holding good contracts or deeds. It is linked to a user module, and the user interfaces have two categories of users: clients UN agencies looking to buy land, and vendors UN agencies looking to sell their land. User information, including name, address, phone number, and email, is also saved in a reliable contract engine. The user will register under an exploit username. Blockchain verifies the transactional paperwork and provides the system with security. Additionally, the blockchain provides a public interface for accessing data.

Flutter - We have made frontend of our project using Flutter. Flutter is open source and created by Google. It is a cross platform SDK. Using single codebase we can create application for Android ,IOS and Web application. Currently with newer version of Flutter we can also create apps for Windows, Linux and Mac os. On the front screen, one can login as a user, land inspector, or contract owner. The contract owner can add a land inspector and see all the added land inspectors. The land inspector's dashboard consists of the functionality to verify user, verify land and transfer ownership. If we login as the user, we have the options of adding lands,

Fig 2 : Login Page

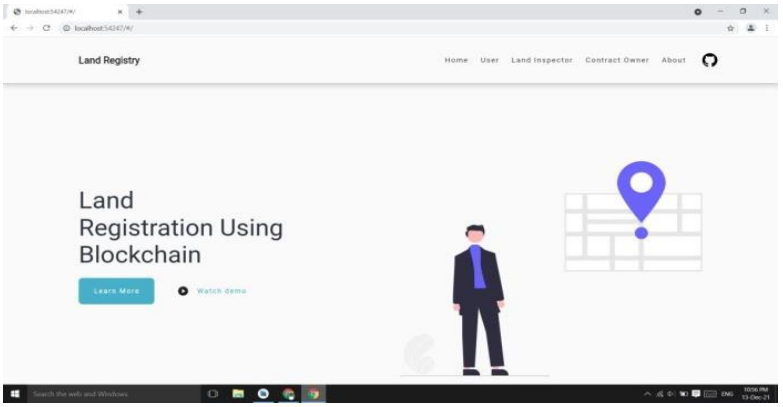
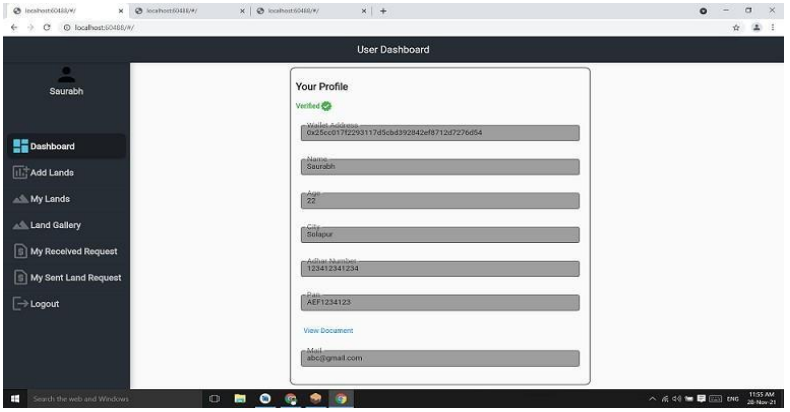


Fig 2 : Login Page

Fig 3 : User Details



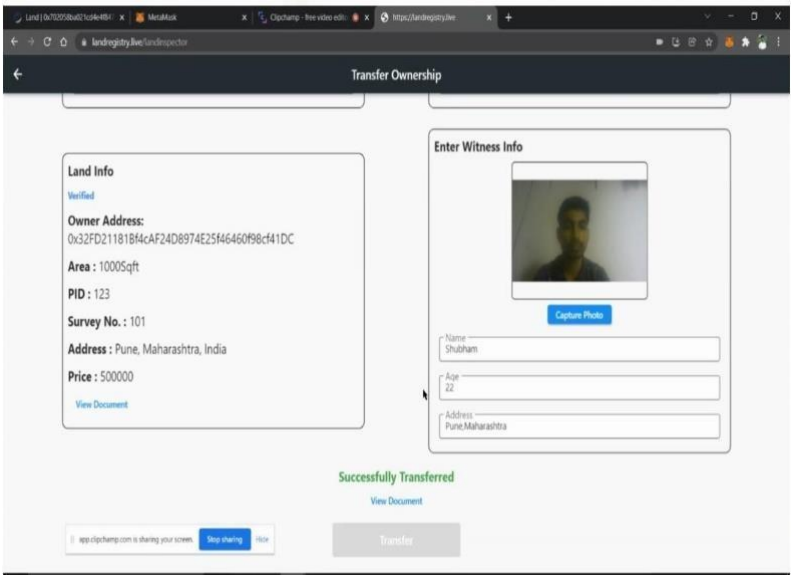


Fig 4 : Witness Information

land details, seeing all lands, sending and receiving land requests. We have used truffle IDE to set up the DAPP.

Smart Contract - Blockchain is to bitcoin, what the internet is to email. A big electronicsystem, on top of which you can build applications. Currency is just one. Bitcoin supportsan optional and special feature called scripts for conditional transfer of values. Ethereum blockchain extended the scripting feature into a full blown code execution framework called smart contract. A smart contract provided the very powerful capability of code execution for embedding business logic on the blockchain. With addition of code execution comes serious consideration about public access to the blockchain hence, the classification of public, private and permissioned blockchain based on access limits. In this project we have implemented a smart contract as the backend which consists of all the terms and conditions for a smooth and secure transfer of property registration.

Truffle - Truffle is a world-class development environment, testing framework and assetpipeline for blockchains using the Ethereum Virtual Machine (EVM), aiming to make life as a developer easier. Truffle is widely considered the most popular tool for blockchain application development with over 1.5 million lifetime downloads.

Metamask - MetaMask is a software cryptocurrency wallet used to interact with the Ethereum blockchain. It allows users to access their Ethereum wallet through a browserextension or mobile app, which can then be used to interact with decentralized applications.

web3.js - Web3.js talks to The Ethereum Blockchain with JSON RPC, which stands for"Remote Procedure Call" protocol. Ethereum is a peer-to-peer network of nodes that stores a copy of all the data and code on the blockchain. Web3.js allows us to make requests to an individual Ethereum node with JSON RPC in order to read and write data to the network. It's kind of like using jQuery with a JSON API to read and write data witha web server.

VIII. RESULTS

Login Page - On the front screen, one can login as a user, land inspector, or contract owner. The contract owner can add a land inspector and see all the added land inspectors. The land inspector's dashboard consists of the functionality to verify user, verify land and transfer ownership. If we login as the user, we have the options of adding lands, land details, seeing all lands, sending and receiving land requests.

Working - First user adds his land details which are verified by the land inspector. Tobuy or sell land, user must send a request to land inspector. After the request has been accepted by land inspector the users can make the transactions. The transaction is verified by the land inspector. After the transaction is verified, the ownership is transferred

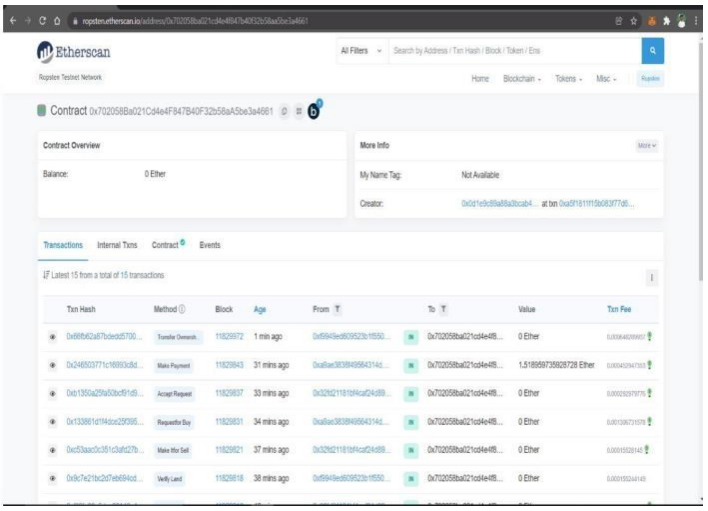


Fig 5 : Contract Information

IX. FUTURE SCOPE

In the future, our scope could be enlarged by integrating our system with government APIs because our established system is currently subject to deployment of transactions where we directly use all the papers that have already been personally validated by the authority. By doing this, we can easily and automatically validate the users and their actions. Users who speak their native languages can also incorporate a language translation feature. Finally, we can add other aspects to our system, making it more dependable and user-friendly, and maintain track of a piece of land's complete history.

X. CONCLUSION

The current system is vulnerable to many sorts of manipulation at every stage and indirectly affects costs through the use of paper resources, the need for extensive record keeping, and record security concerns. Blockchain has the ability to address every problem. A framework for a safe and trustworthy land registry system has been put out in this project to address the major problems of tampering, double spending, and providing nearly real-time updating of land records. The proposed method is particularly cost-effective since it requires fewer and more reliable human resources. We have also offered a pre- agreement contract algorithm for use by the buyer and seller.

At the moment, our main priority is getting rid of intermediaries. However, in order to use the blockchain successfully, we might also identify the land by using geographical factors like geolocation, latitude, and longitude. This would further improve the accuracy of transactions and ensure that no unlawful ones were executed. One of the future goals would be to put this into practice on a wide scale.

IX. ACKNOWLEDGEMENT

Motivation and guidance are the keys towards success. I would like to extend my thanks toall the sources of motivation. We would like to grab this opportunity to thank Dr. P.R. Rodge, Principal forencouragement and support he has given for our project. We express our deep gratitude to Dr. Uttara Gogate, Head of the Department who has beenthe constant driving force behind the completion of this project. We wish to express our heartfelt appreciation and deep sense of gratitude to our project

guideProf. Shweta Patil for his/her encouragement, invaluable support, timely help, lucid suggestions and excellent guidance which helped us to understand and achieve the project goal. Her concrete directions and critical views have greatly helped us in successful completion of this work. We extend our sincere appreciation to all Professors for their valuable inside and tip during the designing of the project. Their contributions have been valuable in so many ways that wefind it difficult

to acknowledge of them individually. We are also thankful to all those who helped us directly or indirectly in completion of this work.

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Product Review and Recommendation

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Abstract— **Websites that compare product reviews have emerged as an essential informational resource for customers trying to make informed judgments about their purchases. Through these platforms, customers may browse user reviews and ratings, search and compare products, and base their decisions on the expertise and experiences of other shoppers. Due to the significance of user-generated material in the purchasing process, there is an increasing need for sophisticated and user-friendly product review comparison websites. With technologies like artificial intelligence, social integration, and better verification procedures, a proposed system aims to improve the user experience in order to meet this demand. As a result, users will experience a platform that is more personalized, entertaining, and outfitted with cutting-edge technologies to deliver reliable information to customers. Product review comparison websites have the ability to play an even more significant part in the decision-making process by staying on the cutting edge of technical developments and consistently enhancing the user experience. This study presents an overview of websites that compare product reviews, the suggested system, and their influence on the choice to buy.**

Keywords—Artificial Intelligence, Data analytics, Product Review, Recommendation system, Recommendation engine

I. INTRODUCTION

Websites that compare product reviews have grown in importance as a tool for consumers trying to make educated judgments about their purchases. Users of these websites have access to a platform where they can look up and compare products, read user reviews and ratings, and base their judgments on the collective wisdom and experiences of other users. As consumers rely on the experiences and opinions of others to inform their own decisions, user-generated information offered by these websites has emerged as a crucial component in the purchasing decision process.

The demand for more sophisticated and advanced platforms has grown as the use of product review comparison websites continues to soar. The suggested system incorporates social, augmented reality, and artificial intelligence aspects to improve the user experience. It also uses better verification procedures to guarantee that the data provided is reliable and correct. As a result, consumers trying to make wise purchasing decisions will have access to a tool that is more valuable, personalized, and entertaining. Product review comparison websites have the ability to influence consumers' purchasing decisions even more in the future by utilizing the most recent technical developments. [1]

II. LITERATURE REVIEW

Websites that provide information and analysis on various products, including their features, costs, and user evaluations, are referred to as "product review comparison websites." They are a resource that helps customers compare various items based on many factors in order to make educated purchasing decisions.

Overview of Websites Comparing Product Reviews: Websites that compare product reviews have been increasingly popular in recent years as a result of the expansion of e-commerce and the ease of online shopping. They offer a variety of product-related details, such as specs, features, costs, and customer reviews, which are compiled from numerous sources. Websites that compare product reviews include some well-known ones like Amazon, Best Buy, and Consumer Reports.

Benefits and Drawbacks of Product Review Comparison Websites: There are several benefits to using a product review comparison website, such as the simplicity of comparing products, easy access to a wealth of knowledge, and the chance to read user reviews and ratings. Additionally, they can offer consumers up-to-date data on prices and product availability in real-time. Websites that compare product reviews can have certain drawbacks, though, such as the possibility of biased or fraudulent reviews, the limitations of user reviews in capturing the genuine value of a product, and the possibility of out-of-date information.

Prior research and conclusions on websites that compare product reviews:
Websites that compare product reviews can significantly influence consumers' purchasing decisions, according to prior study. According to several research, these websites help consumers feel more confident while making purchases, which results in more informed and satisfying purchases. Other studies have demonstrated that the use of product review comparison websites can harm brand loyalty and undermine consumer confidence in conventional brick and mortar retailers.In conclusion, in the digital age, websites that compare product reviews have become an invaluable resource for customers. They offer a wide variety of details on numerous products, making it simpler for customers to compare and decide what to buy. To make the best purchasing decisions, it is crucial to be aware of the limitations of these websites and to critically assess the information provided. To fully comprehend the effects of product review comparison websites on customer behaviour and the market as a whole, more research is required.

Table 1: Literature review

Reference	Focus	Key Findings
[1]	Product Recommendation Systems a Comprehensive Review	The recommender system will take the information and formulate the decision in one of the following two ways either by the use of collaborative filtering or by the use of content filtering.
[2]	Product Recommendation using Machine Learning Algorithm - A Better Approach	The k-mean is a method for grouping which is not parametric. According to their similarity, it distributes the objects into k clusters. In this article, using the Euclidean distance this similarity is calculated.
[3]	Product Based Recommendation System On Amazon Data	This system is not quite consumer friendly as it doesn't compare prices of the product from different websites.
[4]	Result Review Analysis of Product Recommendation System in Domain Sensitive manner.	This system focuses a lot on user data and user history and also on the search pattern.
[5]	Comparing consumer produced product reviews across multiple website with sentiment classification	This system encourages consumers to post reviews of their purchased products, so that new consumers can evaluate these reviews for same product across different websites to help them make purchasing decisions.

From this table we can conclude that Consumers are often faced with the challenge of making informed purchasing decisions when shopping online. There are countless products available, each with its own unique features, benefits, and drawbacks. In addition, user reviews and ratings can vary widely, making it difficult to determine the quality and suitability of a product. This can lead to poor purchasing decisions, resulting in wasted time and money.

III. PROBLEM STATEMENT

The problem today we face is the availability of vast amount of information available online, as well as the numerous websites and marketplaces that offer products for sale. Navigating this maze of information can be overwhelming, especially for consumers who are new to online shopping.
The goal of the product review comparison website is to address this problem by providing consumers with a centralized resource for gathering information on products, user reviews, and ratings. The website aims to make the process of shopping online more intuitive, efficient, and reliable, by providing users with a clear and concise source of information on the products they are interested in. This will enable consumers to make informed purchasing decisions with confidence, ensuring that they get the best value for their money.

IV. ALGORITHM

Step 1: Start

Step 2: User visits the site's landing page

Step 3: Login or registration

Step 4: Home page

Step 5: Search product for Reviews and comparisons

Step 6: Search product by categories or by using search box

Step 7: Get Results/Desired product

Step 8: If found then fetch product details

Step 9: If not found then repeat step 5

Step 10: Comparison page

Step 11: Choose from multiple online stores

Step 12: Stop

IV. PROPOSED SYSTEM

Among the most well-known e-commerce sites worldwide are Snapdeal, Amazon, and Flipkart. Web scraping is a technique used to collect data from these websites. In the process of web scraping, data is automatically extracted from websites and stored in an organized way, like a database. This enables the rapid gathering of enormous volumes of data from numerous websites.

A database, which acts as a central repository for the information, houses the data gathered from various websites. Large volumes of data can be structured and managed effectively in the database. This makes it possible for the website to swiftly obtain the needed information and provide it to the user in an organized and understandable manner.

The creation of the actual website is the process's last phase. The website is made to give consumers a platform where they can look for products, evaluate various possibilities, read user reviews and ratings, and decide which products to buy. The website makes advantage of the database's data to offer users the most recent details on a variety of products. The website offers a comprehensive and user-friendly platform for customers wishing to make informed purchasing decisions by utilizing the data acquired from Amazon, Flipkart, and Snapdeal.

Searching for and comparing products is one of the website's primary functions. To discover what they need, users can browse categories or conduct specialized product searches. After a product is chosen, the website offers comprehensive information about it, including characteristics, customer reviews, and ratings. Users may easily comprehend the advantages and disadvantages of a product since this information is presented in a clear and straightforward manner.

A general overview of the working of a web application related to product review comparison:

User Login: Users would first need to create an account on the product review comparison website or sign in using their existing social media accounts.

Product Search: Users can search for products using keywords, filters for product features, prices, and user ratings.

Product Comparison: Users can compare different products based on various criteria, such as specifications, features, prices, and user ratings and reviews.

User Reviews and Ratings: Users can provide reviews and ratings for products they have used, and view reviews and ratings from other users.

Recommendation Engine: The recommendation engine would use machine learning algorithms and data analysis techniques to recommend products to users based on their search history, preferences, and purchasing behavior.

Product Purchasing: Users can purchase products directly from the product review comparison website or through a linked e-commerce platform.

Social Sharing: Users can share their reviews and recommendations with friends and family on social media, and view reviews and recommendations from their social network.

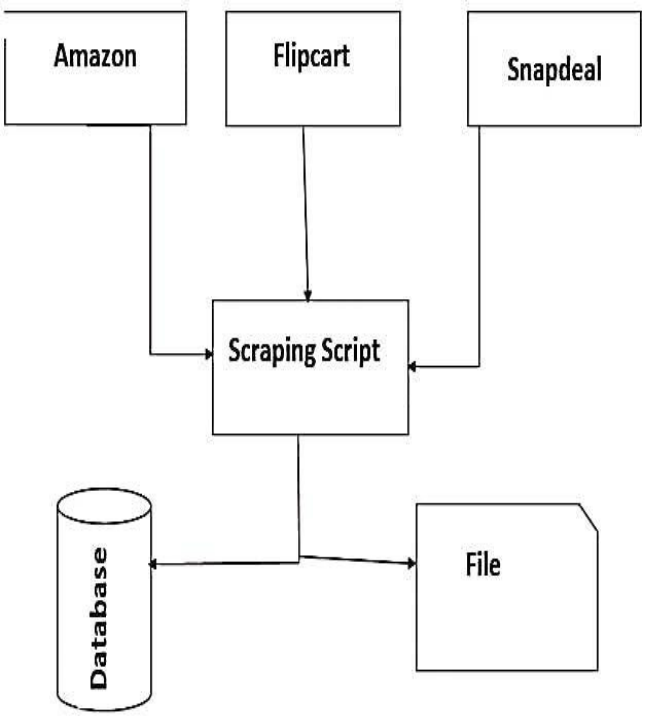

Figure 1: - Block diagram of the proposed system

The suggested system has the potential to completely alter how people find and buy things, making it a useful resource for years to come.

V. METHODOLOGY

The methodology for developing the product review comparison website involves several key steps. These steps are designed to ensure the accuracy, reliability, and relevance of the information provided on the website.

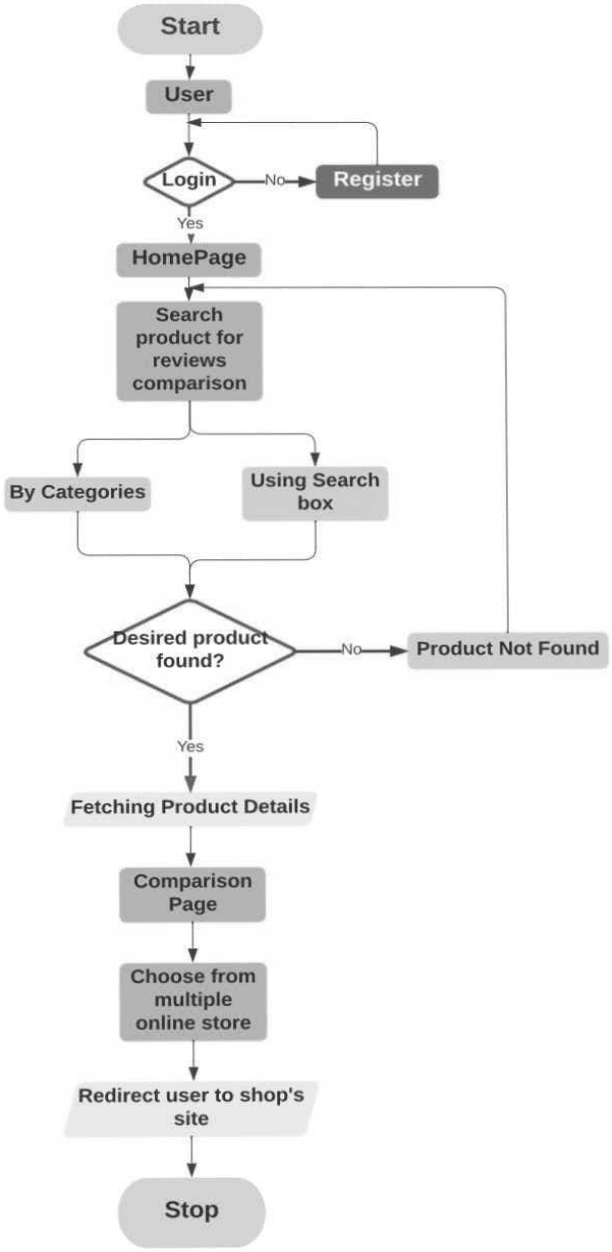

Figure 2:- Flow of the proposed system

The first step in the methodology is data collection. This involves utilizing web scraping techniques to gather information from Amazon, Flipkart, and Snapdeal. The data collected includes product information, user reviews, and ratings. The data is stored in a database, which serves as the centralized repository for all information. This step is critical to the success of the website, as it provides the foundation for all other steps.

The next step in the methodology is data cleaning and preprocessing. This involves the removal of any irrelevant or duplicate information, as well as the correction of any errors in the data. The data is then organized and structured in a format that is easy to use and understand. This step is important to ensure the accuracy and reliability of the information provided on the website.

Methodology for "Product Reviews Comparison Website" can be divided into the following steps:

Web Scraping: The first step involves collecting product reviews from popular e-commerce websites such as Amazon, Flipkart, and Snapdeal. This can be done using web scraping techniques that allow data to be extracted from websites automatically.
Database Creation: The next step involves storing the collected product reviews in a database. This database will serve as the source of data for the product reviews comparison website.

Product Reviews Comparison Website Development: The final step involves developing the product reviews comparison website. This website will allow users to compare product reviews from different e-commerce websites and make informed purchasing decisions.

In the development of the product reviews comparison website, the following technologies can be used:

Front-end development: HTML, CSS, JavaScript, and front-end frameworks such as React or Angular can be used to create the user interface.

Back-end development: A back-end technology such as Node.js or Ruby on Rails can be used to create the server-side logic.

Database management: A database management system such as MySQL or MongoDB can be used to manage the database.

Web scraping library: A web scraping library such as BeautifulSoup or Selenium can be used to extract data from the e-commerce websites.

The entire process of collecting product reviews from e-commerce websites, storing them in a database, and developing the product reviews comparison website requires a good understanding of web development, databases, and web scraping techniques.

The third step in the methodology is the development of the website itself. This involves the use of advanced web development technologies to create a platform that is user-friendly, intuitive, and provides users with the information they need to make informed purchasing decisions. The website is designed to be easily navigable, with clear and concise information on products, user reviews, and ratings. These technologies are used to provide a more personalized and engaging experience for users, as well as improve the accuracy and reliability of the information provided. The use of these technologies ensures that the website remains relevant and up-to-date, providing users with a valuable resource for years to come.

VI. ADVANTAGES

1. Improved user engagement: Customers will quickly take their money elsewhere if they don't get what they're looking for quickly. Pretty sure you don't want the same to happen to your store. Personalized recommendations help engage your site visitors more. That leads to more extended stays and, eventually, lower bounce rates.

2. Improved time and cost efficiency: With an AI-powered personalization tool, you can save time and money. It automatically undertakes product suggestions alongside cross and upselling approaches. Hence, it enhances efficiency gains that can save your operational costs in the long run.

3. Improved customer loyalty: Successful personalization systems can achieve 20% improvement in customer satisfaction. Satisfied customers are more likely to stick with your brand and even get more referrals. You can also use data insights from a product recommendation system to tailor your customer loyalty programs. It makes it easy to offer personalized rewards based on customers' wants and preferences. Hence, the rewards, whether discounts, coupons, free or subsidized shipping, etc., can resonate with each customer.

VII. RESULTS

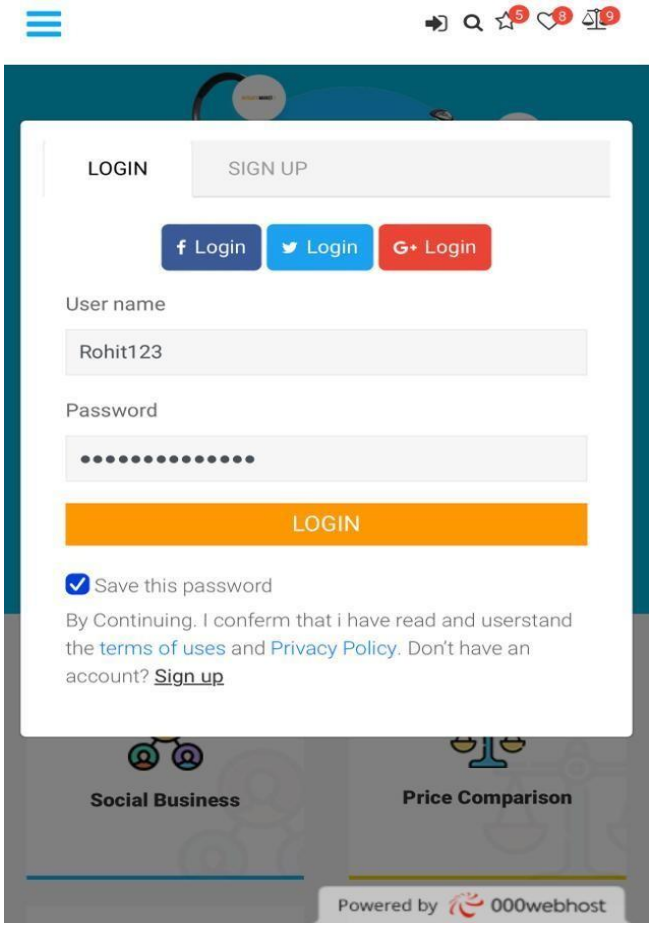

Figure 3:- Login page

This is where users can login into the website

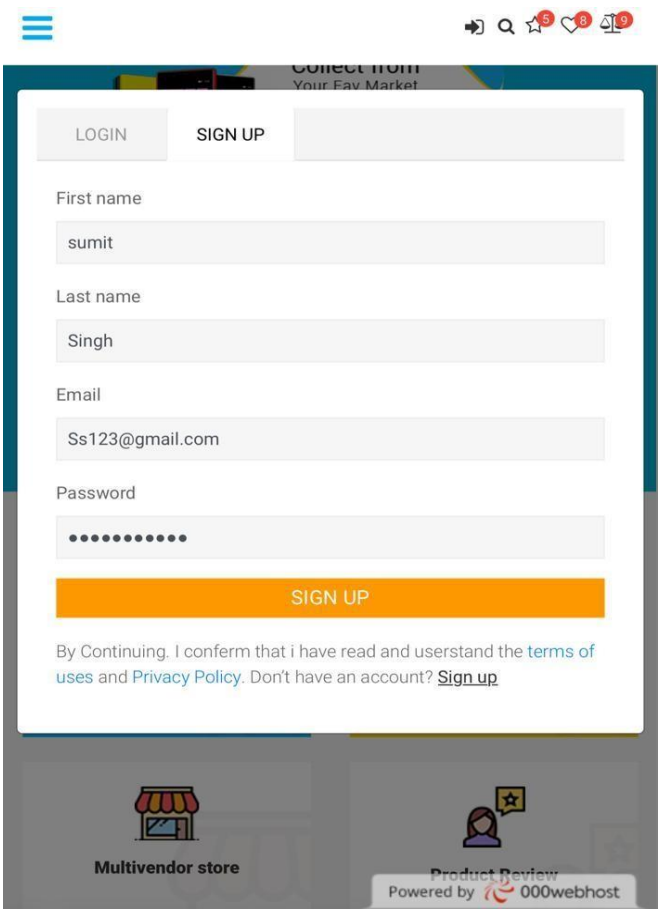

Figure 4:- Signup page

This is where users can create a new account on the website.

Figure 5: - Home Page

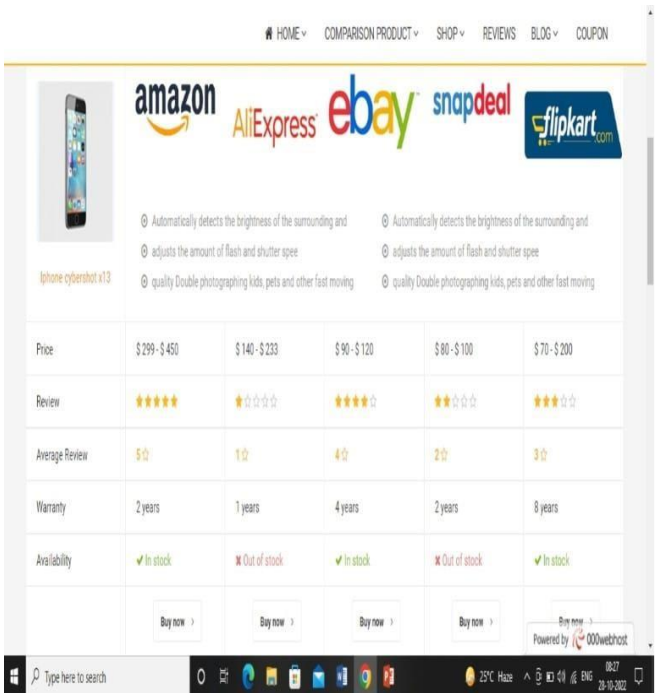

Figure 6: - Comparison Page

This is where all the prices and ratings of the product can be compared.

VIII. CONCLUSION AND FUTURE SCOPE

Websites that allow users to search and compare products, read user reviews and ratings, and make informed judgments about which products to buy have become increasingly popular. This website have become a crucial resource for customers as the role of user reviews and ratings in the purchasing process increases. Through greater personalization, social features, and enhanced verification, the proposed system intends to improve user experience and give even more relevant and accurate information. Websites that compare product reviews have the potential to be even more important in the decision-making process if they continue to be at the forefront of technical development and continually enhance the user experience. This website has a promising future ahead of it as it continue to assist customers in finding the products that best suit their requirements and tastes and assist them in making wise purchases.

Here are some probable directions in which the proposed system could go in the future:

Integration with AI-powered shopping assistants: Product review comparison websites may interface with AI-powered shopping assistants to offer consumers real-time assistance and direction while they browse and compare products.

Future advancements could improve the user experience and offer even more precise and relevant information to support consumers in making wise shopping decisions. By adding opinions of trending influencers and YouTube recommendations.

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Big Data Characteristics and Applications

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Abstract **: In the past, data or let's say traditional data was limited because there were not many platforms to share data such as Social media, Online Deals, E Commerce,etc. and it was easy to store, process and cover the data due to its small volume and structured format, but day by day technology evolved following the world and new services got introduced due to which data generation increased which leads to the development of numerous ways that can be used to store and reuse this quantum of data. These technologies with their capability to prize information from large data sets for better decision-making process have created ways to maintain data, process data and new growth openings. But if data isn't well defended from pitfalls like phishing, etc, all these processing becomes futile, if these data falls in wrong hands, it could be misused. There are numerous ways to maintain data security and integrity of data but still it could be violated if not carried out properly. So while dealing with data, Security and sequestration becomes high concern in order to cover it from attacks. Our purpose in this paper is to know about the characteristics, challenges faced while maintaining big data and applications of Big Data.**

Keywords**: Big Data, Big Data Types, Characteristics**

INTRODUCTION

As we all Know, we deal with data every day, like when we make videos to post on social media, or when we send the messages throw texting applications, or when we receive something through mails, and many other cases. This data keeps on increasing and keep on increasing as the time goes by. Now a days we also see many new platforms where either user sends or receive data that come every day. Also now that internet era is going on, even if user make slight clicks here and there, new data is generated for that click. Like that for everything there is new data about that.

Big Data helps medium sized to large sized companies to store, manage and manipulate the large amount of data that is of large volume, and comes in wide variety and with high velocity.

Types of Big Data

Primarily there are three types of Big Data: Structured, Unstructured and Semi-Structured.

Structured Data is the data that is in fixed format like the traditional data.This type of data is organized and you can easily access and store this type of data in traditional databases. The example you can take is data stored in tables and spreadsheets.

Unstructured data is the data that is with an not formatted or unknown structure. You can see this type of data everywhere such as videos, images, text, and other formats.

Semi-structured data is the data that is kind of unstructured but has a particular structure to it. For example e-mail.

Characteristics of Big Data

Volume:

The amount of data you have. The volume of data will keep on increasing as the time goes by. You can also observe this

Velocity:

Velocity is nothing but the speed of data processing Big data processes requires high velocity as the data is in large amount. It consists of the rate of change, activity bursts, and the linking of incoming data sets.

Variety:

Variety is nothing but the different types of big data. It is among the biggest issues faced by the big data industry as it affects performance. It's vital to manage the variety of your data properly by organizing it. Variety is the various types of data that you gather from different kinds of sources.

Veracity:

Veracity refers to the accuracy of your data. It is among the most important Big Data characteristics as low veracity can greatly damage the accuracy of your results

Value:

Value refers to the benefits that your organization derives from the collected data.

Validity:

It is nothing but how valid and relevant is the data to be used for the intended purpose.

Volatility:

Big data is constantly changing. The data you gathered from a source a day ago might be different from what you found today. This is called variability of data, and it affects your data homogenization.

Visualization:

It refers to showing your big data-generated insights through visual representations such as charts and graphs. It has become prevalent recently as big data professionals regularly share their insights with non-technical audiences.

Big Data Applications

As Big Data is used everywhere there are many applications lets view some:

Government:

As the government collect a large amount of data, so they use big data analytic to manage this huge amount of data

Hospitals:

They deal with large amount of data related to patients, so they use big data.

Schools and Colleges:

They keep records of large amount of Data related to students and staff and also related to events.

They use big data to manage this large amount of data.

Social Media analyzers:

They study trends and behaviour of social media users. So they use big data to keep this large amount data in check.

Banking:

Banks also deal with huge amount of customer data, so they use big data to keep this large amount of data in check.

There are many more applications of big data that are not listed here but you can observe the in your day to day life.

Conclusion

From above mentioned details, we can figure out that we see that big data is very important part of our day to day life. We can also observe it used everywhere. Big data also play important role for many organizations or companies. We can also expect to see the importance of big data increase even more as the time goes by. As the data will keep on increasing as the time goes by.

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AI Based Voice and Face Recognition

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Abstract—**This paper presents a methodology for developing a face and voice recognition proctoring system for online interviews and applies it on an online hiring platform. The results show that the project can detect faces and recognize them based on the database. The project help users to ensure safety and conduct smooth online interviews without any malpractices. The AI-based voice and face recognition proctoring system is a technological solution designed to enhance the security and integrity of online exams and assessments. The system utilizes advanced machine learning algorithms to verify the identity of test-takers and monitor their behavior during the exam. The system consists of two main components: voice recognition and face recognition. The voice recognition module analyzes the unique vocal characteristics of the test-taker and matches them with pre-registered data to confirm their identity. The face recognition module captures images of the test-taker and analyzes their facial features to verify their identity. During the exam, the system continuously monitors the test-taker's behavior to detect any signs of cheating or misconduct. It uses real-time video analysis to detect unusual behaviors such as looking away from the screen, talking to someone else, or attempting to access unauthorized resources. The system also uses natural language processing to monitor the test-taker's speech patterns and detect any suspicious language or indications of cheating. If the system detects any suspicious behavior, it immediately flags the incident and sends an alert to the exam proctor. The proctor can then review the footage and take appropriate action to maintain the integrity of the exam. The AI-based voice and face recognition proctoring system is a powerful tool for ensuring the security of online exams and assessments. By leveraging advanced machine learning algorithms and real-time monitoring, it provides a robust defense against cheating and other forms of academic misconduct.**

Keywords—Face recognition , Face detection, CNN, Neural Network, voice recognition

I. INTRODUCTION

An AI-based face and voice recognition proctoring system is a technology-driven solution designed to ensure the integrity of online exams. As online learning becomes more popular, institutions are facing new challenges in verifying that students are not cheating during online exams. Traditional methods of proctoring, such as using a human proctor to monitor the exam, can be expensive and may not be practical for large online classes. An AI-based face and voice recognition proctoring system addresses these challenges by using advanced algorithms to analyse a student's facial and vocal features to verify their identity. The system captures several images and recordings of the student's face and voice before the exam and uses them to create a reference dataset. During the exam, the system compares the live video and audio captured from the student's webcam and microphone to the reference dataset to ensure that the student is the one taking the exam. The system uses advanced AI-based techniques such as eye-tracking and keystroke analysis to detect any suspicious behaviour or anomalies that may indicate cheating. If the system detects any discrepancies or anomalies, it alerts the proctor to review the footage and take appropriate action.

The use of an AI-based face and voice recognition proctoring system can help ensure academic integrity during online exams, while reducing the need for human proctors and minimizing costs. However, it is important to ensure that the system does not violate the privacy of students and that it does not unfairly penalize students who may have technical issues with their webcam or microphone. Therefore, proper implementation and transparent communication with students are essential to ensuring the success of such a system.

Security Companies: The truth that machines can nowadays correctly apprehend individuals, affords a slew of possibilities for the safety sector, leader amongst them the capacity to discover unauthorized get entry to the places wherein non-legal humans should not be. This is mainly beneficial if protection forces are attractive or dealing with intrusions in a place that won`t be included through constant CCTV cameras.

Immigration checkpoints: Chief among these is the ability to detect and prevent border crossings by known criminals or persons of interest through facial recognition. Border controls are now synchronized with information databases such as INTERPOL's "face identification" method to identify individuals based on a measure of accuracy. By processing facial information via the cloud, predictive algorithms can be run on footage to not only improve typical image quality, but also factors such as aging, plastic surgery, cosmetics and even the effects of narcotics. be able to consider.

Ride-sharing transport: Passengers in the ride sharing industry can also benefit from facial recognition. For the sharing economy, facial recognition provides an additional layer of travel verification and security. Cars may be equipped with native face scanning his technology that allows for additional security benefits without the need for additional devices. Vehicles can be unlocked by recognizing faces, ensuring that only passengers who have booked a ride can board. This is the best security available today. Security that users are unaware of because it is seamlessly integrated into their behaviour.

Cars: In-car voice technology has made it safer and easier to navigate – and to listen to exactly what you want, whenever you want. Most new cars can connect to Bluetooth devices, such as smartphones, which effectively makes your car voice enabled; just talk to your phone to start navigating or listening to a playlist. However, some newer cars have their own speech recognition to remove your phone from the equation and let you navigate or listen to music without ever looking at a screen.

Accessibility: Speech recognition can be very helpful if you cannot type freely or are visually impaired. We will be able to navigate and communicate online and on the phone with just our voice, making computers and smartphones more accessible to some.

Security: Speech recognition technology has advanced to the point of being able to uniquely identify speech. This has powerful implications for personal security and identity. One of the developments for personal security is voice authentication with what is called biometrics. This basically uses your voice to unlock your device. This means that something only you have access to (your vote) could be your password.

II. LITERATURE SURVEY

Face and voice recognition proctoring systems are becoming increasingly popular in online education and testing environments. These systems use advanced technology to verify the identity of the test taker and ensure that the person taking the test is the same person who is supposed to be taking it.

The paper provides a comprehensive survey of face recognition techniques, including the history, current state of the art, and future directions of the field[1].

This paper provides a comprehensive survey of voice recognition techniques for authentication, including the history, current state of the art, and future directions of the field[2].

This paper presents a proctoring system that uses computer vision and machine learning to monitor students during online exams. Thesystem uses facial recognition to verify the identity of the test taker and monitors the test environment to prevent cheating[3].

This paper presents a voice biometric system for online proctoring in higher education. The system uses voice recognition to verify the identity of the test taker and monitors the test environment to prevent cheating[4].

This paper presents a face and voice recognition based online examination system that verifies the identity of the test taker and monitors the test environment to prevent cheating. The system uses a combination of facial recognition and voice recognition to ensure the authenticity of the test taker[5].

This paper presents a robust face and speech recognition system for online exam proctoring. The system uses a combination of facial recognition and speech recognition to verify the identity of the test taker and monitor the test environment to prevent cheating[6].

This paper presents a face recognition and tracking system for online exam proctoring. The system uses facial recognition to verify the identity of the test taker and tracks the face throughout the exam to prevent cheating[7].

Overall, these papers demonstrate the importance of face and voice recognition proctoring systems in ensuring the integrity of online education and testing environments. While there are still challenges to be addressed in terms of accuracy and privacy concerns, these systems represent an important step towards ensuring fair and equitable assessments in online settings.

III. PROPOSED SYSTEM

An AI-based face and voice recognition proctoring system is a software system that uses artificial intelligence technology to monitor online exams and ensure that

students are not cheating. This system uses advanced algorithms to analyze a student's facial and vocal features, and determine whether they match the features of the student who is supposed to be taking the exam.

For this project, we have decided to work with following technology:

a. Flask: API
b. NodeJS: Backend Process
c. MongoDB: Database Design

Before the exam, the students must register their face and voice in the system. The system would capture several images of the student's face and voice, and use them to create a reference dataset. During the exam, the system would use the student's webcam and microphone to capture live video and audio. The system would then compare the live video and audio to the reference dataset to determine if the student is the one taking the exam.

If the system detects any discrepancies or anomalies, such as a different face or voice, it will alert the proctor. The proctor can then review the footage and take appropriate action, such as stopping the exam or flagging the student for further review. The system would also use additional AI-based techniques, such as gaze-tracking, video split, web scraping and keystroke analysis, to detect any suspicious behavior or anomalies that may indicate cheating.

Overall, an AI-based face and voice recognition proctoring system has the potential to improve the security and fairness of online exams, by using advanced technology to prevent cheating and maintain academic integrity. However, it is important to ensure that the system does not violate the privacy of students or unfairly penalize students who may have technical issues with their webcam or microphone.

The below architectural diagram Fig 1 shows the process of face recognition:

- First, images or frames from the video stream are sent to the face recognition module, which recognizes faces in the input images.
- Sends the bounding box coordinates of the detected faces as output. Face preprocessing is done in the cue detection block to identify the locations of facial reference points (also known as datum cues) such as the eyes, nose, lips, chin, and chin.
- Before submitting the aligned face to the facial recognition module, check the face for spoofing to ensure that the face is from a live image or video feed and has not been spoofed to gain unauthorized access.
- The image is then sent to the next block, the face recognition block. This block performs a series of processing tasks before face recognition is successfully completed.
- This is an important step because we don`t want the facial recognition engine to be distracted by variations in different poses, facial expressions, lighting changes, etc. in the input facial image.
- After the within-class variation of the input surface has been resolved, the next important processing step is feature extraction.
- Here, a comparison is made between the feature vector obtained in the last step and the face vector registered in the database.

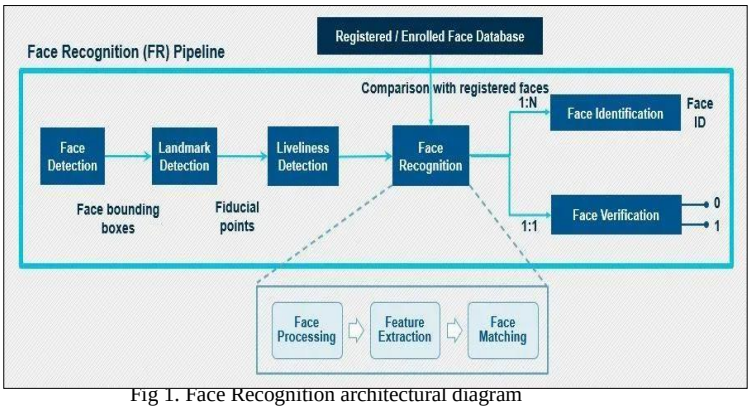

Fig 1. Face Recognition architectural diagram

An architectural diagram of a typical speech and speaker recognition system is shown in Fig 2.The system is trained to recognize the voice of individual speakers, each of whom delivers a specific set of utterances via a microphone jack or telephone.

- The captured analog speech waveform consists of her three components: Speech segments, silent segments, and background noise signals.
- To extract the relevant audio signal, the audio waveform is digitized and signal processing is performed to remove noise signals and silent or unvoiced components.
- Relevant information ignored during this process is considered completely lost, and conversely, irrelevant information such as the fundamental frequency of the speaker or the characteristics of the passed microphone is treated as useful, and the performance of speech feature classification is improved. affect.
- The extracted speech signal is then converted into a stream of pattern feature vectors of speech patterns for classification and training.
- If irrelevant information is allowed, the speech features that can be generated from the distorted speech signal may not resemble the class distributions learned from the training data.
- The system recognizes individual speaker voices by comparing the audio features of the extracted utterances with the respective template features invoked by the training system.

- The GMM Recognizer computes a score that is used to match the speaker's most characteristic speech features. The speaker's speech recognition decision criteria was based on the correlation analysis of the speaker's speech features from the ANN and the GMM.

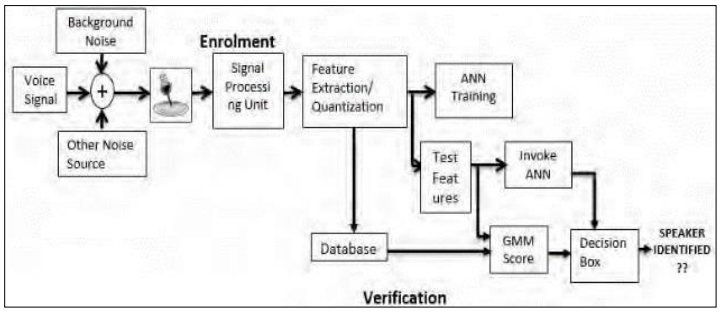

Fig 2. Voice Recognition architectural diagram

IV. RESULT AND DISCUSSIONS

For a smooth conduct without any cheating, a combination of various techniques along with face and voice recognition is used on secure browser. This requires the supervisor to complete some actions which is basic necessity. There are other ways to trick such as a person sitting behind person and having conversation, or even interactable AI devices, such issues are solved with voice recognition. External gear such as spectacle camera which covers the whole field of view of test taker and applying computer vision to feed. It is necessary to avoid fraud. So, AI used in face and voice recognition helps to proctor multiple students simultaneously.

A camera is used at user's end to capture frames for authentication of user. These frames are captured to monitor the user. The frames are taken at taken at regular intervals and it's face is identified. If the user is unidentified, it is been removed from the meeting.

The system also uses microphone of user to record it's voice at beginning, to confirm identity and enter the meeting. Also proctoring is done in whole session with voice recognition. When the user is speaking, the voice is taken as samples from instances and identification is done each time. This eliminates the possibility of another person which is not in view of proctor to have conversation with user.

V. CONCLUSION

An AI-based face and voice recognition proctoring system is a technology that can automatically verify the identity of a person through their facial features and voice. This system is increasingly being used for online proctoring in education, certification, and recruitment settings.

While the system can offer a range of benefits, such as enhancing security and reducing cheating, there are also concerns about its potential drawbacks. For example, there are concerns about the accuracy of the technology and the potential for bias in its implementation. Additionally, there are privacy concerns related to the collection and storage of biometric data, as well as the potential for misuse or unauthorized access to such data.

In conclusion, while AI-based face and voice recognition proctoring systems can offer benefits in certain settings, careful consideration should be given to their implementation to ensure that they are used ethically and responsibly, and that privacy concerns are addressed.

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Review On Study Of The Platform For Secure Mobile Application

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Abstract: **These days, smartphones and other mobile gadgets play a huge role in all facets of our lives. due to the fact that they essentially gave the same capabilities as desktop workstations and became powerful in terms of CPU (central processing unit), storage, and installing a wide variety of software. Security is therefore seen as a crucial component of wireless communication technologies, notably in wireless ad hoc networks and mobile operating systems. Additionally, as the number of mobile applications grows across a range of platforms, security is seen as one of the most important and significant topics of discussion in terms of problems, trustees, dependability, and accuracy.Security this article intends to give a comprehensive report on thriving security on mobile application platforms and to inform users and businesses about critical dangers. Additionally, several methodologies and methods for security measurements, analysis, and prioritizing at the pinnacle of mobile platforms will be described in this article. Increased knowledge and awareness of security on mobile application platforms are also beneficial for avoiding discovery, forensics, and countermeasures employed by the operating systems. Last but not least, this study also covers security add-ons for well-known mobile platforms and analysis for a poll inside a recent platform security investigation, awareness, sensitive data, and vulnerability.**

Keywords: Threats, cyber strategy, mobile platforms, application security, mobile malware.

I. INTRODUCTION

At this time, smartphones and other mobile gadgets are quite significant to individuals all over the world. Because they supplied the same features and services as desktop workstations, the security issue is still a significant challenge. Attackers and harmful software have grown more prevalent in recent years. 2015 will be a turning point for threats to mobile devices, according to a report on threats, as the total number of mobile malware samples exceeded 5 million in Q3 2014. Therefore, numerous studies and researches now focus on the security requirements and problems associated with diverse mobile platforms. The choice of appropriate mobile platforms is therefore one of the most crucial choices while using a smartphone. In general, the three main categories of the security aims and objectives of information in an organization are confidentiality, integrity, and availability. To put it another way, confidentiality, integrity, authentication, and authorization can all be used to gauge security issues, the security incident became more powerful on mobile platforms and phone devices because of the amazing increase in memory, data transfer, and processing. The methods for analyzing and ranking security requirements in mobile application platforms will be the main focus of this study. In terms of theory, rather than using technical facts. Additionally, the analysis and assessment of the research and approaches now in use will be discussed. This study introduces the "threat model" of mobile platforms inside two well-known key platforms, IOS and Android, as well as general model security architectures.Last but not least, we'll talk about privacy and security concerns with mobile platforms. It is important to note that in this article, security on mobile platforms has been examined from several angles, revealing how both the Ionic and Android platforms have developed security models to counter threats, specific justification for securing mobile application platforms, and security threat assessments[15].

II. THE CRITICAL VALUE OF THE STUDY

Currently, the most accessible targets for hackers and dangerous software are now smartphones and mobile devices. Mobile malware samples total more than 5 million in Q3 2014, according to McAfee Labs' threat prediction

report. Additionally, in the past year, 110 million Americans, or almost 50% of US adults had some type of personal information exposed.Therefore, it is clear that having the most recent information on the security mechanisms offered by mobile platforms is crucial. People will therefore have the proper information to select the best platform to utilize on a regular basis. Finally, based on the results of this study, platform providers will use this survey to strengthen their security measures.

III. MOBILE APPLICATION SECURITY PLATFORMS

Mobile application development in various platforms is based on functionaland non-functional requirements. Currently, various types of platforms exist to deploy mobile applications with different privacy policies. Therefore, this research focuses on the most priceless and popular mobile application platforms in the world. Furthermore, it discusses how the security within each platform is different from each other for instance, Motion BlackBerry OS, Apple IOS, Google Android, and Microsoft Windows Phone. There are some imperative security issues to be major impacts on mobile devices. In addition to these, controlling thirdparty applications is a difficult task within each mobile app store, which they have a huge impact on increasing the security issues within mobile platforms. Dimensional Research institution stated that security risks were the major cause of the mobile security platforms. The number of IT professionals saying Android was the riskiest increased and was by far the most frequent platform indicated (64%). Moreover, Apple/IOS followed Android (16%) Windows Mobile (16%), and Blackberry (4%). Perception of Android security problems continued to grow theatrically as the platform was perceived to have the greatest security risk (up from 49% in 2013 and 30% in 2012). Mobile platform security is an increasingly important area of research as more people rely on their mobile devices for their day-to-day activities. As the number of mobile device users continues to grow, so does the potential for malicious attacks. Mobile platforms are especially vulnerable to attack due to their portability, the small form factor, the multiple applications and services, and the lack of security measures in place. There are a number of challenges associated with securing mobile platforms, including the complexity of hardware and software, the diversity of devices, and the potential for data leakage. This study seeks to understand the current state of mobile platform security and to identify potential avenues for improvement. It will examine the various threats to mobile devices, the security measures currently in place, and the effectiveness of those measures. The study will also look at the challenges associated with developing and deploying secure mobile applications and will identify best practices for ensuring the security of mobile platforms.

IV. LITERATURE SURVEY

“Becher, M., Freiling, F., Hoffmann, J., Holz, T., Uellenbeck, S.and Wolf, C. (2011) Mobile Security Catching Up? Revealingthe Nutsand Boltsofthe Security of Mobile Devices. 2011 IEEE Symposium on Security and Privacy.P 96-111”, describes the one may argue that the year 2000 marked the start of the smartphone era. Since then, other additional "smart" devices have entered the market, including BlackBerries, iPhones, and most recently, Androidbased phones. The risk of mobile attacks would increase significantly by the end of 2007, according to research on smartphone security and the potential for malicious software. These include a decrease in operating system heterogeneity, increased smartphone adoption, and increased interoperability of executables on mobile devices. The anticipated abundance of attackers has not yet materialized. “Bhattacharya, P., Yang,L,Guo M, Qian K, and Yang M.(2014), Learning Mobile Security with Lab ware, IEEE Security & Privacy”, describes Security is therefore seen as a crucial component of wireless communication technologies, notably in wireless ad hoc networks and mobile operating systems. Additionally, as the number of mobile applications grows across a range of platforms, security is seen as one of the most important and significant topics of discussion in terms of problems, trustees, dependability, and accuracy. This article intends to give a comprehensive report on thriving security on mobile application platforms and to inform users and businesses about critical dangers. Additionally, this article will show several strategies and methods for security measurements, analysis, and prioritizing at the pinnacle of mobile platforms. Additionally, to avoid detection, forensics, and countermeasures used by the government, raises understanding and awareness of security on mobile application platforms. “Braun, P., and Rossak, W. (2005) Mobile agents. Basic”, describes a few potential uses for social mobile applications are the creation of communities or groups around common interests or objectives, the sharing of information like personal profiles, news, exclusive deals, or any kind of recommendations, and the preselecting of potential social network communication partners. We offer strategies for information representation using semantically

rich languages based on existing standards and outline the decentralized peer-to-peer architecture. We explain how mobile agents are made possible in mobile ad hoc networks to serve as user representatives and intelligent information carriers, and we offer the first version of a social mobile application. “Burkle, A., Hertel, A., Müller, W. and Wieser, M. (2008)”,describesthat we propose an agent-based middleware that has been created as a component of an ongoing linkage project for social-mobile applications. The idea of the MobiSoft project is to use electronic personal assistants in face-to-face interactions to facilitate, enhance, and promote human social interaction. A few potential uses for social mobile applications are the creation of communities or groups around common interests or objectives, the sharing of information like personal profiles, news, exclusive deals, or any kind of recommendations, and the preselecting of potential social network communication partners. We offer strategies for information representation using semantically rich languages based on existing standards and outline the decentralized peer-to-peer architecture. We explain the advantages of using mobile agents as user representatives and intelligent information carriers in mobile. “G. Delac, M. Sillic, and J. krolo Emerging security threats for mobile platform ’,in proceeding of the 34th international convention MPRO, pp.1468-1473, IEEE, Opatija, Croatia, May 2011”describes the It's important to remember that while mobile security risks and best practices are rather universal, security policy administration is largely local and, as a result, is tailored to particular business scenarios and application settings [105]. Therefore, at the outset of our research, we made the assumption that we would only be able to identify and examine general knowledge that is relevant to the study's issue. As a result, explicit knowledge signifies an awareness of the generative processes that make up the field of mobile security. “D. He, S. Chan, and M. Guizani, “Mobile application security: malware threats and defenses,” IEEE Wireless Communications, vol. 22, no. 1, pp. 138–144, 2015”, describes the, however, there are several drawbacks to this study, as well as some potential areas for future research and improvement. First, including more factual data and experimental outcomes would make the findings more convincing. Second, through an open dialogue with specialists in the field of mobile security, cognitive biases, such as the individual view of the research problem, should be reduced. Third, we ignored sparse topics and individual case studies in favor of retrieving general artifacts, which reduced the analysis's granularity.

V. CONCLUSION

The introduction and examination of numerous mobile device and mobile application security challenges by presenting a wider range of mobile threat tactics concludes. In comparison to PCs, the main dangers and hazards that confronted smartphones have been underlined. In addition, future risks to data security and communication will be harder to handle because hackers are constantly seeking new ways to compromise smart device platforms, according to studies from the literature. This can be accomplished through additional security measures, access point manufacturers, and application programming interfaces, or APIs. Mobile applications are a result.Simplify how applications can be utilized for business, social networking, commerce, travel, education, banking, and network utility while addressing every part of our lives. Additionally, one of the potential and difficult tasks that must be taken into account throughout the planning stages is security. More importantly, developers need to think about how secure their applications are on several widely used platforms, like IOS and Android. It is clear that there are an increasing number of mobile end consumers that download programmers. As a result, when an application is signed, better security measures should be implemented. In conclusion, more user education regarding mobile safety has been determined to be essential for reducing the number of data losses, attacks, and threats.

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Survey Paper on Detection & Analysis of Alzheimer's Disease

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Abstract:-**Alzheimer's disease (AD) is brain related disorder and should be detected at early stage to reduce further complications. The diagnosis of Alzheimer's disease (AD) is essential for treating the patients and should be done at earliest stage to reduce future risks as there can be occurrence of irreversible brain damage. The methods used for detection of AD is Magnetic resonance imaging (MRI), Positron Emission Tomography (PET), computed tomography (CT). Out of the mentioned methods Magnetic resonance imaging (MRI) provides critical insights. Along with MRI for detection convolutional neural networks can be used. Categorization is done in various stages such as mild cognitive impairment (MCI), normal control (NC), Alzeimers Diesease (AD).**

Keywords: Alzheimer's disease, Convolutional neural networks, detection, diagnosis, prediction, Magnetic Resonance Imaging.

I. INTRODUCTION

Alzheimer's disease (AD) is a neurodegenerative illness, an disease related to brain. This disease gradually affects the memory of an individual and leads to various issues that creates hurdles in day to day life activities. The difficulties faced by patients are they are unable to perform the daily routine work such as walking, speaking, writing and also face serious problems such as identifying the persons, family members. At the early stage of AD the cognitive skills starts to decline. Various symptoms[2] are observed during the AD period and they change over a period. The symptoms cause the nerve cells to be frequently damaged. There are various stages of AD such as mild cognitive impairment (MCI), normal control (NC) and AD . One of the stage is mild cognitive impairment (MCI) and is the intermediate stage of AD where people can do daily routine task independently but in some cases, assistance is required to manage daily routines of life. Recent studies show that the MCI stage lies between normal control (NC) and AD. If more symptoms are observed in that stage then it is called a late mild cognitive impairment (LMCI) or
progressive MCI, if symptoms remain stable then it is called stable mild cognitive impairment (sMCI). It is very essential to observe the stages and the transition between them. The doctors have to be cautious about a situation when symptoms converted from one stage to another. It is very difficult for researchers to determine the transformation of the accurate symptom from one stage to another. Different types of medical images play an important role in identification and to find the transformation of symptoms. Various scanning mechanisms can be considered such as Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI) and computed tomography (CT). MRI is one of the most used imaging modalities to diagnose various diseases. It helps to detect the diseases at early stage and are highly sensitive. The MRI images are prominently used as compare to other modalities for AD classification. In classification various features are extracted from MRI images which are used for prediction or diagnosis. The features are gray and white matter intensities[1], cortical thickness, and cerebral spinal fluid (CSF) used for predicting the stage at which the disease is.

In AD classification problems, traditional machine learning-based approaches produce better results in terms of classification. In machine learning, the support vector machine is famous that is commonly used in several studies. However, machine learning-based approaches require highly trained labor to process the data samples. Furthermore, different modalities, especially MRI and PET

images produced different regions belonging to AD.

In recent research studies, deep learning, convolutional neural networks (CNN) achieves competitive results in pattern recognition and classification. The neural network-based approaches are utilized in computer vision, video classification, medical image analysis. It is a type of artificial neural network inspired by the hierarchical model of the visual cortex. The CNNs is a multilayered structure which includes convolutional layers, pooling layers, activation functions and fully connected layers. In case of classification problem several intermediate layers extract the low-level features and then are used to build high-level features. It is a hierarchical structure that increases the depth, breadth of the network. The CNN's key block is the convolutional layer, which has more importance in extracting the input data feature. During training, it uses learnable filters that will extract the small part of the images.

II. BRAIN ANATOMY

The brain is protected by a bone structure that is covering it called as the cranium and popularly known as skull. The cranium will protect the brain from damage or injury. Between the skull and brain is the meninges, which consist of three layers of tissue that cover and protect the brain and spinal cord. The brain is a complex organ that is responsible for controling thoughts, memorys, emotions, touch, motor skills, vision, breathing, temperature, hunger and other processes. It is made up of more than 100 billion nerves that communicate. The brain consists of 3 main structural divisions: the cerebrum, the brainstem, and the cerebellum. The brain is divided in three basic units: the forebrain, the midbrain, and the hindbrain. The hindbrain includes the upper part of the spinal cord, the brain stem, and a wrinkled ball of tissue called the cerebellum. The hindbrain is responsible for controling the body's vital functions such as respiration, heart rate.

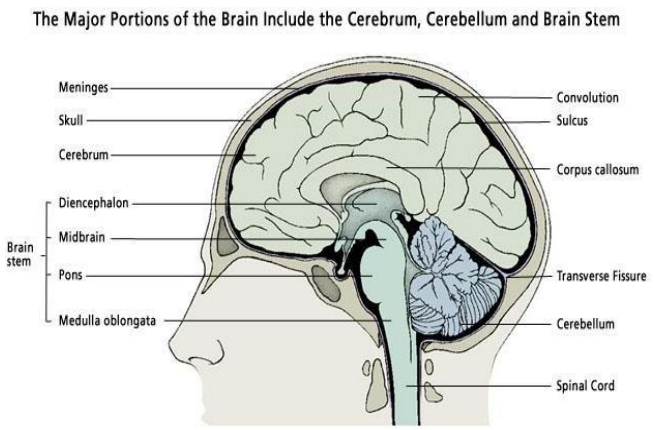

Fig 1: Portions of Brain

The brain consists of Gray and white matter are two different regions of the central nervous system. In the brain, gray matter refers to the darker, outer portion, while white matter describes the lighter, inner section underneath. In the spinal cord, this order is reversed: The white matter is on the outside, and the gray matter sits within.

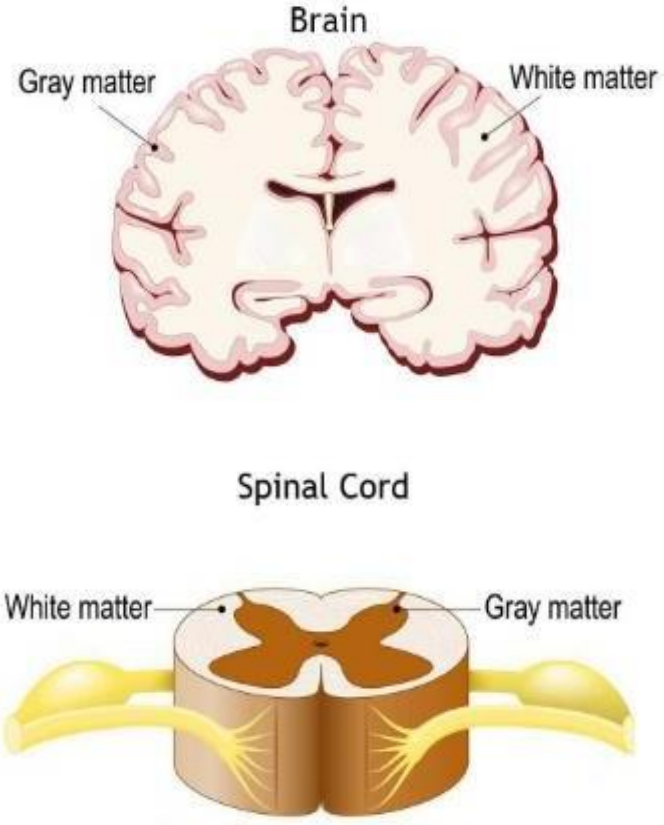

Fig 2: Portions of Brain

III. CONVOLUTIONAL NEURAL NETWORKS

A Convolutional Neural Network (CNN) is basically used for image classification and recognition. It is made up of multiple layers such as Convolutional layers, Pooling layers, fully connected layers. The layer called as Convolutional layer will apply filter to the input image in order to extract features, the Pooling layer will downsample the image to reduce computation, and the fully connected layer will make the final prediction. The network will learn to the optimal filter through backpropagation and gradient descent methods.

The Artificial Neural Network algorithm performs really well. They are are used in various classification tasks such as image, audio, words. Neural Networks are used for various purposes, examples are for predicting the sequence of words the Recurrent Neural Networks more precisely an LSTM, similarly for image classification Convolution Neural networks can be used. The Neural Network is made up of three types of layers:

1. ***Input Layers:*** The input to the model is provided by this layer. The number of neurons in this layer are equal to the total number of features in the data.

2. ***Hidden Layer:*** The output from the Input layer is then feed to hidden layer. There can be many hidden layers depending upon the model and data size. Each hidden layer can have different numbers of neurons which are generally greater than the number of features. The output from each layer is computed by matrix multiplication of output of the previous layer with learnable weights of that layer and then by the addition of learnable biases followed by activation function which makes the network nonlinear.

3. ***Output Layer:*** The output from hidden layer is given as input to logistic function like sigmoid or softmax which will convert the output of each class into the probability score of each class.

The data is then fed into the model and output from each layer is obtained this step is called feedforward, after this the error is calculated using error function. Few of the common error functions are cross-entropy, square loss error, etc. After this, we backpropagate into the model by calculating the derivatives. This step is known as Backpropagation which basically is used to minimize the loss.

IV. DISCUSSION & ANALYSIS

Researchers have used machine learning and deep learning-based techniques to diagnose AD at an early stage. Researchers have developed systems that will help for diagnosis of AD. The approaches are more helpful in computer vision, image classification, and artificial intelligence systems. In deep learning, CNN-based techniques can manipulate the input data samples where manual experts for the feature extraction is not required. The authors have proposed systems based on CNN-1 and CNN-2. The parameters considered are accuracy, sensitivity and specificity. For diagnosis of AD, the neuroimaging plays an important role in for the early detection. The important one is the MRI. There are various stages for detection such as mild cognitive impairment (MCI), normal control (NC) and Alzheimer's Disease (AD). For the research work, author has classified the NC,MCI and AD patients with two approaches based on CNN. In both the approaches, author used the GM images extracted after the segmentation of MRI subjects. After completing the experimental process, the proposed models average performance on NC vs. AD is 95.33% and 89.87%, which showed the efficiency of CNN-1 and CNN-2 models.

V. CONCLUSION

The brain is one of the part of the body and is the essential one since it helps to control thoughts, memory, emotions, touch, motor skills, vision, breathing, temperature, hunger etc. Just like other body parts may suffer from problems or diseases in the same way the brain can face problems and may get affected by disease. Early detection of brain issues is crucial because at later stages many complications can be developed. Therefore it is essential to detect the disease at early stage. Alzheimer's disease (AD) is an illness that is related to brain. Due to this disease the memory of an individual is affected and creates various issues that creates problems to carry out day to day life activities such as the patients are unable to perform the daily routine work.

Neuroimaging is very essential technique to detect the onset of the Alzheimer's disease (AD). Neuroimaging basically produces images of brain structure, brain activity, nervous system. Various techniques are available such as MRI, PET Scan, CT Scan. Once the Alzheimer's disease (AD) is detected at early stage it becomes easy to start with treatment. Convolutional Neural Network (CNN) can be used along with Neuroimaging for detection of Alzheimer's disease (AD).

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Smart Cards: The Future Technology

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***Abstract*— Smart Cards are one of the rearmost operations of Information Technology. This composition covers all information about it as history, origin, advantages, disadvantages, and forthcoming trends in smart card technology. The government wanted to replace everything which we carry in the portmanteau will be replaced by a smart card. As smart cards and other chip-grounded cards advanced, people set up new ways to use them, including charge cards for credit purchases. numerous diligence has enforced the power of smart cards into their products similar to GSM digital cellular phones to television- satellite decoders.**

Keywords— GSM digital cellular phones (*keywords****)***

I. INTRODUCTION

A Smart card, chip chard, or integrated circuit card(ICC), is any portmanteau-sized card with bedded intertwined circuits which can reuse data. This implies that it can admit input that is reused by way of the ICC operation and delivered as an affair. A smart card, a type of chip card, is a plastic card bedded with a computer chip that stores and transacts data between druggies. The smart card may be effective with reference to attendance but it can also be applied in the same expressway in other seminaries other colorful places can also be acquainted and improve there-existing norms. New functions may carry utilizing smart cards to pierce indoor facilities, parking parcels, and cafeterias. By introducing this system, we can ameliorate the security levels of parking parcels, easier to identify the person who, for illustration, bloodied the futsal court by penetrating the entry history of the smart card, and scholars may now store plutocrat in smart card precisely like the Touch N ' Go card for cafeteria operation and mostly improves the luxury of smart card druggies [2] As experimenters and manufacturers struggle to develop and distribute products in step with the rearmost technological advances, confusion over the language of new bias arises. For purposes of discussion, this document will use the following description of a smart card a credit-card-sized device containing one or further intertwined circuit chips, which perform the functions of a microprocessor, memory, and an input/ affair interface. The bias which aren't of standard credit card size(i.e., plastic keys and dog tags, or cards that are thicker than the standard credit card), but which else conforms to this description, will be appertained to in this document as" smart commemoratives."[1]

II. LITERATURE REVIEW

Now if we talk about the history of mileposts in the development of smart card technology.1970 —Dr. Kunitaka Arimura of Japan filed the first and only patent on the smart card conception. These are times were further invention takes place for smart cards Roland Moreno patented the memory card in 1974. By 1977, three commercial manufacturers Bull CP8, SGS Thomson, and Schlumberger, started developing smart card products. In March 1979, Michel Hugon from Bull CP8 was the first to design and develop a microprocessor-grounded card combining a processor and original memory. He constructed the motorized smart card.1979 early developments for the banking sector.1995 first public eID card(Finland ID).1999 first smart cards for transport.2001 the department of defense first issued military cac credentials for physical access control and secured logical authentication.2003Micro-SIM launched 2005 first ICAO- biddable electronic passport(Norway passport) 2012 Nano- SIM introduced 2018 first biometric contactless payment card, eSIM, launched(consistency is< 1 mm or0.039 in) 2019 First 5G SIM available.

III. SMART CARD ARCHITECTURE

The architecture of a smart card included three elementsLike the following elements are

- I/O SYSTEM:
- CPU or Central Processing Unit
- Memory

Smart cards must have certain units to perform I/O functions. Normally, a smart card has some logic circuit that, in conjunction with the microprocessor, controls the timing and flow of data transferred into and out of the smart card's memories. To exchange data smart card must have a physical structure through which it can interface with a reader/writer device to connect to other computers. There is generally two types of physical interface takes place for smart cards

1- contact type

2- non-contact type(contactless)

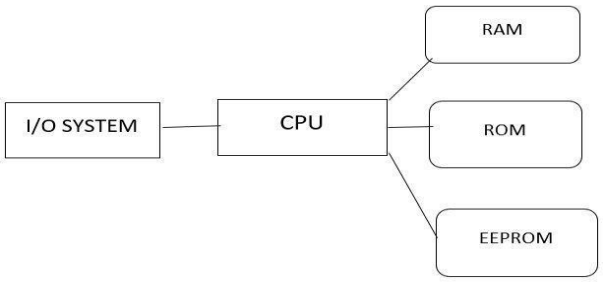


Fig no-01 Architecture

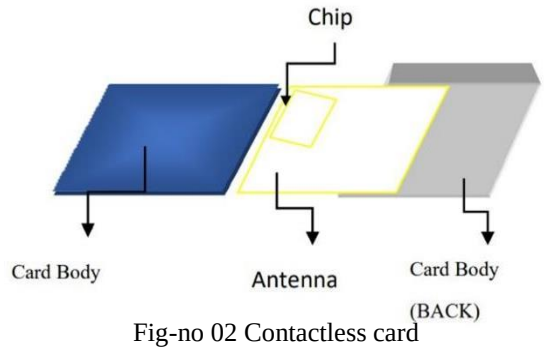


Fig-no 02 Contactless card

The discrepancy, a smart card with an anon-contact type interface can transmit information to and admit information from an anthology/ pen device without a physical connection. anon-contact type interface may be enforced using capacitive plates placed inside or on the face of the card. When placed within a short distance from an anthology/ pen device containing corresponding capacitive plates, information can be changed. With the anon-contact interface, problems similar to electrostatic discharge and impurity of physical connections(dirt, grease, etc.) may be avoided. (RSKI 87,p. 16) still, a smart card with a non-contact interface may bear fresh factors which may increase the card's vulnerability to internal breakage. ISO isn't presently working on homogenizing any non-contact ICC interfaces.[1]

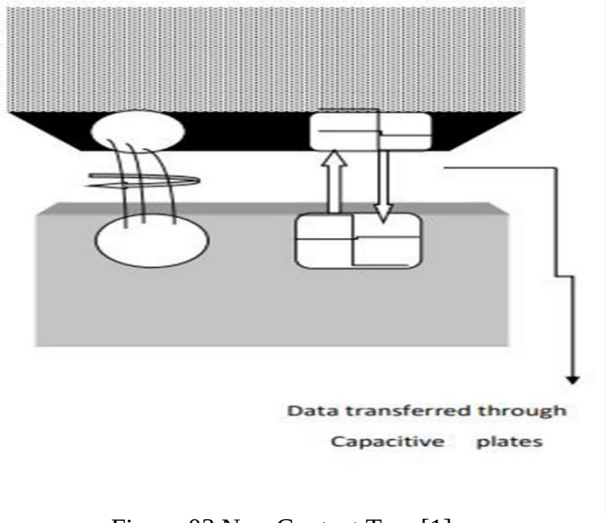


Fig no-03 Non-Contact Type[1]

A contact smart card must be fitted into a smart card anthology with a direct connection to a conductive contact plate on the face of the card(generally gold-plated). Transmission of commands, data, and card status takes place over these physical contact points, this interface consists of an 8- contact connector, which looks like a small gold circle or series of places on the shells of the card. Memory for storing the data & nearly all the recollections presently used in smart-card microcomputers are manufactured from the semiconductors accouterments. Semiconductor recollections correspond of matrices of cells formed by transistors to store information. By varying the composition and cell configurations of semiconductor accoutrements, recollections with different characteristics can be produced.

Four types of semiconductor memory used in smart cards are bandied below. Random Access Memory(RAM)-Smart card RAM is generally manufactured from essence oxide-semiconductor silicon. RAM is nonpersistent memory, it's used as a temporary working space for storing and modifying data. Smart card RAM is generally unpredictable in nature(That, it'll lose its stored information incontinently if power to the memory is removed). RAM, the fastest type of memory, is frequently used as a " scrape pad ", buffer, or another type of temporary storehouse. Smart card ROM is a semiconductor memory that is non-volatile (i.e., its stored information is retained indefinitely without a nonstop power force to the memory), it's used for storing the fixed program of the card(.eg., operating system, endless data). Erasable Programmable Read-only memory(EPROM)-Smart card EPROM is a Non-unpredictable semiconductor memory that can be originally programmed at the stoner's installation rather than at the ROM manufacturer's factory. Data and programs can be loaded into the smart card EPROM via a smart card anthology/ pen device; the transfer of the information is controlled by the smart card's microprocessor. When it's used in other types of computers, EPROM can be canceled (by exposure to ultraviolet light) and reprogrammed. EPROM may be used in other types of computers, EPROM can be canceled (by exposure to ultraviolet light) and reprogrammed. EPROM may be used in a smart card to permanently store an inspection trail, and a complete history of the operation of the card. Then in EPROM only we can tack the data not to cancel the data from smart card EPROM, it may ultimately come full, and therefore, the smart card will expire ". Electrically Erasable Programmable Read ONLY Memory(EEPROM)-Smart card EEPROM is anon-volatile semiconductor memory that can be electrically canceled and reprogrammed via an anthology/ pen device at the stoner's installation. We can save data content when power is turned off. Reading from EEPROM is as fast as reading from RAM, but writing to EEPROM is 1000 times slower than writing to RAM. Reliably accept at least 100000 write cycles, and retain data 10 times. Then's a selection of parameters from some of the smart cards on the request moment. Smart cards like these are programmed is assembly language and don't important in the way of coffers. To keep down costs, they don't get resources.[3]

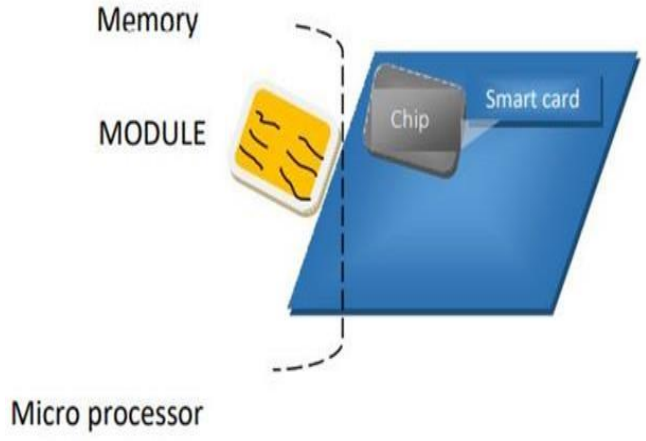


Fig no-04 Contact type [3]

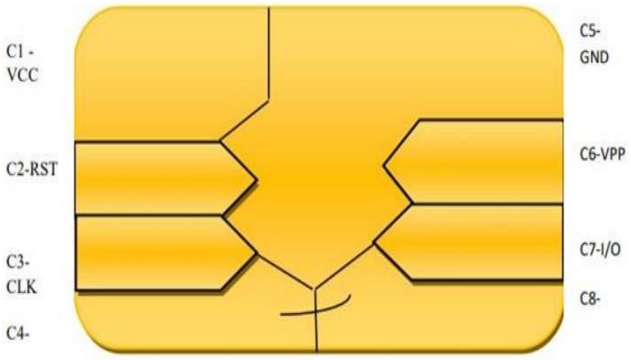


Fig no -05 Pinout micro module[3]

Smart card	Word size	ROM	EEPROM	RAM	VOLTAGE	CLK	Writer/erase cycle	Transmission Rate
InfineonSLE44C10S	8-bit	9k	1K	256GB	2.7-5.5V	5MHZ	500000	9600BAUD
Orga ICC4	8-bit	6K	3K	128B	4.7-5.3V		10000	
Gem Combi	8-bit		1K		4.5-5.5V	13.6MHZ	100000	106kbaud
DNP Resonant	8-bit		1K		5V	13.6MHZ		9600baud
Ama Tech Contactless	8-bit		1K		5V	13.6MHZ	100000	
Schlumberger Cyber flex	8/16-bit	8k	16K	256b	5V	1-5MHZ	100000	9600baud

Table -01 Selection Parameter for smart card[1]

IV. CENTRAL PROCESSING UNIT

The CPU or the microprocessor is the unit component that distinguishes the smart cards from other cards which are designed to simply store data. The microprocessor in association with the operating system enables the smart card to "make its own decision " concerning where the data is stored in its memories and under what circumstances it should transfer information through its input/output interface. The microprocessor consists of three majors components:

- Arithmetic logic unit: The ALU provides the basic logic and arithmetic functions for the microcomputer.
- Control unit: The control unit assures that the timing of events in the various parts of the bus provides a link between the smart card and the computer.

Bus: The configurations for the bus, which may be comprised of several segments of the microcomputer are coordinated.

V. SMART CARD AND IDENTITY MANAGEMENT

A Smart card can be used to securely hold user information, and to provide two-factor or three factor authentication. Smart card technology enables distributed and federated applications in lieu of a central database of all user identity and other personal information. The use of smart cards and federated data with standard based protocols would allow academic institutions, medical practitioners, the police , telecommunication and other government agencies to have access to data across multiple data stores with an assurance that: The smart card user identity is authenticated ;

The records of the user retrieved will be analysed for approval if it matches with the data in the chip or rejected if there is mismatch. Only the agencies registered under the government and have need of the data have access to the central data base.[1]

In the case of user data access, proper security controls and restrictions must also be implemented around the application, database, and environments that house the electronic data. Smart cards can be effective in supporting numerous organizational programs in the country such as SIM card registration, voters card registration, healthcare applications and many more , with or without a unique identifier[1]

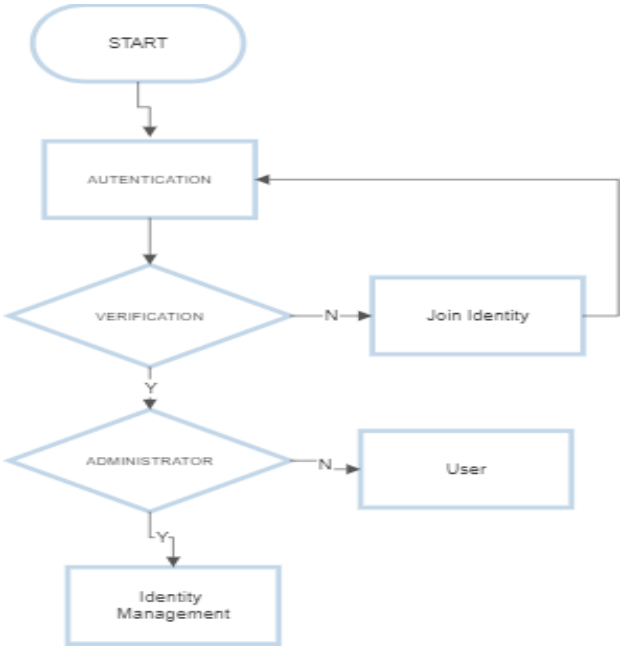


Fig no -06 Identity authentication for smart card[4]

VI. SMART CARD HELP TO PROTECT THE PRIVACY

Smart cards offer a number of features that can be used to give or enhance sequestration protection in the system. Smart cards give mechanisms for authenticating others who want to gain access to the card. These features can be employed by a system to cover sequestration by, for illustration, icing that a banking operation has been authenticated as having the applicable access rights before penetrating fiscal data serve on the card.

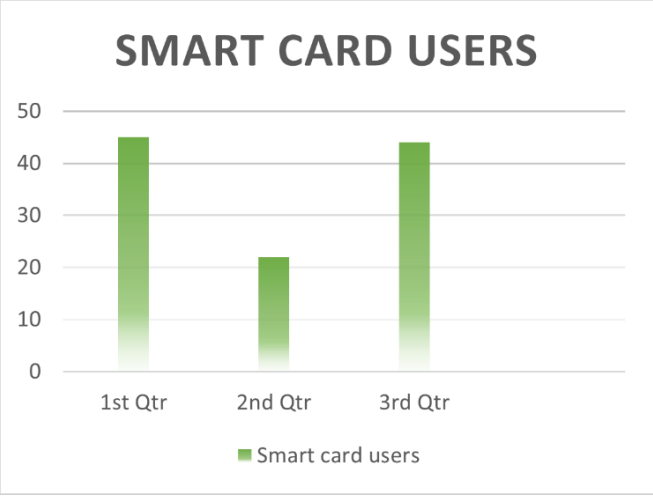
Secure data storehouse. Smart cards give a means of securely storing data on the card. This data can only be penetrated through the smart card operating system by those with proper access rights. This point can be employed by a system to enhance sequestration by, for illustration, storing particular stoner data on the card rather than in a central database. Smart cards give a robust set of encryption capabilities including crucial generation, secure crucial storehouse, mincing, and digital signing. This protects the

dispatch communication from latterly being tampered with and provides the dispatch philanthropist with an assurance of where it began. The fact that the signing key began from a smart card adds credibility to the origin and intent of the signer. Secure dispatches. Smart cards give a means of secure dispatches between the card and card compendiums. analogous in conception to security protocols used in numerous networks, this point allows smart cards to shoot and admit data in a secure and private manner. This capability can be used by a system to enhance sequestration by icing that data transferred to and from the card isn't interdicted or tapped into. [1]

Biometrics. Smart cards give mechanisms to securely store biometric templates and perform biometric matching functions. For illustration, storing point templates on a smart card rather than in a central database can be an effective way of adding sequestration in a single sign-on system that uses point biometrics as the single sign-on credentials. .particular device. [2]

Personal device A smart card is, of course, a particular movable device associated with a particular cardholder. The smart card plastic is frequently substantiated, furnishing an indeed stronger list to the cardholder. For illustration, a healthcare operation might handpick to store medicine radiation information on the card rather than in paper form to ameliorate the delicacy and sequestration of a case's conventions., and instruments. numerous of moment's smart cards have been certified they misbehave with assiduity and government security norms. They gain these instruments only after completing rigorous testing and evaluation criteria by independent instrument installations. These instruments help systems cover sequestration by icing that the security and sequestration features and functions of the smart card tackle and software operate as specified and intended.[1]

VII. CONSUMERS PRIMED TO USE SMART CARD



45 percent of consumers are favorably disposed to using smart cards

25 percent of households would actually obtain these smart cards

44 percent of consumers are likely to use identification-type smart cards (telephone cards, gas cards, automated teller machine [ATM] cards, etc.)[5]

Attribute	Details
Report coverage	Revenue forecast, company ranking, competitive landscape, growth factors, and trends
Actual estimates/Historical data	2014 - 2015
Forecast period	2016-2025
Country scope	U.S., Canada, U.K., Germany, Russia, India, Japan, China, Brazil, and Mexico
Market representation	Revenue in USD Million & CAGR from 2016 to 2025

Table no-02 Survey on Smart card[4][5]

VIII. APPLICATION

A smart card is in use in daily life applications are discussed below:

The most commonly used smart cards for domestic purposes are DTH cards. These cards provide authorized access to information received from satellites. The information received by these cards gets encrypted and decrypted within it.

Government purpose:

The government of India issues identity cards to all citizens. An example of such cards is " AADHAR cards", or "Pan cards" provided to all citizens.

Health care purpose:

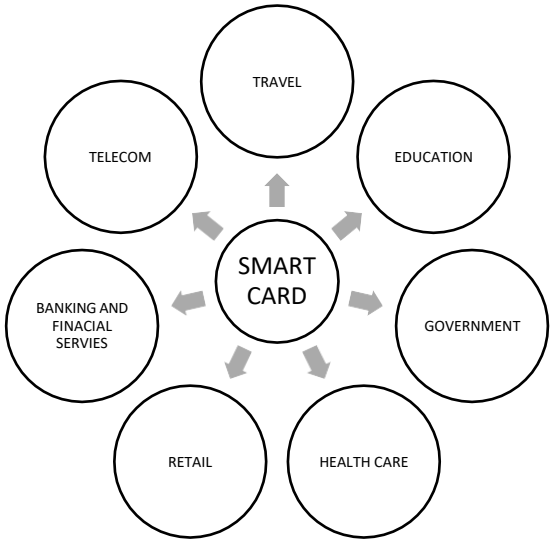
The advent of smart cards in health care sectors has allowed hospitals to securely store patients' medical reports safely and reliably. It helps authorities to access information quickly, can update if required, and immediate insurance processing, and refund.

Financial Transactions:

Smart cards are very handy as a tool for financial transactions both in traditional and web-based applications. A cash value can be stored in smart cards to use it as credit cards. Its potential to support both consumers and businesses against lower rates of transactions widens its applicability in marketing targeted programs in financial services.

Telecom sector :

Providing secure cellular communication is assisted by smart cards. New apps and functions are providing real-time download capabilities by smart cards. A SIM card is given by cellular operators to their subscribers and its use of multimedia



IX. CONCLUSION

Smart cards can add convenience and safety to any traction of value and data; In this paper, we also discussed the background and the architecture of the smart card. Now if we talk about the future aspects of data in the smart card by the use of biometrics. Smart card readers can be built into future computers on peripherals which will enable the users to pay for goods purchased on the internet. The smart card is not only a data store but also programmable, and portable tamper resistant.

X. ACKNOWLEDGMENT

I am humbled to acknowledge the priceless guidance offered by Mrs Swati Mude(Assistant Professor) Thakur College of Engineering and Technology for this research paper.

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Job-Board-Application

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Abstract—**The rapid development of the internet has enabled job recruitment websites to become a popular means of connecting employers and job seekers. Online job recruitment websites have been developed to facilitate the hiring process and reduce the costs associated with traditional offline recruitment methods. This paper explores the current state of online job recruitment websites and their impact on the recruitment process. The literature review examines the advantages of online job recruitment websites, such as increased reach and efficiency, and their limitations, such as privacy concerns and the difficulty of verifying job postings. The paper then presents an overview of the types of job recruitment websites and the features they provide. Finally, the paper discusses the future of online job recruitment websites and their potential to revolutionize the recruitment process.**

This project is aimed at developing a web-based and central recruitment Process system for the HR Group for a company. Some features of this system will be creating vacancies, storing application data, and Interview process initiation, scheduling interviews, storing Interview results for the applicant and finally Hiring of the applicant. Reports may be required to be generated for the use of the HR group. This project 'Job Board App' is an online website in which jobseekers can register themselves and then attend the exam. Based on the outcome of the exam the jobseekers will be short listed. For freshers, the exam will be conducted at some venue after a short listing of the preliminary Aptitude Test. The details of the examination, venue & Date of the examination will be made available to them through the website.

Keywords—Ai recruiter, Jobseekers, Administrator, Company, Preliminary aptitude test.

I. INTRODUCTION

The internet has revolutionized the way we find and apply for jobs. Online job recruitment websites have become an important tool for employers and job seekers in the 21st century. Online job recruitment websites provide employers with an efficient and cost-effective way to find qualified job applicants and for job seekers to find suitable job

opportunities. This paper explores the current state of online job recruitment websites, their advantages and disadvantages, and their potential for revolutionizing the recruitment process.This project Job Board App is an online website in which jobseekers can register themselves online and apply for jobs and attend the exam. Job Board App provides online help to the users all over the world. Using web recruitment systems like recruitment websites or job sites

also play a role in simplifying the recruitment process.

Such websites have facilities where prospective candidates can upload their CV and apply for jobs suited to them. Such sites also make it possible for recruiters and companies to post their staffing requirements and view profiles of interested candidates. Earlier recruitment was done manually, and it was all at a time-consuming work. Now it is all possible in a fraction of second. It is all done online without much time consuming.[1]

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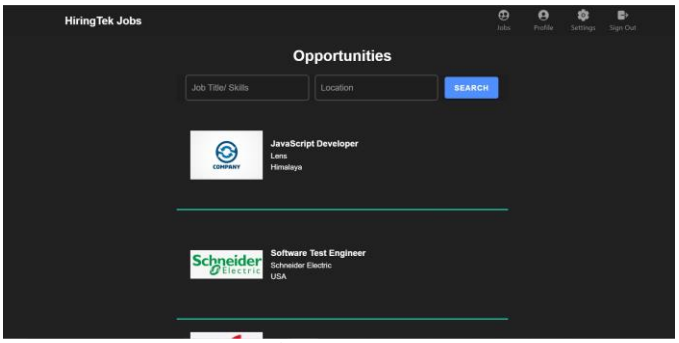


Fig 1: Overview of Job board Application

Job Board App enables the users to have the typical examination facilities and features at their disposal. It resolves typical issues of manual examination processes and activities into a controlled and closely monitored workflow in the architecture of the application.

This multi-platform solution brings in by default, the basic intelligence, and immense possibilities for further extension of the application as required by the user. The system makes it friendly to distribute, share and manage the examination entities with higher efficiency and easiness.Using web recruitment systems like recruitment websites or job sites also play a role in simplifying the recruitment process. Such websites have facilities where prospective candidates can upload their CV and apply for jobs suited to them.

A quick look at the overall trends in Online recruiting shows the rise in the importance of marketing the web site, online training, dawn of video interviews and emergence of professional Internet Recruiters. Online recruiting and online recruiting systems,[2]

II. LITERATURE SURVEY

System Analysis is the detailed study of the various operations performed by the system and their relationships within and outside the system. Analysis is the process of breaking something into its parts so that the whole may be understood. System analysis is concerned with becoming aware of the problem, identifying the relevant and most decisional variables, analyzing, and synthesizing the various factors and determining an optional or at least a satisfactory solution. During this a problem is identified, alternate system solutions are studied, and recommendations are made about committing the resources used to the system.[3]

DESCRIPTION OF PRESENT SYSTEM

Presently recruitment is done manually. That is if a company or organization needs employees they make an announcement through the newspaper. People who are eligible send applications to the organization or company. From these applications they are called for interviews or tests. After tests the company has to do short listing manually. From these shortlisted candidates, they are called for interviews. After the interview short listed candidates are employed. So it's all a time consuming procedure.

LIMITATIONS OF PRESENT SYSTEM

Recruitment is done manually. These tasks are time consuming. It may take one month or longer. People around the world cannot apply. The Job Board App is very convenient because in the manual system there are a lot of difficulties in conducting and managing a recruitment exam, short listing, maintaining staff etc.

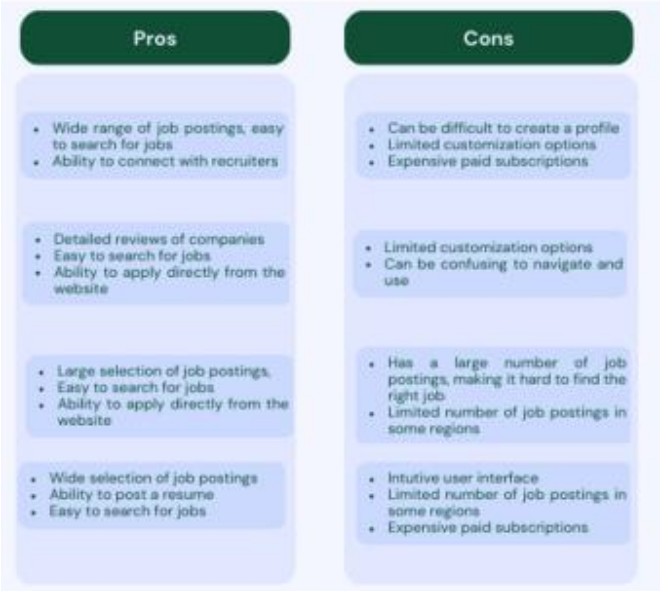
PROPOSED SYSTEM

The Job Board is aimed at developing a web-based and central recruitment Process system for the HR Group for a company. Some features of this system will be creating vacancies, storing application data, and Interview process initiation, Scheduling Interviews, Storing Interview results for the applicant and finally hiring of the applicant. This

project Job Board App is an online website in which jobseekers can register themselves and then attend the exam. Based on the outcome of the exam the jobseekers will be shortlisted. The details of the examination & Date of the examination will be made available to them through the website. People all around the world can apply and register. It has made all the process easy.[4]

ADVANTAGES

Job Board App enables the users to have the typical examination facilities and features at their disposal. It resolves typical issues of manual examination processes and activities into a controlled and closely monitored workflow in the architecture of the application.



This multi-platform solution brings in by default, the basic intelligence, and immense possibilities for further extension of the application as required by the user. The system makes it friendly to distribute, share and manage the examination entities with higher efficiency and easiness. It is a comprehensive resource for finding a job online.

III. PROBLEM STATEMENT

The role of online job recruitment websites on employers' hiring and recruitment processes is an important yet under-researched topic. This research paper will explore the potential benefits and drawbacks of online job recruitment websites for employers, as well as analyze the impact of these websites on the overall recruitment process. The paper will also examine how employers can best utilize online job recruitment websites to efficiently and effectively find suitable candidates for their open positions. Finally, the paper will provide recommendations on how employers can maximize their use of online job recruitment websites to achieve the best outcomes for their hiring and recruitment needs.

Hiring Tek provides a recruitment platform as a service and also builds a jobs board public app to list out jobs posting. Implementation Requirements:

1. Enhance the UI(user interface) to provide the facility to subscribe the notification system with different keywords and implement the backend RESTful API associated with the UI.

2. Build an RESTful API to scan the uploaded candidate profile and resume and show all the jobs which match the skills set and experience in the ranking order.
.
3. Enhance UI to provide ability to search with keywords and various predefined filters to match the jobs postings and implement the backend RESTful API associated with UI.

4. Build the automated unit and functional tests to validate the functionality to avoid the product regression and to make it stable with bug free.

5. Design the backend schema layout in the mongo DB to persist all the settings and user data.

It will be accessed from all mobile platforms and desktop devices. The requirement is to enhance the Jobs board app to include a subscription system to match the candidates' requirements and notification system. Also, require adding the search functionality, user interface and backend API to search the job posts as per user requirements.

IV. PROPOSED SYSTEM

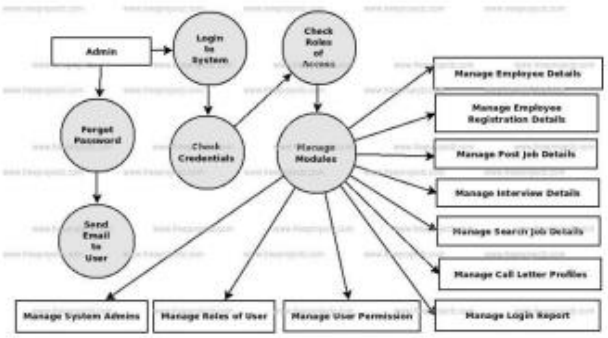


Fig 2: Architecture Diagram for the proposed model

The Architecture for the Job Board Application

E-recruiting systems have evolved through numerous technological developments since their introduction in the mid-1990s. At the early stage of corporate e-recruiting, the purpose of the career Web site was to simply post job openings on the static Web page for job seekers' information. As the e-business technologies advance and recruiters gain more e-recruiting experience, the front-end
e-recruiting systems add new features and functions, target job seekers better, and integrate with a back-end human resource management system.

An advanced e-recruiting system of large companies has been powered by an enterprise wide system and incorporated best-practice recruiting methodologies to achieve strategic advantage.[5]

While sound architecture is critical to the successful development of complex systems and seamless integration with other systems, it has not yet been well established for the holistic e-recruiting system because of its infancy. The architecture helps recruiters and system developers understand how various components of the e-recruiting system work together to achieve recruiting goals. Here, a high-level architecture of the holistic e-recruiting system for a corporate career Website is presented. Since the architecture is a roadmap to the development of the e-recruiting system that supports the recruiting process, understanding the e-recruiting process is required in order to better identify architectural components.

The architecture of the holistic e-recruiting system consists of eight distinct yet interrelated subsystems: applicant tracking management subsystem; job requisition management subsystem; job agent management subsystem; prescreening/self-assessment management subsystem; e-recruiting performance analysis subsystem; candidate relationship management subsystem; workflow management subsystem; and database management subsystem. The accompanying figure shows the relationships between e-recruiting processes and the eight components of the holistic e-recruiting system.

Applicant tracking management subsystem. Finding the right candidates for a particular job is a difficult and costly task for recruiters and hiring managers.[7] The functions of an applicant tracking management subsystem include gathering job applications, storing candidate profile resumes, checking the status of each candidate in the recruiting process, generating requested information for decision makers, and disseminating the information to other human resource management systems. The fundamental technology for applicant tracking is a Web-based search engine that scans through the applicant database based on keywords, phrases, or natural languages.

Job requisition management subsystem. The primary function of this subsystem is to streamline job requisitions and online postings. Users of the job requisition management system are recruiters and hiring managers. Job requisition and approval submissions can be processed without a manual data entry into a job database when integrated with a human resource management system. This subsystem is a single automated job posting point to

multiple recruiting sites such as an internal career Website,[6] external job boards, and industry consortia. During the recruiting process, the job requisition management subsystem allows managers to regularly monitor current job postings and close job postings as they are filled or canceled.

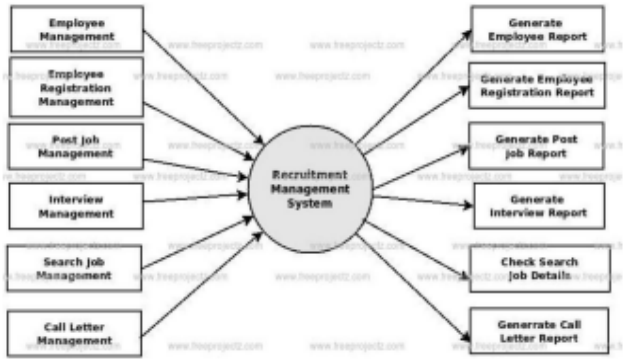


Fig 2: Workflow

Job agent management subsystem. The purpose of this subsystem is to promote information exchange between e-recruiting users and the e-recruiting system by using a personalized search agent. Creation of the personalized job agent is interactive, leading to the creation of a unique profile. For job seekers, a job agent can perform a particular search based on job search and communication parameters such as job locations, job categories, and the frequency of job search. Based on the job agent's notification, job seekers may apply for jobs online or ignore them. Recruiters specify to the personalized job agent the duration of the job postings, frequency of the candidate search, and mode of notification.

Prescreening/self-assessment management subsystem. The purpose of this subsystem is to assess the degree of match between applicants' qualifications and job requirements at the time of online job applications. To improve the overall quality of job applicants, the prescreening/self-assessment management system minimizes the submission of job applications from job seekers who do not meet basic job requirements. For certain job categories, pre screening helps recruiters sort through a pool of resumes and rank them based on a predefined scoring system. The choice of the questionnaire item is crucial to the success of this subsystem. Commonly used question items include levels of technical skills, personalities, interpersonal skills, work ethics, and aptitude. The process of the prescreening/self-assessment tests is interactive and has an option of "exit any time without completion."[8]

E-recruiting performance analysis subsystem. This subsystem analyzes the strategic, financial, and operational performances of an e-recruiting system in order to improve the overall efficiency and effectiveness of the career Web site. Table 2 summarizes major metrics

used at leading companies. Performance reports are generated based on predefined report format and real-time data. As each user has unique reporting requirements, this subsystem should provide recruiters with an easy-to-use report generator equipped with a variety of reporting options. The performance analysis subsystem should be able to alert managers of an exceptional situation when certain performance measures do not meet thresholds defined by managers.

Candidate relationship management subsystem. This subsystem provides recruiters with long-term relationship management programs and tools needed to effectively manage applicants. One of the disadvantages of the e-recruiting method is a lack of the human touch such as a face-to-face meeting or conference call. The candidate relationship management is designed to provide applicants with a feeling they have an ongoing relationship with the company through a "virtual human touch." Delivering a maximum level of virtual human touch will increase the chance of job acceptance by candidates by implicitly indicating the attractiveness of a company's job opportunities.

The rationale behind the use of a candidate relationship management subsystem is that maintaining the best pool of job applicants at all times is faster and more cost-effective than looking for new job applicants when jobs become available. Given the widespread adoption of the various e-recruiting technologies in the job market, only companies with a positive long-term relationship with job applicants will gain a competitive edge.

Workflow management subsystem. While each of the previously mentioned subsystems supports the e-recruiting process partially, the workflow management system integrates these subsystems to support the entire spectrum of e-recruiting activities.

This subsystem enables interrelated subsystems to collaborate around the e-recruiting activities and to integrate with other human resource management systems. For example, once job applicants have entered their resume and profiles in response to a job opening,

The workflow management system triggers the applicant tracking subsystem for candidate screening, and a job agent sends a list of candidates meeting the desired requirements to hiring managers for further actions. The potential value of this system is currently regarded as the driving force behind the standardization of e-recruiting processes.

Database management subsystem. The holistic e-recruiting system stores all the data on jobs and applicants at a centralized database. During the traditional batch-mode recruiting process, once recruiting is complete, paper-based applications and resumes are kept in the file cabinet for a predefined period of time and thrown away. Later, when a new job is available, another recruiting cycle begins with a new collection of job applications. E-recruiting has changed the recruiting practice from batch-mode to ongoing recruiting. Many companies encourage job seekers to submit applications and resumes online regardless of the current job availability, store the applications and resumes at the

centralized database for a considerable period of time, and evaluate a pool of job applicants stored in the database as soon as a new job is available.

III. MODEL EVALUATION AND RESULT

The last and most crucial phase comprises model evaluation and discovering really considerable results.

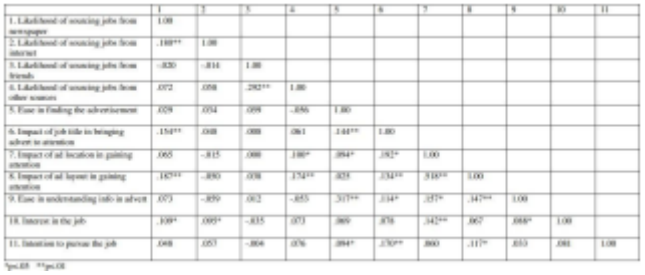


Fig 4: Intercorrelation between variables

The data obtained indicates that the number of vacancies advertised remained fairly constant. The number of applications had a significant increase in 2001, the year that electronic recruitment was introduced, from 7,071 to 12,219, increasing the average number of applications per job significantly from 17.5 to 28.62 and providing initial support for the hypothesis that the use of the internet as a recruitment source increases the number of applications received by the organization. These numbers remained high until 2004 when the numbers of applications per job decreased to similar averages that were received prior to the introduction of e-recruitment, down to 16.24 applications per job.

This decrease coincides with a change to the organization's e-recruitment strategy which ceased utilizing two major Australian
recruitment job boards

To better understand the employment trends of the organization a report was generated which placed the number of applications and jobs per year against the two key employment groups within the organization, professional staff and academic staff. The results of this report are depicted in Figure 3.
The results indicate that the increase in applications in 2001 is attributed primarily to the professional employment group, with only a gradual increase in academic applications. In contrast, the number of academic applications continued to increase after 2002,
whilst the number of applications for professional vacancies declined significantly from 11,821 in 2002 to 9,198 in 2003, with another significant decrease to 6,517 in 2004.
The number of applications received by the organization. These numbers remained high until 2004 when the numbers of applications per job decreased to similar averages that were received prior to the introduction of e-recruitment, down to 16.24 applications per job.

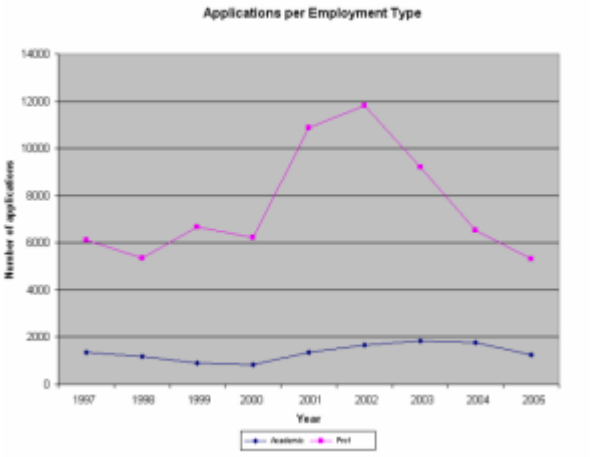


Fig 5: number of applications per year based on Employment group

Research Question 1: How does e-recruitment impact on the quality of applications
received?
Research Question One explored the quality of applications sourced through the internet as compared to the proposed overall increase in the volume of applications received for positions, demonstrated by the component of the study model below:

Fig 6: process flow of recruitment system

Fig 6: process flow of recruitment system

In order to explore the first research question, a number of reports were generated from the organization's human resource information system based on data captured by the organization.

The first report detailed the number of applications received by the organization each year and the number of applicants shortlisted each year. [10]
The data is presented in Table

	Year								
	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of applications	7,466	6,528	7,575	7,071	12,219	13,481	11,033	8,297	6,589
Number of shortlisted applicants	1,235	1,232	1,224	1,088	1,137	1,340	1,377	1,432	1,444
% of applicants shortlisted	**16.54**	**18.87**	**16.16**	**15.39**	**9.31**	**9.94**	**12.48**	**17.26**	**21.92**

Fig 7: Percentage of applicant getting placed

overall, the results from Tables demonstrate that there is no discernible increase in the quality of applicants that used the internet as a recruitment source as opposed to applicants that

use newspaper or other recruitment sources, despite the increase in the quantity of applications that are associated with the use of e-recruitment

IV. ACKNOWLEDGMENT

I gratefully acknowledge the support, guidance and encouragement of my Dissertation Guide Associate Professor Dr. Megharani Patil ma'am for this novel work.

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Security of Cloud Computing

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Abstract— **Security of cloud computing is a firm hand of cyber security devoted to securing cloud computing systems. Security of cloud computing or directly cloud security touch on to a board set of policies, technologies, applications, andcontrols utilized to protect virtualized IP, data, application, services, and the associated infrastructure of security of cloudcomputing.**
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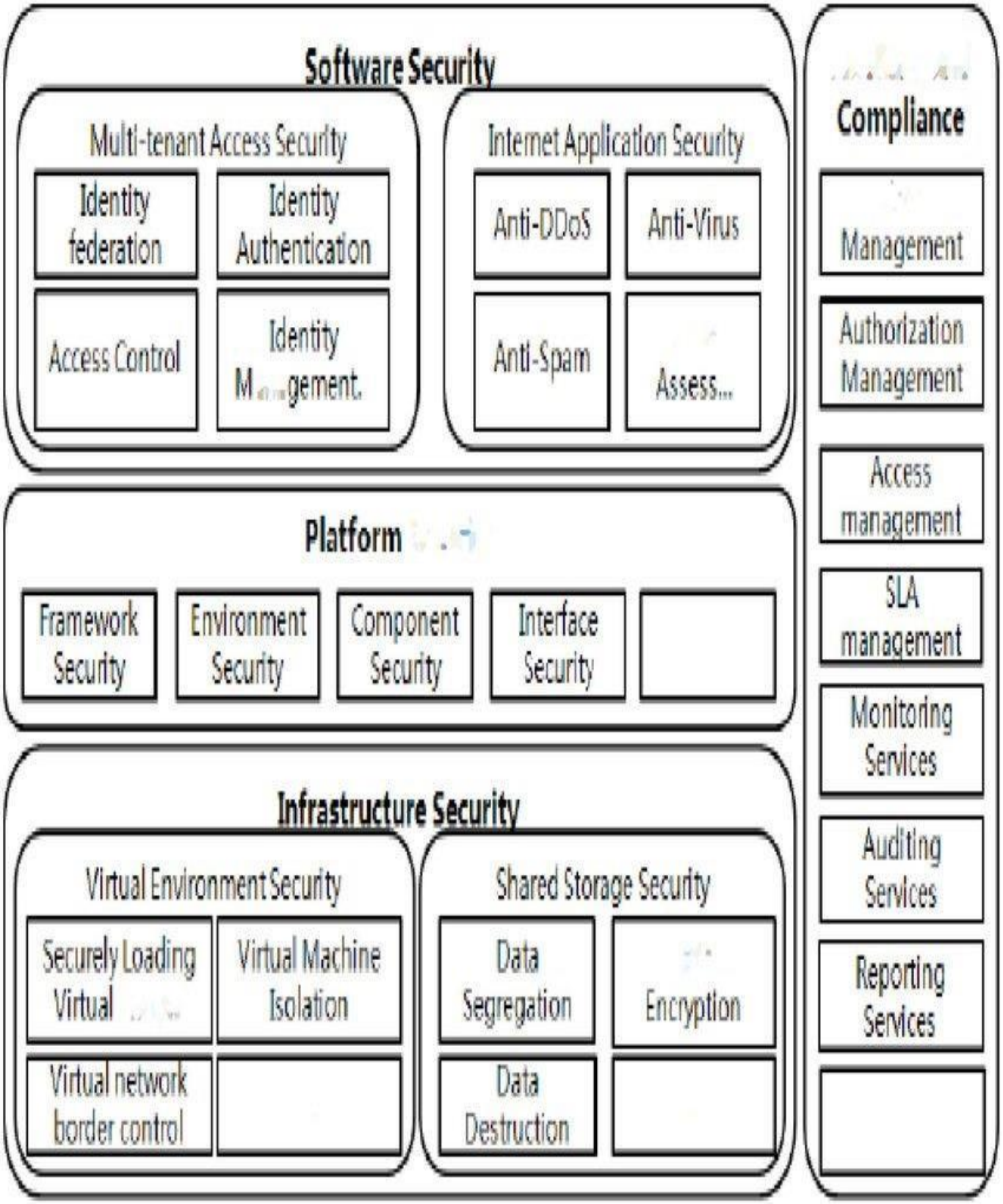
Key Words -***Security, Cloud Computing***

I. INTRODUCTION

The security of cloud computing is a collection of technology designed to address internal and external threats. Security of cloud computing or more clearly cloud security touch on to a board set of policie , technologies , applications ,and controls make use of to protect virtualized IP , data , application , services , and The related infrastructure of cloud computing .Cloud computing Industry is growing .According to Gartner, World Wilde cloud services revenue is on pace to surpass $56.3 billion in 2009, a 21.3% increase from 2008 revenue of 46 .4 billion, according to Gartner , Inc. The market is expected to reach $150.1 billion in 2013. Business are increasing cloud adaption. We expect a great deal of migration towards cloud computing within the federal government in addition to the already robust private sector growth. The growth of the cloud should not protect the data that goes into it.

II. ARCHITECTURE

Security in cloud computing is a major concern. Proxy and brokerage servies should be employed to restrict a client from accessing the shared data directly. Data in the cloud should be stored in encrypted form.


Software Security
Multi-tenant Access Security
Identity federation
Identity Authentication
Access Control
Identity M...gement.
Internet Application Security
Anti-DDoS
Anti-Virus
Anti-Spam
Assess...
Platform
Framework Security
Environment Security
Component Security
Interface Security
Infrastructure Security
Virtual Environment Security
Securely Loading Virtual ...
Virtual Machine Isolation
Virtual network border control
Shared Storage Security
Data Segregation
Encryption
Data Destruction
Compliance
Management
Authorization Management
Access management
SLA management
Monitoring Services
Auditing Services
Reporting Services

SECURITY OF CLOUD COMPUTING

Security is protection from, or resilence against, potential harm caused by other,by restraing the freedom of others to act. Security of cloud computing is a collection of security measures designed to protect cloud-based infrastructure, application and data.

These security measures are configured to protect cloud data, support regulatory compliance and protect costomerrs privacy as well as setting authentication rules for indivial user and devices. From authencating access to filtering traffic , cloud security can be configured to the exact need of the business .and because these rules can be configured and managed in one place ,administration overheads area reduced and IT tearms emprovered to foucs on other area of the business.

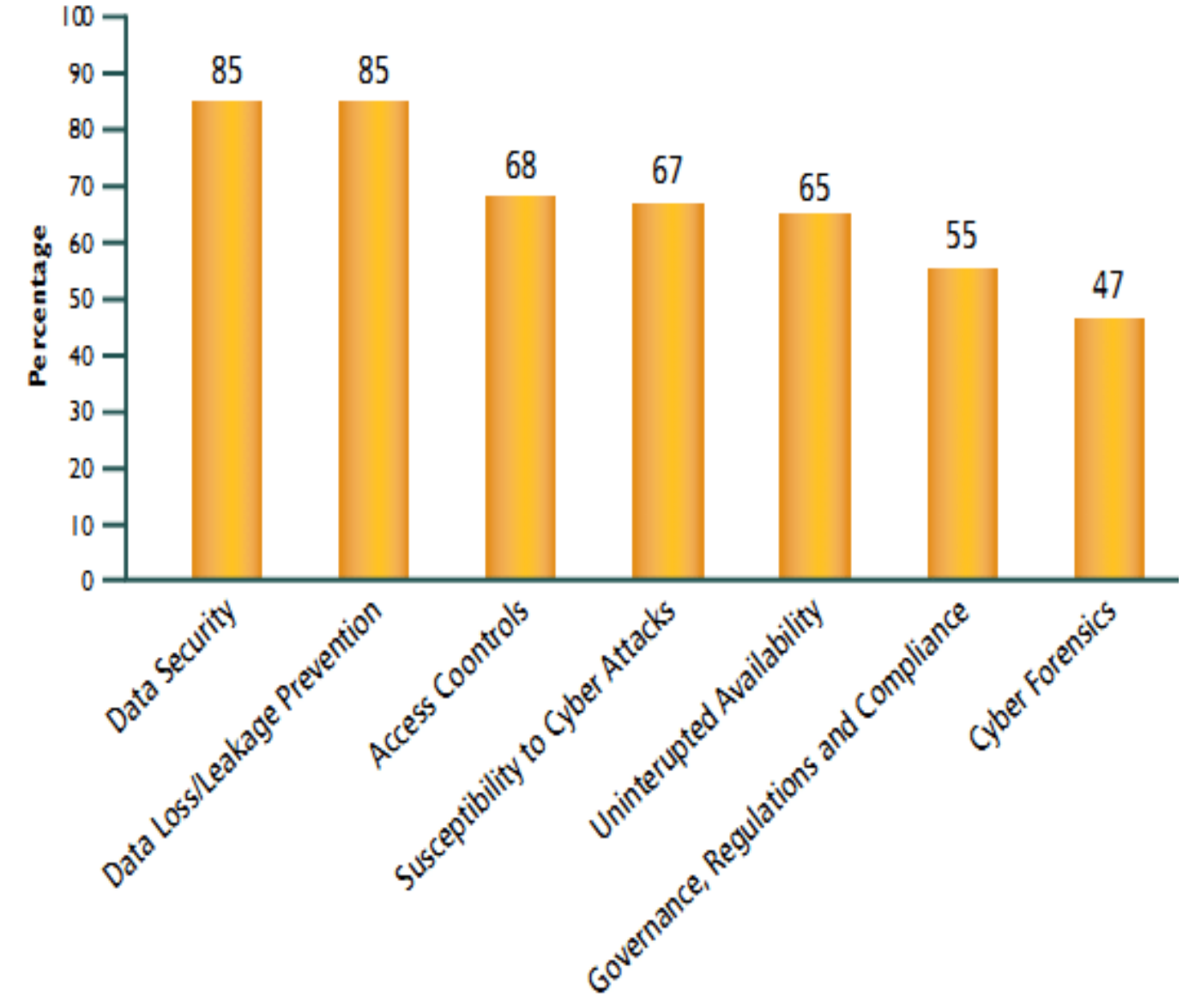


Fig1.cloud security

Cloud computing is based on five attributes: multitenancy, massive scalability, elasticity, pay as you go, and self-provisioning of resources.

Multitenancy:

Unlike previous computing models, which assumed dedicated resources (i.e., computing facilities dedicated to a single user or owner), cloud computing is based ona business model in which resources are shared (i.e., multiple users use the same resource) at the network level, host level, and application level.

Massive scalability:

Although organizations might have hundreds or thousands of systems, cloud computing provides the ability to scale to tens of thousands of systems, as well as the ability to massively scale bandwidth and storage space.

Elasticity:

Users can rapidly increase and decrease their computing resources as needed, as well as release resources for other uses when they are no longer required.

Pay as you go:

Users pay for only the resources they actually use and for only the time they require them. Self- provisioning of resources:

User self – provision resources, such as additional system (processing capability, software, storage) and network resources.

CLOUD SECURITY DESING PRINCIPLES

The security design principle are the key pillars for implementation of cloud security to project system, application and platform security architecture.

Below are the key desing principles which needs to be considered for cloud technology adoption.

1.

1) Security at all layers: Ensure robust security is applied to all layers [physical, network, data, application,etc. of their architecture with multiple security controls. This will ensure end to end protecting of application/ data hosted by departments on cloud platform.

2) Safeguard data while at rest and in transit: Identify and Classify the dada in terms of critically / sensitivity and define their levels. This can be prevented via using the available security controls like access control, tokenization, encryption, etc.

3) Monitoring and auditing: Ensure monitoring, auditing and alerting is configured to capture the changes in the department's system in real time. Further, log integration and metric collection can automatically investigate, act and respond.

4) Access management and Controls: Ensure implementation of principle of selective privileges and impose segregation of duties with appropriate access and authorization. Centralized identity and access management can eliminate any unauthorized access and information loss/ theft

5) Readiness for security events: Department/CSP need to prepare system for any unusual security event. Regular vulnerability and security tests need to be conducts to identify the security gaps and issues. Drill can be conducted to record the response of the cloud systems at different layers.

6) Automate security best e practices: Automating software/hardware/application, based security system via AI/ML/Bots to improve the ability to secure environment which can perform regular checks and implement the controls needed to restrict the attack and enhance cloud security.

7) Cloud Vendor Lock-in: Department to ensure that there is no vendor lock-in by Cloud services provider while hosting the application/data, as there is no standard guidelines between different cloud providers for data migration and exports, so it becomes difficult to migrate data from one cloud provider to another or migration to on-premise Dara centre.

BENEFITS OF SECURITY OF CLOUD COMPUTING

. High Availability – Ensuring continuity is one of the primary reasons behind businesses looking for reliable cloud security solutions. The right cloud computing security solutions. The right cloud-computing security solution should incorporate real-time support,24*7*365 live monitoring of business assets and have redundancies built-in so your website and applications remain online and functional even in the case of an attack.

With cloud service providers, such as Active Co 's cloud Services vancouver, you can rest assured that your core business assets, such as website and applications will always remain functional globally[3].

. cloud DDoS protection – Traditional network infrastructure work on the basic of origin and backup serves that can be easily disabled DDoS attacks that are capable of generating up to 20Gbps of traffic. These attacks can take anywhere from hours to mitigate during which your services may be completely or partially affected and your business sustains severe financial and reputation loss. To ensure continuity of service, you need managed hosting providers and/or content delivery networks with DDoS absorption capabilities as well as real- time scanning to identify and prevent/mitigate DDoS attacks. This is done through the CDN`s capability of making use of a global network of PoPs that can manage spikes in legitimate traffic and divert synthetic spikes from a attack on the network. This enables CDN`s to both bring downtime down to zero as well as enables security controls that feel intuitive.

Flexibility- the right cloud computing solution for your business ensures irrespective of capacity. whether you`re experiencing a surge in legitimate traffic or in the case of an attack, the solution should be able to provide you enough flexibility to avoid server crashes and avoid unnecessary costs during lean hours through up or downscaling.

Data Security- Ensuring the privacy and security of your business` sensitive information and transactions is a top priority for your cloud computing security solutions. It should be able to prevent third parties for eavesdropping or tampering with your data through the right security protocols, such as, transport layer security [TLS]- the replacement to secure sockets layer [SSL] Ecommerce sites are particularly vulnerable to data breaches and should take care to implement a CDN with PCI compliance and other relevant digital rights management layers.

Regulatory compliance- Ecommerce businesses and financial institutions also face a greater degree of both industrial and governmental compliance and regulations checks. With the right CDN, you will be able to build a highly compliant

infrastructure that is capable of always protecting your consumers` data.

. Round The Clock Support- cloud Services Vancouver Have a host of companies offering cloud security solutions. The right cloud security solutions for your business, however, should be able to render downtimes to near zeros. It should be able to provide you with effective and time-sensitive customer support 24*7*365 any time of the day or night with live monitoring.

SECURITY OF CLOUD COMPUTING ADAVATAGES

1) Shifting public data to a external cloud reduces the exposure of the internal sensitive data
2) Cloud homogeneity makes security auditing / testing simpler
3) Clouds enable automated security management
4) Redundancy / disaster recovery

IV. CONCLUSION

The cloud computing has the potential to be a disruptive force by affecting the deployment and use of technology. The cloud be the next evolution in the history of computing, following in the footsteps of mainframes, minicomputers, PCs, servers, smart phones, and so on, and radically changing the way enterprise manage IT. Cloud computing provides advanced computing resources available on – demand, that scale as needed, with regular updates and without the need to buy and maintain an on - premise infrastructure. With cloud computing, teams to marked as they can rapidly acquire, scale services, without the considerable effort that requires managing a traditional on – premise infrastructure.
The version of this template is V2. Most of the formatting instructions in this document have been compiled by Causal Productions from the IEEE LaTeX style files. Causal Productions offers both A4 templates and US Letter templates for

LaTeX and Microsoft Word. The LaTeX templates depend on the official IEEEtran.cls and IEEEtran.bst files, whereas the Microsoft Word templates are self-contained.

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Live Talking Avatar

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Abstract— **Live talking avatar presents an approach for creating an interactive model. It presents a real-time talking avatar. The live talking avatar has many potential applications in video phones, virtual conferences, entertainment, etc. In this project, we have designed the model as to communicate via the internet for various uses. In this paper, we propose and implement a real-time talking avatar, where we can communicate with each other by synchronizing live human voice and motion from ours while keeping anonymity by using a voice conversion technique. We improve the accuracy of the human- to-character/avatar conversion by specializing to the character's visuals. Finally, we conduct subjective experiments and show the possibility of a new style of visualization and animation on the internet.**

Keywords—Real-time, interactive model ,AI model , Avatar, Animation , Visualization.

I. INTRODUCTION

Human-computer interaction plays an increasingly important role in today's computer system. The use of virtual animated characters in the current digital support system can greatly benefit user experience and interaction. These virtual characters or simply avatars can be applied to a wide range of applications for entertainment, personal communications, commerce, or education. Along with the development of the new web standards and technologies, today it is possible to deploy standard computer graphics applications on internet environments, keeping a good balance between visual quality and latency. The solution we present in this work is primarily the system for avatar creation and animation, which can be deployed on web platforms. Although, there are several approaches concerning model presentation and model deformation, this work presents a new approach for avatar creation which is achieved only with a live human face. In this paper we present an approach for creating interactive and speaking avatar models, based on standard face images. We have started from a 2D live human face model that can be adjusted to a particular face. a process based on Procrustes analysis is applied in order to find the best match for input key points, obtaining the rotation, translation and scale needed to best fit the model to the photo.

II. CHALLENGES

Research in this area has focused on improving the quality of character animations and reducing the computational resources required to create them. One of the key challenges in this field is to create animations that are indistinguishable from real videos. Other challenges faced is that the dataset will be very large and complex. Also, User Interface should be simple and easy to use. Decreasing the time required to predict the results is also necessary.

Achieving a high level of accuracy is very important in the field of Avatar character Animation and face detection.

Also, there are many challenges faced while using the live talking avatar. Some are as follows: -

1) Emotion detection: - Avatar also must be able to detect the micro-expressions on the face to help with emotion detection.
2) Personalization: - Avatars must be customized and personalized according to the requirement.

III. PROBLEM DEFINITION

A computer can efficiently and effortlessly interpret a lot of faces where it is difficult for the other websites and machines to interpret such a high amount of data. The most prevalent technology which is being used for the prediction is machine learning and deep learning. Our proposed system is successfully animating the real time movements into a animated avatar with help of machine learning. Our system has achieved a good efficiency in generating the resultant and accurate avatar movements. We have also reduced the overall time needed for execution. The purpose of live talking avatar technology involves machine learning algorithms to replicate the face movements and mimic realistic-looking videos in the form of Avatar.

IV. EXISTING SYSTEM

There are existing system that use live talking avatar. That systems does not involves awidespread plan to test the special features and general functionality of platform. The process used was strictly quality and had limited personalization.

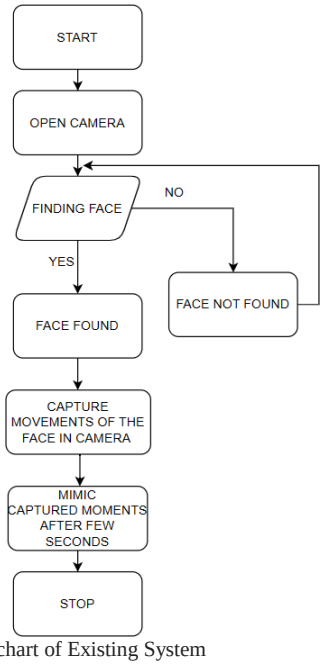

Fig 1.Flowchart of Existing System

1. The first step was to catch the input video into frames. The video capture function provided by using Html element “video” was used for this purpose. Since the method explored in this project was based on using a single face as input, multi- frame information was not needed. Besides, the similarity between two adjacent frames is too high hence putting them all into a training set will not only reduce the training efficiency but also potentially give rise to issues such as overfitting.
The videos chose for this work were all at a frame rate of 30 frames per second. After testing it was identified that selection of multiple face was not a reliable approach.

2. After finding the face, The second step was to use the color property RGB() to detect the area which hold the most blue colored value on the face and point them. The problem faced by the system was due to atmosphere and other environmental issues the camera was not able to mark blue colored point marks on the face. To overcome this problem at the time of testing we applied external blue colored sheet pieces on our faces for easy detection of the face. After detecting all the blue marked points on the face the avatar will move according to the movements of the face in the camera frame. All this animation will be carried out with the help of animate property which is supported by html element canvas. The canvas is responsible for creation of our avatar and its working in real time.
3. To make our Avatar more realistic live human we added new feature "the movement of hairs" by using the property of JavaScript "Pendulum" which allows us to create movements by applying a specific range.
As the avatar moves from right to left the hair also moves in the opposite direction for some instance and then come back to the original position.
This step is a iterative step as the avatar moves the hair will move continuously according to the user hair in the camera frame.
Co-operation

V. PROPOSED SYSTEM

A live talking avatar is a proposed system that utilizes artificial intelligence and computer-generated imagery to create a virtual representation of a human that can mimic their facial expressions, voice, and body movements. This technology has a wide range of potential applications, including customer service, virtual assistants, and online education. However, its development is still in progress, and further research is needed to improve the realism and interactivity of these avatars

The proposed system has the ability to mimic the user’s movements in real-time. It also includes the movement of hair as well as lips. The camera frame registers the user’s movements and the avatar moves according to it.

The application recognizes ‘blue’ for mimicking the movements of the user. So, the user has to use blue tape or a blue paper chit and place it over a part of the face for the system to recognize the face points.

The system first finds and renders the avatar and then searches for a face in front of the camera. If the system cannot find your face, it will search for a face again. Once a face is found, the system will follow the user’s movements in real-time.

The system still cannot imitate the user’s speech or talk and does not have voice recognition. It can only display the user’s lip movements. Another limitation is that the user has to use a blue element to read the user’s facial movements.

To make our Avatar more realistic live human we added new feature "the movement of hairs" by using the property of JavaScript "Pendulum" which allows us to create movements by applying a specific range.
As the avatar moves from right to left the hair also moves in the opposite direction for some instance and then come back to the original position.
This step is a iterative step as the avatar moves the hair will move continuously according to the user hair in the camera frame.

The proposed system still has ways to go with respect to the development sector, albeit it has come a long way from the existing system.

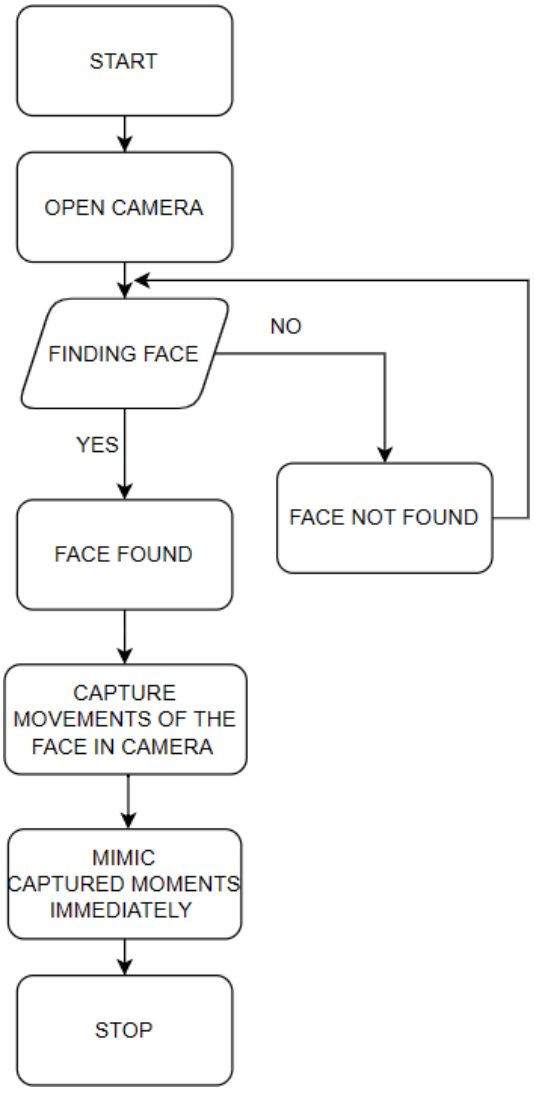

Fig 2. Flowchart of Existing System

VI. METHODOLOGY

➢ Creation of Avatar

Firstly, for the creation of our Avatar We used Canvas Element of HTML Which Allows to create different Graphics on Web page. The importance of Canvas lies on JavaScript which is actually responsible For drawing graphics. Canvas has several methods for drawing paths, boxes, circles, text etc. Which can be written in in JavaScript.

- We used Many Methods From these to draw Our Avatar. Like For Drawing Face First We divided our Window into 4 equal parts and then used the drawing methods like quadraticCurveTo().
- By applying Co-ordinate points of screen, we successively drew half-side of face.
- By using Method of Canvas Translate() We drew the other half of face by applying opposite co-ordinate points from first.

❖ For the creation of Beard and Hair we used lineTo(), quadraticCurveTo() methods which allows drawing of straight and curve lines.

❖ For the creation of Eyes, Ears And other Body We used methods like circleTo(), bezierCurveTo().

❖ For filling the color we used canvas.fill(); method which fills the color in drawing.

❖ For animation of Canvas on web-page the animate() method is required. we used animate() method for animation of canvas which is repeated for each frame in every second. Also after every change (like translate, movements etc.) on different parts of avatar like hair,face,neck,eyes the restore() method is required. We use it for every one of them.

❖ For applying movement to our Avatar manually, we provided slider and applied the mathematical function linear interpolation which provides the movements to face horizontally and vertically within applied range.

❖ For the movement of lips, we provided another slider with linear inter-polation with a small range. As value of slider increases the lips move vertically and as the value decreases the lips move horizontally.

❖ For the movement of hair, we provided the inbuild method pendulum () which uses range the as the head moves right hair moves opposite in direction and after few seconds they reset to their initial position.

❖ To make our Avatar more Realistic we used the properties like scaling and offsets which were very helpful for targeting movements at specific area.

❖ By using DOM(document-object-model) we provided every element's id and assign them to camera. By applying many methods with specific ranges we successfully achieved the movement of avatar in real time.

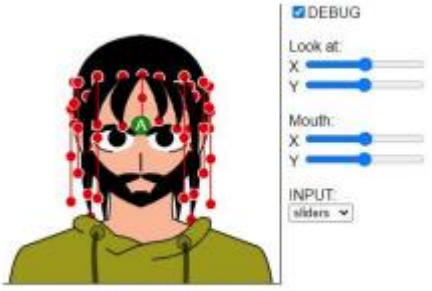

Fig 3. Movement by using Slider

VII LITERATURE SURVEY

SR.NO	LITERATURE	AUTHOR	WORKING	LIMITATIONS
1)	Creation of symmetric diagram of avatar by using a picture of face as model.	Java script design patterns- Addy Osmani.	Applied basic geometry for symmetric diagram.	Cant use z-axis as avatar is in 2D .
2)	Applied basic mathematical functions.	Margin Haverbeke	Applied functions like linear inter-polation .	For rendering , sliders are required .
3)	For realistic representation of the avatar we used scaling property .	Rado Istadori	Scaling methods of x axis and y axis. (x off-set and y off-set).	Still advanced scaling methods are needed.
4)	For hair movement, we provided in-build concept pendulum.	Rado Istadori	Movement of hair (like pendulum)	Requires long hair to work perfectly
5)	For scanning face DOM (document object model) is applied .	Margin Haverbeke	Scanning face successfully.	Requires high level specification s.

VIII.CONCLUSION

Our Proposed system is using various deep learning and machine learning algorithms in order to mimic the movements of the user and the system is achieving the maximum accuracy of the user's movements. A live talking avatar can be a very useful tool for a variety of applications, including animations, virtual events, and entertainment, etc. a poorly executed system cannot be useful and also annoying for the users to use . therefore , it is very important to create a useful and high quality technology .

IX.RESULT AND DISCUSSIONS

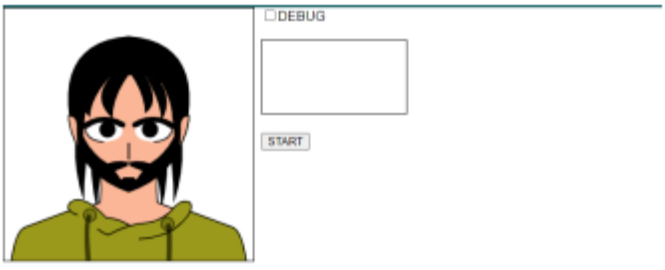

Fig 4. Static Models In figure 4, you can see that the avatar character is ready to express the same expression as of the camera.

Fig 5. Motion Model

In this figure 5, we can see that the avatar and camera person trying to mimic with same expressions.

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Predictive Text Generation

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Abstract:- **With the improvement in the field of machine learning and the ability of computers to make sense of written language, the prospects of the field have exploded. Nowadays, a predictive text generator has become the need of the hour, whoever may be the user. Current systems for word prediction and text messaging – predict words based on the frequency, however, the words used in a sentence sometimes depend on the context used. Multiple words are mapped on a keypad to generate the next word in the sequence. We offer a Context-Based Word Prediction system for summarizing Earning Scripts of corporate organizations, thereby minimizing the amount of time required to analyze such documents and adapt to the changes in the industry and maximize profits. Using Machine Learning, a word prediction model can be developed such that words are predicted keeping in mind the context. The model will be using RNNs and LSTMs for the generation of words / long sequences.**

Keywords-RNNs, LSTM, Text Summarization, Earning Scripts, Prediction Model, NLP

I. INTRODUCTION

It may take days, if not weeks, for typical humans to methodically look through a 50- page technical paper, filter out unnecessary material, and write a detailed summary of that text while without risking its correctness. Even if you put your best effort into text summary, you can't rule out the possibility of data redundancy or, worse, missing anything critical. But what if you could have a nonhuman substitute do it for you? This option will never tire of reading, organizing, and analyzing, its brain will not become overworked, and it will be as close to flawless as you can get. Natural language processing (NLP) is one of the oldest and most investigated areas of artificial intelligence (AI).

Text summarization is a technique for condensing extensive passages of text. The goal is to develop a cohesive and fluent summary that only includes the document's major ideas. In machine learning and natural language processing (NLP),

automatic text summarization is a common challenge. Data is to this century what oil was to the previous one, propelled by current technical breakthroughs. Today's world is propelled by the collection and transmission of massive volumes of data. With so much data moving in the digital world, machine learning algorithms that can automatically condense lengthy texts and offer accurate summaries that can effectively communicate the intended messages are necessary.

II. LITERATURE REVIEW

In one of the past papers, a new algorithmic framework called the LeakGAN for the generation of long text via adversarial training was proposed. By leaking the feature extracted by the discriminator as the step-by-step guiding signal to guide the generator better generate long text, LeakGAN addresses the non-informativeness and sparsity problems of the scalar reward signal in previous GAN solutions. However, we found that long Text Generation with the system did not yield satisfactory results due to many factors such as LSTM - RNN's failure to capture long-term dependency, discriminator's failure to give those "good but tiny" sequences appropriate penalty, as well as the capacity of the discriminator to check the global consistency of the whole sentence, is localized and thus requires further work.

Through one of the other papers, it was seen that the paper proposed a context-based word prediction system for the prediction of the most appropriate word in a given context. This system also extended to informal words. The algorithms used include Hidden Markov Model and Support Vector Machine. It was noticed that in the current system, if there are 20,000 words, SVM needs to learn classification for these many classes which can be very large considering: No. ofdigits in code = No. of letters in word. Hence, the usage of SVM limits the number of codes. In the system the Average percentage error for Informal word based on Context based word prediction system is still quite high.

III. PROBLEM STATEMENT

To develop a Text Summarizer to reduce the work and effort and that can accurately summarize the Earning Scripts of corporate organizations. Use innovative technologies and technical insights to differentiate the proposed model of text summarizer from the existing models. Analyze results and optimize the model to achieve acceptable results.

IV. DATA COLLECTION

For data, we have worked on the Earning Script of a company for the year 2022-23. Using Earning Script as a dataset allows the model to work with the numerals and symbols associated with such documents and helps in the ideal training of the same.

V. PROPOSED SYSTEM

Before we embarked upon the actual implementation, the **5W1H** questions were decided to be as follows:

1. Why do we need a text generator?
2. When are they helpful to people?
3. Who benefits from these text generators?
4. Where can the text generators be used?
5. What is the main idea behind automated text generators?
6. How is it done?

We further performed survey analysis by creating a Google form with a set questionnaire pertaining to Predictive Text Generation. The results observed can be inferred from the below graphs.

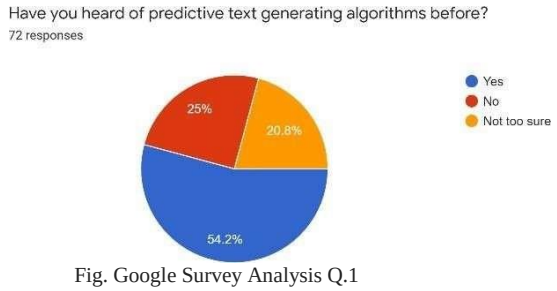

Fig. Google Survey Analysis Q.1

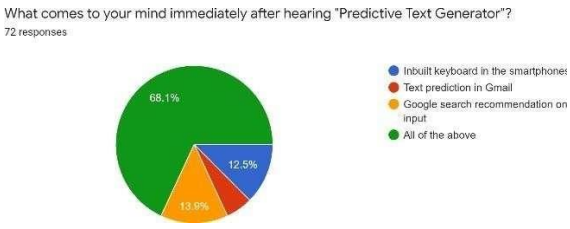

Fig. Google Survey Analysis Q.2

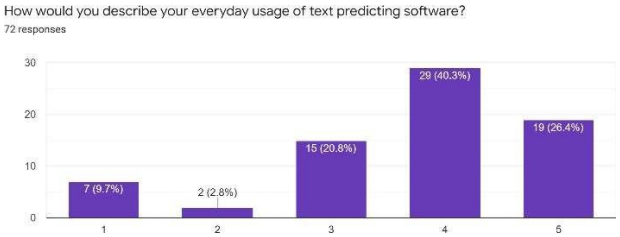

Fig. Google Survey Analysis Q.3

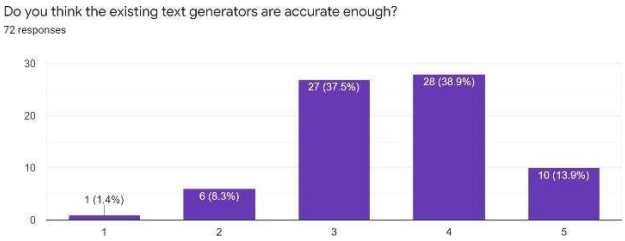

Fig. Google Survey Analysis Q.4

The entire working flow of the project is as follows:

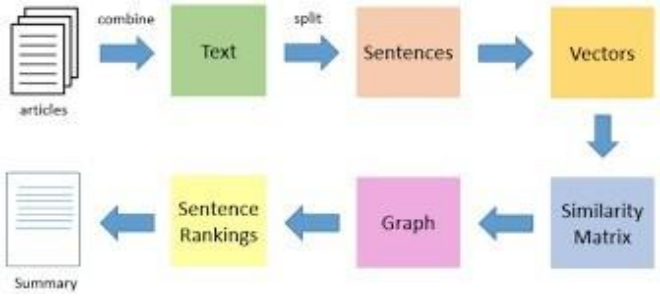

Fig. Workflow of the project

Predictive text generation using Recurrent Neural Networks (RNNs) is a popular technique used in Natural Language Processing (NLP) tasks. RNNs are a type of neural network that is well-suited to modeling sequential data, making them an ideal choice for text-generation tasks.

The basic idea behind predictive text generation using RNNs is to train a model on a large corpus of text and use it to generate new text. The model is trained to predict the next word in a sentence given the previous words in the sentence. This is done by feeding the model a sequence of words, one at a time, and updating its internal state after each word. The internal state of the model serves as a memory that can capture information about the context of the text.

Once the model is trained, it can be used to generate new text by feeding it a seed sentence and asking it to predict the next word. This process can be repeated iteratively to generate longer pieces of text.

One common approach to improve the quality of the generated text is to use a technique called "sampling". Sampling involves randomly selecting the next word from the probability distribution produced by the model, rather than always selecting the word with the highest probability. This allows for more diverse and interesting text to be generated.

Overall, predictive text generation using RNNs is a powerful technique that can be used for a variety of applications, including chatbots, language translation, and text completion. In this project, we work on a model that can shorten the earning scripts issued at the end of the fiscal year to produce a shortened version of the script for the corporate officials to understand and incorporate the necessary changes with ease and with the surety that the shortened document includes the important contextual nuances of the earning script.

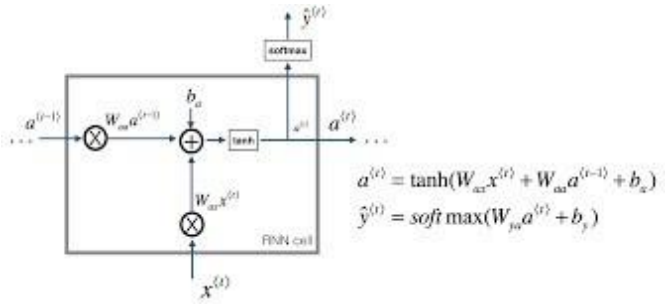

Fig. Recuurent Neural Networks

We have also employed Long short term memory models to incorporate longer text because of the model's ability to store a greater amount of information.

$$
\begin{aligned}
f_t &= \sigma_g(W_f x_t + U_f h_{t-1} + b_f) \\
i_t &= \sigma_g(W_i x_t + U_i h_{t-1} + b_i) \\
o_t &= \sigma_g(W_o x_t + U_o h_{t-1} + b_o) \\
c_t &= f_t \circ c_{t-1} + i_t \circ \sigma_c(W_c x_t + U_c h_{t-1} + b_c) \\
h_t &= o_t \circ \sigma_h(c_t)
\end{aligned}
$$

Fig. Long Short Term Memory

VI. RESULT AND DISCUSSION

From the implemented model we can conclude that the text summarizer is able to accurately summarize the earning script based on the context of the characters in the script. The accuracy of the earning script can be further improved by training on various texts – fictional, mathematical, legal, and educational. The summary of the text does not accommodate the introduction of new laws affecting the corporate industry and hence, the model can be trained on the same. The trained model can also be used to summarize fictional content, for instance – novels, technical papers, blogs, and other creative and legal content.

VII. CONCLUSION

As a result, we can conclude that Recurrent Neural Networks (RNNs) and Long Short Term Memory (LSTMs) can be used to summarize long texts while also keeping in mind the context. We can go even further by creating an entire paragraph suggester. Based on the findings, we may conclude that the technologies employed yielded positive outcomes. Because the RNNs and the LSTM were trained on documents containing alpha-numeric values and mathematical symbols, the trained model is capable of making sense of corporate and legal documents along with technical papers as well. This summarizer serves the purpose of saving invaluable time for corporate individuals and reduces human errors like overlooking critical information and neglect as a result of lethargy.

VIII. FUTURE SCOPE

We'd like to look into methods for generating numerous sentences with diverse content in the future. Furthermore, we would like to build an application that would act as a workable prototype available for all sorts of applications including mobile devices, PCs, etc. We'd further need a larger dataset to enhance the accuracy and prediction of the model.

IX. ACKNOWLEDGEMENT

We gratefully acknowledge the support, guidance, and encouragement of our Guide Professor Mrs. Ashwini Patil Ma'am, and our industry mentor Mr. Abhinav Garole for guiding us in building this model.

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Deep Learning Based Intrusion Detection Model for Network Security

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Abstract Abstract: Since it serves as a potent means of network security defence, intrusion detection technology is an essential component of the network security system.As the Internet has grown quickly, so too have network data volumes and threats, which are now more sophisticated and diversified. Modern intrusion detection equipment cannot reliably recognize different types of attacks. A CBL_DDQN intrusion detection model based on an upgraded double deep Q network is suggested based on deep reinforcement learning to address the imbalance of regular traffic and attack traffic data in the actual network environment as well as the low detection rate of attack traffic. This model integrates the feedback learning and policy generating methods of deep reinforcement learning with a one-dimensional convolutional neural network and a bidirectional long-term, short-term memory network to train agents to attack different types of samples.Classification, to some extent, lessens the reliance on data labels during model training. The Borderline SMOTE algorithm reduces data imbalance, thereby improving the detection rate of rare attacks. The NSL KDD and UNSW NB15 data sets are used to assess the model's efficacy.The findings demonstrate that the model has performed well with respect to the three indices of accuracy, precision, and recall, and the detection effect is significantly superior to Adam BNDNN, KNN, SVM, etc. The detection method is an efficient network intrusion detection model

Keywords: Keywords: Deep Learning, Intrusion detection, Classification, LSTM, CNN, SMOTE

INTRODUCTION

Nowadays, everyone has a smartphone, and UPI has just "Network intrusion detection system (network intrusion detection systems, NIDS)", as a proactive defense technology, is the primary means to discover potential network threats in time and formulate reasonable defense strategies and is an integral part of the network security technology system [1-4]. It can detect attacks in time and reduce network security threats by collecting and analyzing relevant network data.

Signature-based NIDS relies on an attack signature database for detection. It has a high detection rate for existing data in the database but cannot detect new attacks [5-8], and the database needs to be updated frequently. Anomaly-based NIDS identifies hidden attacks in computers by analyzing unusual traffic distributions and can be used to detect new types of attacks. The system uses configuration files to store all normal behaviors of users, hosts, network connections, and applications. This approach compares current activity to the configuration file and flags any significant deviations as anomalies [9-12]. This data sensitivity effectively prevents various malicious behaviors. However, this sensitivity advantage can lead to high false favorable rates, leading to unnecessary panic and overreaction [13-15].

Machine learning algorithms, such as Bayesian networks [16], support vector machines [17], etc., are widely employed in anomaly-based NIDS. Small-scale traffic data detection challenges have been successfully tackled by these methods. Performance of classic intrusion detection methods, however, is facing considerable hurdles in dealing with huge high-dimensional data due to the ongoing advance of network technology and the ongoing expansion of network scale.

Representing representation learning, deep learning can automatically learn high-level data features directly from complex original features, doing away with the requirement for specialized knowledge in the manual feature extraction procedure. As a result, the deep Model architecture is the basis for the vast majority of modern intrusion detection systems. Among the most popular deep models are the autoencoder [18], the convolutional neural network (CNN) [19-20], the recurrent neural network (RNN) [21], etc. Literature [22] proposes to use CNN for network intrusion detection and uses CNN to select features to classify traffic. Compared with traditional algorithms, it has a good effect but ignores the connection in the time sequence of traffic data; Literature [23] proposes to use LSTM (extended short-term memory network) is used in intrusion detection and has achieved good classification results, but without considering the spatial characteristics of the data, there is still room for improvement in classifier performance. To fully extract the

features of network traffic data, literature [24] proposes to use CNN and LSTM in combination, use CNN to learn the parts of network packets, and then use LSTM to learn the details of network traffic, compare with using LSTM, CNN or LSTM alone. The upgraded model is more efficient and produces more accurate results when classifying traffic data. These models rely on large amounts of labelled data samples, even though the neural network model is capable of powerful feature extraction. Still, there is a lot of data that needs labelling, and doing it manually is a costly and time-consuming process.

Reinforcement learning (RL) is an active solution to the aforementioned issues. Traditional RL is based on the Markov decision process (MDP) to create algorithms;however, it can only examine small-scale problems. Moreover, the natural environment is often complex and changeable. Therefore, it is problematic for traditional RL methods to obtain effective solutions when solving practical problems. Literature [25] combines reinforcement learning with deep learning. It proposes deep reinforcement learning (DRL), which approximates the complex data space and mapping relationship in reinforcement learning with neural networks,

significantly expanding the application range of reinforcement learning. This is because coupled with its unique feedback mechanism; reinforcement learning also has aextensive range of applications in classification problems application. Literature [26], for the first time, equates the classification problem to the continuous decision-making process of the agent (agent) and proposes a classification task solution based on reinforcement learning, with an accuracy rate of 87.4% in the eight UCI data sets. Literature [27] proposed an AE-DQN model based on adversarial multi-agents for the problem of network intrusion detection and achieved good detection results. Although the above-mentioned deep reinforcement learning model shows unique advantages in solving the classification problem with imperfect labels, the selection of the deep learning network model cannot Whether the selection of the deep learning model is mainly appropriate determines the classifier's performance. Therefore, the focus of the above models is only on the generation of agent strategies[28-29].

Uneven data is another common issue. The classifier can obtain higher overall classification accuracy, but the recognition rate of smaller class data is meagre, and misclassification of minority classes will bring huge costs. At the algorithm level, by changing the classifier, the existing classifier can strengthen the learning of the minority class[30].

In order to boost the system's detection rate for different types of traffic, this study presents a network intrusion detection model based on the enhanced double Q network. The model incorporates the hybrid network model of CNN and BiLSTM into the learning framework of the deep Q network, simulating the intrusion detection process as the sequential decision-making process of the agent. Improve the classifier's ability to identify different forms of attack flows. Concurrently, an unbalanced processing strategy is offered to improve the detection rate of rare attacks while taking data imbalance into account.

2. CBL_DDQN model based on improved double deep Q network

This paper introduces the mixed CBL model of CNN and BiLSTM into the dual deep Q network framework. To better utilise the CBL network to fit the Q function and the feedback mechanism in the dual deep Q network, a new model for intrusion detection called CBL DDQN is developed. and optimization strategy to optimize the CBL network, and finally, realize the correct classification of traffic.

Network traffic data is a sequence with a time step, which has both spatial and temporal characteristics [13-16]. Because both CNN and BiLSTM are very good at extracting features from input, we create a CNN-BiLSTM hybrid model, the CBL model, by fusing a one-dimensional convolutional network with a bidirectional long-term, short-term memory network (see Figure 1).

The parameters are discretized in the highest pooling layer to shorten training time and prevent overfitting; middle-layer parameters are normalised with batch normalisation to speed up training; and the BiLSTM layer is used to learn onward and rearward time series data. One way to improve understanding is to utilise two BiLSTM layers that each learn at a different granularity. One-dimensional convolutional neural network with long-term time-dependent feature correlation; network layer between BiLSTM layers to extract features efficiently and speed up training; Dropout layer to prevent model overfitting; and Softmax function for probability matrix output.

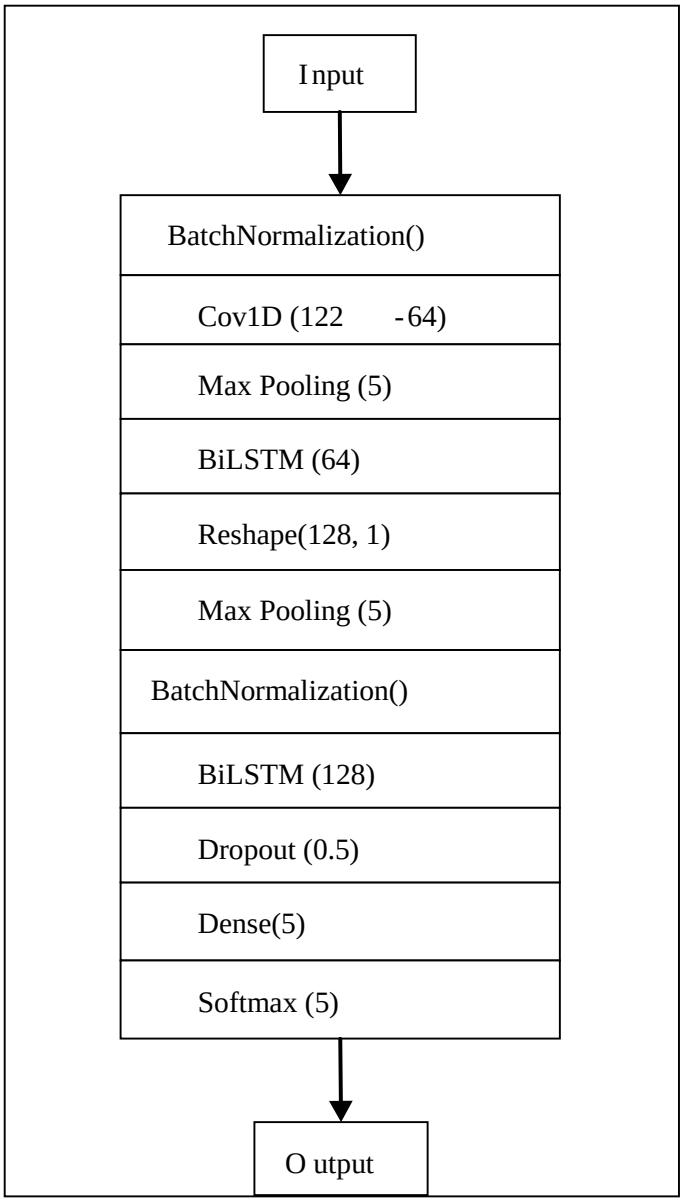

Figure 1 CBL model framework

3. Selection and processing of data sets

4.1 Dataset selection and preprocessing

In this study, the CBL DDQN model is validated using simulation tests on two public intrusion detection datasets NSL KDD and UNSW NB15. Table 1 and Table 2 detail the two datasets, respectively.

Table 1 Attack category information of NSL_KDD dataset

Attack Category	**Quantity**	**Convert Tag**
Normal	077054	0
Dos	053385	1
Probing	014077	2
R2L	003749	3
U2R	000252	4

Table 2 Attack category information of UNSW_NB15 dataset

Attack Category	**Quantity**	**Convert Tag**
Normal	93000	0
Generic	2677	1
Exploit	2329	2
Fuzzers	16353	3
Dos	44525	4
Reconaissance	24246	5
Analysis	58871	6
Backdoor	13987	7
Shellcode	1511	8
Worms	174	9

Data preprocessing mainly includes the following three parts: character feature medicalization, one-hot encoding and numerical normalization.

(1) Numericalization of character features

The category features of standard records and different attack records are converted from character type to digital label, and the label distribution after conversion is shown in Table 1 and Table 2.

(2) One-hot encoding

With one-hot encoding, the distance calculation between components can be more realistic.

(3) Numerical normalization

After one-hot encoding, to reduce the impact of the value of each dimension attribute feature on the subsequent network, each dimension attribute feature is normalized according to formula (18), and the normalized interval is [0,1] :

$$\dot{x} = (x - x\min)/(x\max - x\min) \quad (18)$$

4.2 Experimental results and analysis

In this paper, two network traffic data sets, NSL_KDD and UNSW_NB15, are used for experiments. The details of the dataset are described in Section 3.1. In the experiment, set all the data of the entire training set as one epoch, set the maximum epoch to 30, make statistics on the classification results of the model every five ages of training, and use the control experiment to test the system before and after using the Borderline-SMOTE algorithm. The recognition rate of the data. The classification results after statistical training for 30 epochs is shown in Figure 2 and Figure 3.

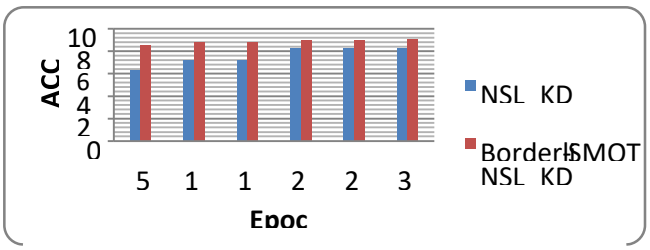

Figure 2 The recognition rate of the model for NSL_KDD

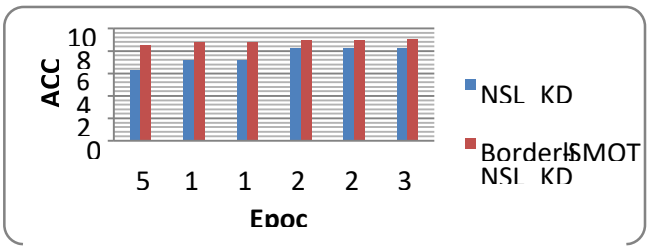

Figure 3 The recognition rate of the model for UNSW_NB15

Figure 2 and Figure 3 show that the classifiers' performances are steadily rising as the training process progresses. If you compare the model introduced with the Borderline-SMOTE algorithm to the same training, you'll see that the latter has a greater classification accuracy. Within a certain threshold of repetitions, the accuracy of the original data set can be directly.

It can be seen visually that the introduction of the imbalance processing algorithm has a more significant role in promoting the convergence of the model.

Accuracy, recall, and precision of six approaches were evaluated to further validate the model described in this research. Table 9 and Table 10 display the statistical outcomes of Adam-BNDNN[18][29], DQN[19][30], RF[19], SVM[19], MLP[19], and Adaboost[20], where the data in bold is the optimal value of this performance index.

For intuition, the data drawn in a bar graph, and the result is shown in Figure 4.

Figure 4 Classification performance of each model for NSL_KDD

Figure 5 Classification performance of each model for UNSW_NB15

With the help of Figure 4, it is clear that the CBL DDQN model suggested in this paper has a substantial detection effect on the NSL KDD dataset. All performance parameters are higher than prior similar studies, with precision at 99.96%, recall at 99.97%, and precision at 99.79%.

Similarly, for the sake of intuition, the data drawn in bar charts, and the results are shown in Figure 5.

Taken together, Table 4 and Figure 5 show that the UNSW NB15 detection results using this paper's model have an overall identification accuracy rate of 90.12%, recall of 95.20%, and precision of 89.93%. On the downside, it does not perform as well as its counterparts. After cautiously considering a number of performance factors, the model suggested in this research is able to produce a good intrusion detection impact.

The above two sets of experimental results demonstrate that the upgraded dual deep Q network model suggested in this paper may effectively address the intrusion detection problem.

4. Conclusion

The purpose of this paper is to present the CBL DDQN network intrusion detection model, which incorporates the hybrid network CBL network of CNN and BiLSTM into the DDQN framework to enhance the model's performance. In comparison to more standard deep learning algorithms, this one reduces or eliminates the need for labelled data. In this way, it outperforms deep learning algorithms in terms of classification accuracy. Moreover, the Borderline-SMOTE technique is used to increase the number of unusual attack samples because of the fact that the disparity between the data makes it hard for the classifier to understand the data features properly. Based on these findings, it appears that the imbalanced processing technique helps the model become more accurate in classifying data.

In conclusion, the suggested model in this paper has good results in the imbalanced data classification challenge. Its overall performance is higher than that of the enhanced DQN network and other deep learning networks, suggesting a novel approach to deep reinforcement learning.

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Controlling Project Execution in the Era of Soft Computing and Machine Learning

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Abstract: During the execution control of their initiatives, organizations use a variety of devices to aid independent direction. Regardless, they are still insufficient in the face of skewed statistics and shifting management approaches. The absence of frameworks for controlling the execution of enterprises has an impact on the nature of their categorization in terms of supporting independent direction. The presentation of soft registering methods, which provide heartiness, effectiveness, and flexibility at apparatuses, is an optional arrangement. This research provides a technique for project execution control based on SoftComputing and ML, which contributes to the executives' ability to further improve the project. The proposed method allows for AI and the replacement of fuzzy inference frameworks in project evaluation. The results are derived from seven calculations involving space apportioning, neural architecture, gradient descent, and genetic algorithms. Adoption of the proposed framework, which has been included in this paper for project personnel, signifies a change in the nature of venture evaluation. The obtained result ensures that the apparatuses are in perfect working order to assist the independent direction in projecting the executive associations.

Keywords: Soft Computing, ML, Project Execution,

I. INTRODUCTION

For project-oriented associations, the proper use of information, processes, procedures, abilities, and equipment is critical to the success of the organisation. Estimating and tracking the development of an effort is made possible in large part by the monitoring and control process [1]. This makes it possible to distinguish between different types of management plans, so that corrective steps can be made as necessary to meet the project's goals. In the context of a company's management team, reconciliation involves coming to daily decisions about where to place the company's assets and efforts, anticipating possible problems so that they can be addressed before they become critical. Developia group of executives that work together as a team with the leader's role as a pioneer and a keen eye for detail is critical to the success of the project. All of the

following should be documented: scope, cost, timeliness, and quality; coordination of activities; and human resources (HR) [2]. An individual who is in charge of overseeing improvement initiatives must have the ability to understand the challenges at hand, differentiate between solutions and take autonomous action, all with the goal of supporting the primary goals of the organisation [3]. PC instruments can be used to assist individuals during the execution and control phases of a project. In this way, it's possible to explain what's going on and propose particular solutions to the problem. It is now possible for project managers to know exactly what action they need to take to solve a specific problem at any given time [4]. As a result of PCs that facilitate autonomous management, which rely on clear and quantitative records, this situation has arisen. Various tools for project managers have been developed during the last many years. Despite this, the majority of these tools don't take into account the treatment of vulnerability, nor the ability to adapt to the needs of different projects [5]. It is possible to complete an execution plan and illustrate the progress of the project through the administration records supported by integrated Project Management. This enables them to discover the root causes of problems so that they may make decisions based on a freshly established set of demands [6]. Multitudinous financial calamities with a large negative impact on relationships are caused by Integrated Project Management errors and deficiencies [7]. Disappointment is common in this field because of the following factors:

- There is a lack of knowledge about good project management procedures.
- Involvement in the management and observation of projects is minimal.
- Problems in dealing with information that is both ambiguous and vulnerable.
- Information gathered by individuals may be out of date if certain members of the project group are no longer in attendance.
- Instrumental flaws in the automated evaluation of projects.
- Instruments of assessment and control that are past their expiration dates in relation to shifting management styles as a result of progress made throughout their continuous improvement [8].

ML can be used as an alternative solution to the previously described concerns. Measurements, rationales, calculations, brain organisation, hypothetical data, man-made consciousness and soft registration are all intertwined in this interdisciplinary field of study [9].

Some of these challenges can be addressed by utilising a project execution control technique that takes into account the sensitivity of registration and artificial intelligence (AI) [10]. As a means of assisting project-based groups in their own self-governance, the suggested structure is projected to provide several benefits. Investigative zeal and down-to-earth dedication are centred on the following perspectives:

- The use of AI in project execution control, increasing the heartiness, variety, and harmony between the force of expectation and the understanding of project management tools.
- Free ware that includes a few soft AI registering methodologies and trial and error of frameworks for the evaluation of project performance will be used to further develop the Analysis. Pro.SC.PMC library [11].

II. LITERATURE REVIEW

A. *Project Management Best Practices:*

Schools or institutions dedicated to the formalisation of association approaches develop Project Management as a discipline. The PMBOK criteria [9], the ware Engineering Institute (SEI) with the Capability Maturity Model Integration (CMMI) [5], the International Project Management Association (IPMA) [12], and criticism, identify ambiguous or unsettled circumstances, and encourage continuous improvement. It suggests that records related to the information categories of Scope, Cost, Time, and Quality be used for this. It oversees the treatment of vulnerability in project

the International Organization for Standardization (ISO) with its guidelines 10006 and 21500 [13] are among these organisations.

The PMBOK recommends monitoring project execution throughout its life cycle in order to provide constructive

gambles, as well as future usage investigation for cost estimation and undertaking plan executives [14].

The importance of PC apparatuses as a support for decision-making in the undertaking improvement group was discovered by CMMI. It oversees process streamlining inside the organisation at level 5, with a focus on continuous improvement in the presentation of cycles through innovative and incremental modifications. It suggests that businesses should periodically renew the meaning of their cycles in order to include the most recent changes made by the organisation into standard cycles when they benefit [15]. The ISO 10006:2003 and 21500:2013 recommendations provide instructions for project directors to supervise quality during project improvement. They are in charge of the estimation and investigation processes, as well as the ongoing development of the project's execution. They advocate for the management of risk associated with spending as well as the control of the project plan. In [16] it is stated that the association's project management processes and techniques should be enhanced based on previous experience, rather than recommending radical changes. It ensures that during the project, the executives provide excellent independent direction at all levels of the organisation [17].

B. Records used to assess the project:

This investigation makes use of a number of project management documents that have been determined in accordance with [18]. These records reflect the project's execution in terms of the PMBOK guidelines and CMMI's basic information regions (see Table.1).

TABLE.I: RECORDS ESSENTIAL TO PROJECT PLANNING

Records	**The executives' information regions of the undertaking**
IEP: Index of Execution Performance	Executives' authority and responsibility
IPP: Index of Plan Performance	Making the most of your time
ICE:Index of Cost-Effectiveness	Expense management
VPI: Viability Performance Index	Extension and administration of high grade
HRPI: HR Performance Index	Executives in Human Resources
PIC: Performance Index Calculated	An administration that is calculated
IIQ: Index of Information Quality	Consistency of data

C. In Project Management, Soft Computing and Machine Learning Applications

With the ultimate goal of achieving appropriate administration, heartiness, and greater proclivity with reality, soft registering strategies monitors resistance to the dubiousness, vulnerability, and imperfect reality of realities [19]. Soft registering entails a variety of computing philosophies, including fluffy logic, brain network hypothesis, probabilistic thinking, and transformational calculation, to name a few [20].

Using information and collected understanding, soft registering strategies provide PC apparatuses with a way to interact with human thinking. Furthermore, they enable independent direction by increasing efficacy, adaptability, and an acceptable balance between force of expectation and understanding. These tactics are effective in situations where there are numerous information sources and there is a high level of resistance to information imprecision; they allow for minimal cost setups and a higher demonstrating limit. A few studies have suggested possible arrangements for project executives based on AI, information mining, computerised reasoning, and soft registering. However, when compared to other application areas, explicit utilizations of these tactics in project directors are somewhat low. A few related works are listed below. In [21], a method based on soft registering is given for categorising projects into three categories: simple, medium, and difficult. In [17], a record structure is built to evaluate the project leaders' presentation in terms of quality, cost, time, and risks. In [22], a fluffy derivation framework is presented to determine the record that analyses the undertaking execution by combining two information sources obtained by the research of substantial worth: expense execution and arranging execution. A model based on ANFIS [23] is presented in [14] to assess product exertion. [24] introduces a framework based on brain networks for utilising the authoritative undertaking the executives development model. [25] proposes a fuzzy derivation framework for evaluating the success of programming project administration. Some of the researches are using machine learning techniques[26,27] for classification and predictions for many applications.

In general, the following characteristics are not included in the profiles of experts investigated:

- The application of artificial intelligence (AI) techniques.
- A shift in the assessment framework, as evidenced by the association's continued improvement.
- The model must be reconciled with the project's executive apparatuses.
- Free programming is used to run the model.
- The recommended solution will be used to evaluate the project's implementation.

A technique is presented as a solution to the concerns that have recently been raised. It employs a number of computational methodologies to assist organizations with task execution control and decision-making.

III. EXECUTION CONTROL TECHNIQUE FOR PROJECTS

An administered learning methodology is used in the suggested strategy to change the bounds of the fluffy derivation frameworks. Learning is based on a number of accomplished initiatives, the mathematical advantages of which are understood via essential administration records and the assessment offered by association specialists. A set of preparing cases and a set of approval cases are derived from this basis of activities [28]. Extricate the informative gathering from the completed undertakings data set; apply multiple AI procedures; and use comprehensive quantifiable measurements to determine the framework that best assessments the activities execution in the association, as shown in Figure 1. The suggested technique uses a set of records as input and produces a fluffy derivation framework for project evaluation as a result. This instrument is more than likely to be finished when top management determines that stated evaluation framework has to be updated as a result of the association's consistent improvement in management styles.

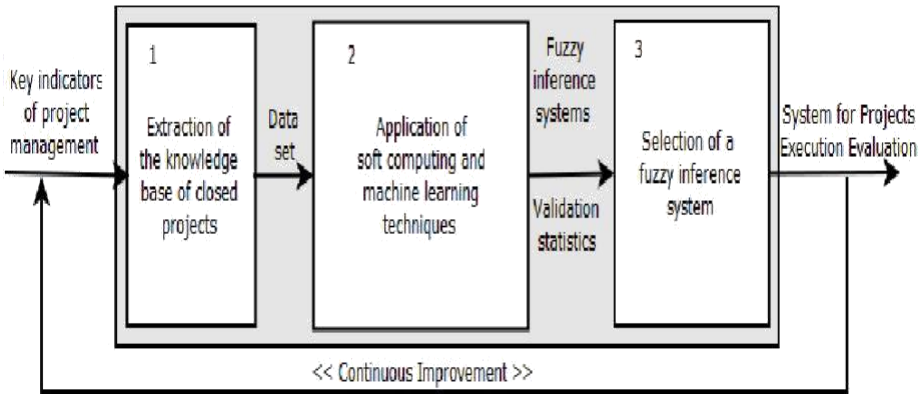


FIGURE.I: PARTS OF THE PROJECT EXECUTION CONTROL APPROACH.

Part 1) Entries to this square are compared to the project executives' records, which are then decided and stored in the association data base. It goes without saying that the use of the records mentioned in Table 1 is recommended. The finished project information base is advised, getting the pre-determined records and the master assessment to the undertakings, which will operate as case preparation. As a foundation for the age and streamlining of fluffy guidelines using AI, this wellspring of data capabilities. To get the preparation and approval sets, the foundation of pre-characterized undertakings is haphazardly divided into numerous allotments. These allotments are then utilised to execute cross-approval between each procedure's studies.

Part 2) Experiments are carried out to register and AI processes for delicate it. The delicate it is made sense of to record tactics in the following section. The following information is saved in the data set for each investigation: fluffy derivation frameworks established, name of the technique used, learning bounds, a measure of rules created, and the aftereffects of elements for measuring the nature of evaluation [29]. Correct Classifications, False Positives, False Negatives, Mean Square Error (MSE), Root Mean Square Error (RMSE), and Symmetric Mean Absolute Percentage Error (SMAPE) are the approval metrics, as shown in Equations 1, 2, and 3.

$$= \frac{1}{} \quad (\quad -)^2 \ldots\ldots\ldots(1)$$

$$=1$$

$$= \quad \overline{\quad} \ldots\ldots\ldots(2)$$

$$1 \quad -$$

$$=100* \overline{\quad} \quad \overline{\quad} \quad (3)$$

$$+$$

$$=1 \quad 2$$

Where m is the count of instances, is the average result value, and is the framework-determined result.

Part 3) Statistical tests are carried out and the best fluffy derivation framework is selected. For this, the effects of delicate registration methods are considered in terms of the type of evaluations, using measures obtained in part 2, which allow obtaining the accuracy of calculations done. These estimates are subjected to Friedman and Wilcoxon tests

of completed projects to ensure constant improvement of the proposed framework. This update may be issued when administrators believe it is necessary for the organization's continued growth [31].

A. The Proposed Method Makes Use of Delicate Computing Techniques

For the transformation and AI of the framework that examines the undertaking execution, a few calculations were used as the technique. The following is a collection of sensitive registering techniques that have been used in practice.

W.M. (Wang and Mendel). This method generates a slew of new fluffy principles and refines them using a space segment methodology [32]. The five stages of the educational experience are as follows.

i) Separate the passage and leave voids of mathematical knowledge, which is

vi) .

base
supplied in fluffy districts, referring to the etymology phrase for time intervals.

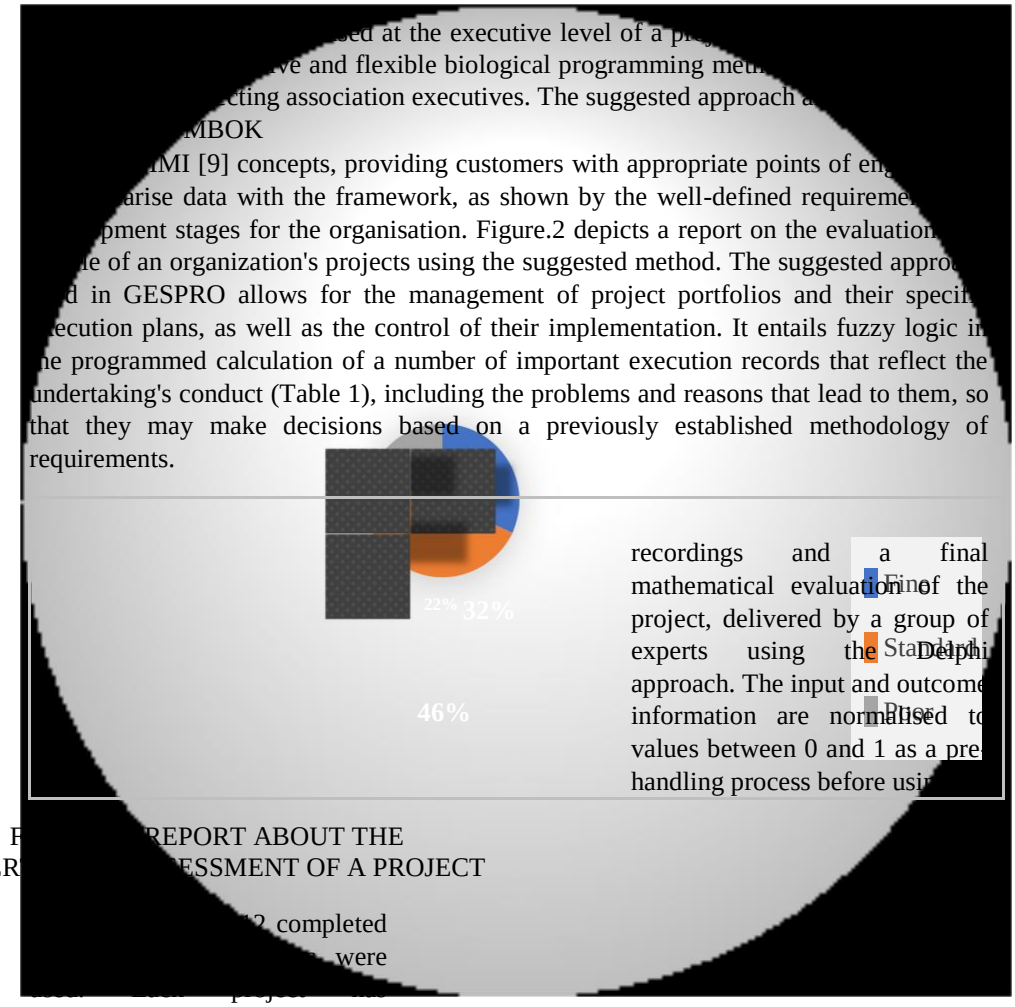
ii) Create fluffy principles based on the preparatory instances, determine the degrees of having a location with fluffy sets for each case, and choose the etymological word with the highest degree in each variable.

iii) Assign a degree of importance to each standard developed, with the goal of resolving conflicts between created regulations.

iv) Construct a consolidated rule basis based on the guidelines and etymological concepts presented.

v) After discarding the repetitious and those with the lowest grades, create a final rule foundation

IV. RESULTS



ed at the executive level of a pr
ve and flexible biological programming meth
cting association executives. The suggested approach a
MBOK
MI [9] concepts, providing customers with appropriate points of en
arise data with the framework, as shown by the well-defined requireme
pment stages for the organisation. Figure.2 depicts a report on the evaluation
e of an organization's projects using the suggested method. The suggested appro
d in GESPRO allows for the management of project portfolios and their specif
ecution plans, as well as the control of their implementation. It entails fuzzy logic in
he programmed calculation of a number of important execution records that reflect the undertaking's conduct (Table 1), including the problems and reasons that lead to them, so that they may make decisions based on a previously established methodology of requirements.

recordings and a final mathematical evaluation of the project, delivered by a group of experts using the Delphi approach. The input and outcome information are normalised to values between 0 and 1 as a pre handling process before usi

F REPORT ABOUT THE
UNDER ESSMENT OF A PROJECT

2 completed
were

advantages of information

TABLE.II: THE DATA SET THAT WAS USED TO TRAIN AND VALIDATE

1	50	49	2	59	52	1	70	3
2	23	30	95	1	51	1	31	2
3	51	51	96	11	80	1	55	4
4	40	49	97	65	51	1	55	4
...	…	…	…	..	..	…	…	...
212	24	24	94	1	2	1	3	2

An informative collection with the content is used for learning: 68 projects rated as Fine (32%), 97 projects rated as Standard (46%), and 47 projects rated as Poor (22%); it does not include invalid or out of reach values to follow the distribution. The informative gathering is hastily divided into 22 discrete allotments. Each section is responsible for preparing 76 percent of the 212 cases and approving the remaining 25%. The cross-approval approach uses these allotments to undertake 22 executions of each soft computing operation. The results obtained from each procedure in each of the 22 information allotments allow for consideration of the presentation of calculations, taking into account the following factors: percent of correct characterizations, number of misleading up-sides, number of bogus negatives, MSE, RMSE, and SMAPE. The following , and pleasing manner, increasing the character of client life, thanks to the offered approach [28].

is a summary of the effects of the different kinds of approvals used in this investigation. Figures.3 and 4 depict the behaviour of seven computations related to % of correct characterizations and SMAPE. It's easy to observe that ANFIS produces the greatest results [17].Finally, using the Wilcoxon test, it was possible to confirm that the ANFIS approach delivers much better results than the rest of the computations and provides the optimum framework for evaluating projects [18]. An assortment of 6 organisations and 15 programming advancement centres profit from the reconciliation of the suggested method at the GESPRO stage, where around 312 projects are supervised every year. The instrument has an average of 6500 users, all with different levels of expertise and professions. Decision-making with the help of GESPRO is finished in a necessary, light-footed

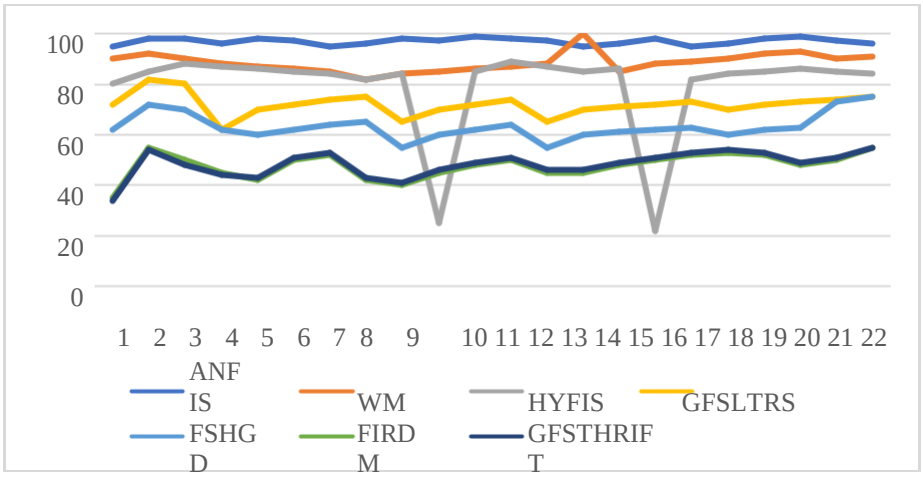


FIGURE.III: PERCENTAGE OF CORRECT CLASSIFICATIONS OBTAINED FOR EACH PROCESS ON THE 22 TEST INFORMATIONAL COLLECTION ALLOTMENTS.

Another advantage of the suggested method is the use of free programming as a need for achieving inventive power, which ensures authoritative progress in a broad and sustainable manner [27]. This legislationis advanced and mirrored by the computational climate and capabilities built on open-source programming developments. This implies the following advantages for the executive instrument: complete control of functionality, timely detection and correction of errors, and constant improvement in light of cooperative occurrences [3].

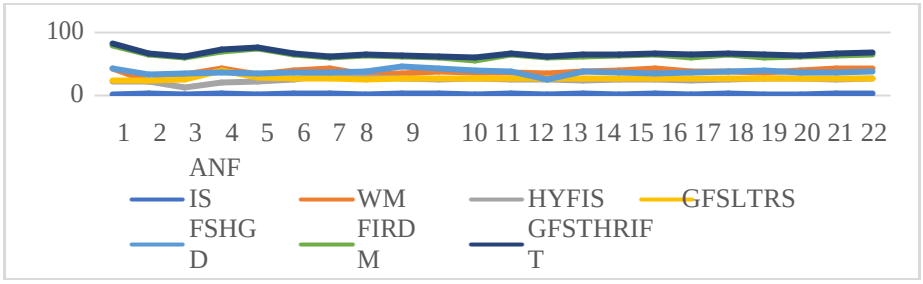


FIGURE.IVEVERY METHOD ON THE 22 ALLOTMENTS OF THE TEST INFORMATIVE GATHERING YIELDED A SYMMETRIC MEAN ABSOLUTE PERCENTAGE ERROR.

Finally, the influence of the proposal, from a financial standpoint, is dependent on investment money, which proposes making better decisions based on data provided by the suggested approach to regulate the undertaking execution [31]. In addition to preserving assets, sending forth labour and goods that are beneficial to the progress of society as a whole.

CONCLUSION

Project execution control is a perplexing position that involves scepticism in concepts and fragility in data, a situation in which the use of careful registration processes yields excellent results. The suggested technique employs these processes in project evaluation, increasing the heartiness, adaptability, and harmony between the executive apparatuses' force of expectation and comprehension. It also makes it possible to secure information about experts in organisations and to accomplish a good project execution control. The use of artificial intelligence (AI) for project evaluation increases a company's ability to adapt to changing management styles as a result of its growth and continuous improvement. With the development of the AnalysisPro.SC.PMC library based on free programming and including important records for project executives, a commitment has been made to the enhancement of current choice aid instruments used by projects.

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E-Commerce and B2B Services

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Abstract – **with its great explosion and the advancement of related technology and services, such as the World-Wide-Web (WWW), the Internet has provided a rich environment for building Internet-based electronic commerce (e-Commerce) applications. The growth of e-commerce has been phenomenal and it is radically transforming the way companies are doing business in all sectors-ECommerce has become an increasingly important source of competitive advantage for B2B companies. It enables them not only to decrease transactional costs and offer wide range of additional services, but also to enhance efficiency in collaboration with their customers and suppliers. Thus, the objective of this paper is to explore how industrial companies use B2B E-Commerce, how it enables their services and what are the main advantages. In the context of continuous increase of the services role in B2B markets and rapid development of information technologies, the paper turns high practical and theoretical importance for business environment. The paper can also support companies in decision making on E-Commerce investments strategy.**

Keywords- B2B E-Commerce, B2B E-Commerce strategy, services in B2B market, types of B2B E-Commerce, international perspectives of B2B E-Commerce, IT technologies, E-Services, Services.

I. INTRODUCTION

Since the last decades e-commerce has become an increasingly important source of competitive advantages. The opportunities of e-commerce enforce managers to redesign business processes and even to rethink the existing business models and the relationships with their business partners. Many different empirical findings demonstrate that ECommerce enables companies not only to decrease transactional costs and to offer additional services, but also to gain efficiency in supply chains and enhance collaboration with their customers and suppliers. Especially, business-to-business (B2B) e-commerce may support services broadly offered by companies in B2B markets.

In the context of globalization of economy, continuous increase of the role of services in B2B markets and rapid development of information technologies this topic is considered to be of high practical and theoretical importance for business environment. Though nowadays in business literature the number of publications and research papers, devoted separately to e-commerce and B2B markets of goods and services is rather high, The role of e-commerce in the review on how such companies use e-commerce may summarize the knowledge in both fields. It provides a structured knowledge on B2B e-commerce based on the existing literature and can be interesting as a starting point for young researchers. B2B e- commerce is analysed not isolated, but the paper establishes the links and emphasises interdependences to the related fields of management science and hence can generate a broad understanding of the topic. Furthermore, the article may also have an impact on business practice. For the executives, who expect to implement e-commerce in their companies, this research represents a useful reference to getthe first insights and broad theoretical background on this topic and provides different illustrative examples.

Hence, the main objective of this paper was to explore how industrial companies use B2B e- commerce, how it enables their services and what are the main advantages for their businesses. In order to achieve this goal the following tasks were defined:

to build an understanding of B2B markets

to distinguish the opportunities from using e-commerce

to provide a way to evaluate e-commerce opportunitiesfor existing business strategies.

Based on the main objective and the tasks, the paper was divided into four sections. At first, the theoretical background on B2B markets is reviewed. It research represents a useful reference to getthe first insights and broad theoretical background on this topic and provides different illustrative examples.

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Based on the main objective and the tasks, the paper was divided into four sections. At first, the theoretical background on B2B markets is reviewed. It includes the characteristics of B2B markets, procurement process and relationship marketing as the basis for further investigations. After that, a review on B2B e-commerce, main types, trends and opportunities are provided in detail

II. B2B MARKETS: THEORETICAL FRAMEWORK

In general terms B2B can be defined as firm's interaction with other firms, comprising suppliers, distributors, agencies and customers [1]. More concretely, B2B markets are about buying goods and services in order to use them in development, creation and delivery of own products and services or to resell to others [2]. Though, business-to consumer (B2C) markets in business literature and at universities are predominantly discussed

In the proposed model by Morgan and Hunt, the relationship is based on trust and commitment. They define commitment as enduring desire to maintain valued relationship and believe in relationship. It is necessary that both parties believe that the relations are important and want to endure relations indefinitely. Morgan and Hunt define trust as the status, where one party has confidence in the reliability and integrity of the other partners and vice versa. They posit, that can be reached if companies or networks provide "resources, opportunities and benefits that are superior to the offering of alternative partners; maintaining high standards of corporate values and allying oneself

Private industrial networks are owned by a single, often a leading company in industry. It sets the rules, establishes control mechanisms and invites firms to participate in its network. Private industrial networks focus on strategic direct goods and services and are interested in long-term relations. They can be defined as "extendedenterprises", as this webenabled network oftrans- organizational processes is closely tied to the existing ERP System of industrial company [19]. Private industrialnetwork makes sense when there is an opportunity forcompetitive advantages and there is no public or industrysponsored marketplaces or they are with exchange partners having similar values and communicate valuable information, including expectations, market intelligence and evaluation of the partners performance and avoiding malevolently taking advantage of their exchange partners" [Morgan and Hunt, (1994), p.34].

Another interesting model was proposed by Möller and Hallinen (2000). The authors propose to divide marketing relationships into two levels: relationship based on markets (for example, can be used for indirect goods) and relationships based on networks (for example, can be used for direct goods). Figure 2 illustrates this idea.inefficient [17]. Manyglobal players, market-leaders are operating privateindustrial networks, such as GE, Nike, Wal-Mart, etc. Today private industrial networks form the largest part of B2B E-Commerce. For example, some years agoVolkswagen Group introduced the Group BusinessPlatform as a tool for communication and cooperation with its suppliers in order to optimize processes and improve thequality level. The goal of the company was not just to findpartners, but also to integrate their suppliers into all business processes, such a procurement, logistics, quality, technical development, and sustainability [20].

and analyzed, there is a number of characteristics and special features that differ B2B from B2C [3]:

- business customers will purchase just the products they really need and which can increase the value of their own products;
- the relationship is more complex and long-term oriented;
- marketing communication is professional and deep;
- purchasing processes are multistage.

Based on these special characteristics, it reveals, that it is crucial to examine B2B markets separately. The main topics to be discussed are supply chain management (SCM), especially buying process and relationship marketing.

A. Characteristics of B2B markets: B2B vs. B2C

Traditionally, two generic types of markets may be distinguished: consumer markets and business markets, whereas the latter include industrial markets or B2B, business-to-government (B2G) and non-profit organization markets. In general terms B2B can be defined as firm's interaction with other firms, comprising suppliers, distributors, agencies and customers (Vagro and Lusch, 2011). B2B markets are networked organizations operating in a complex environment (Kotler et al., 2009). The management target of the companies is to understand the business buying processes and to build profitable relationships with business consumers by creating additional value (Kotler and Armstrong, 2010). More concretely, B2B markets are about buying goods and services in order to use them in development, creation and delivery of own products and services or to resell to others (Kotler and Armstrong, 2010).The knowledge and understanding of B2B can be really important from different perspectives. Taking for example the ranking of 'Fortune 500', the number of consumer (B2C) and industrial companies (B2B) presented in this list is almost equal. In German The role of e-commerce in B2B markets of goods and services 45 speaking countries especially industrial companies play an important role for the whole economy of the region (Fauska, 2012). And finally, the market volume of B2B is much higher than the one of consumer markets (Kotler and Armstrong, 2010). Hence, before analysing B2B e-commerce it is important to understand the main characteristics of business markets. They can be summarised in three blocks:

- market structure and demand
- nature of buying customers
- decision process.

In comparison to consumer goods markets, business buying process in B2B markets is very complex. It involves large sums of money, technical and economic considerations of all stakeholders, including their own interests, at different levels of organization. In B2B markets buyers and sellers are more interdependent and

work closely together during all the stages of buying process. Moreover, the buying process could create additional value for the partners (Kotler and Armstrong, 2010). According to these features the main differences to B2C, which should be taken into account while analyzing B2B, are the following

- business customers will purchase just the products they really need and which can increase the value of their own products
- the relationship is more complex and long-term-oriented
- marketing communication is professional and deep
- purchasing processes are multistage
- procurement manager buys goods not just for the company, but also in order to present himself, his promotion or bonus can depend on his decision and negotiation skills..

Based on special characteristics of B2B markets, it reveals, that the main topics to be discussed on B2B are supply chain management (SCM), especially buying process and relationship marketing. These two concepts must be reviewed before analysing the opportunities of B2B e- commerce.

B. Procurement Process in B2B Markets

Procurement process as part of SCM can be described as the way firms purchase goods or services they need to produce their own products, which will be sold to

end-customers. As illustrated in Figure 1, business buying process consists of several complex steps that involve not only sellers, buyers and intermediaries, but also different organisational levels and departments in a series of connected and interdependent transactions. That is obvious, that during each phase of the purchasing process the transactional costs occur. The first four steps concentrate on decision where to buy and what to pay for a product. The next steps involve carrying out the purchase formalities. At the end the analysis of the process may be done. This process is described for a one-to-one relationship between buyers and sellers. In B2B market there are many of such relationships and sets of connected processes. The set of firms, which are linked through a series of transactions refer to the supply chain (Laudon and Traver, 2011).logistics, IT, and procurement. That could ensure long-term relationships between the companies.

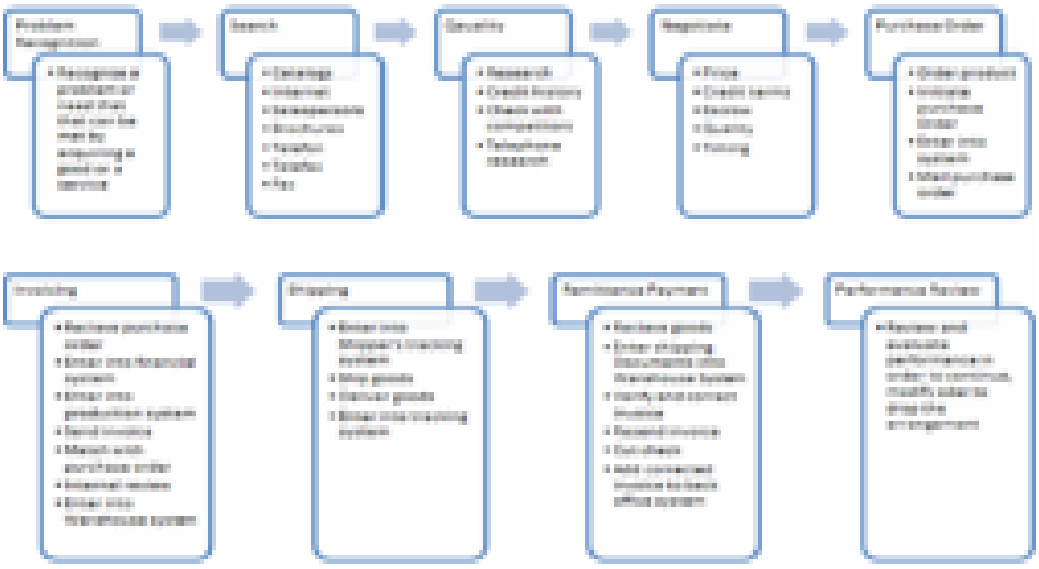

Figure 1 Procurement process in B2B markets (see online version for colours)

C. Relationship Marketing in B2B Markets

During the analysis of B2B markets attention should be paid to relationship marketing. During the last decades a number of essential changes took place in B2B markets, which reinforced the importance of strong relations between business partners. The importance of services has increased dramatically. Quality management has become a topic of high priority, so companies need to involve suppliers as well as customers into their quality management programmes to maintain competitiveness in the market. The development of information technologies facilitates closer interactions between companies. The interactions are getting more complex and even the borders of a company may be blurred (Koutsch, 2003).

As defined by Morgan and Hunt (1994, p.34), "Relationship marketing … refers to all marketing activities directed toward establishing, developing, and maintaining successful relational exchanges,…, involving suppliers, lateral organizations, customers, or one's own employees or business units". Relationships with customers appear to be one of the most important competitive advantages of industrial companies. That is caused by the specific characteristics of B2B markets, such as limited number of partners, constant interchanges between companies, closer collaboration in order to find the best solution for existing problem. Based on these features of B2B markets, it is essential to build strong relationships with partners in order to succeed. As stated by Anderson and Narus, companies cooperate with each other in order to achieve common goals. The outcome from collaboration may exceed the results, which companies could achieve if they were operating isolated (Anderson and Narus, 1990). Morgan and Hunt (1994, p.34) also mention that, "effective competitor in today's global marketplace requires one to be an effective cooperator in some network of organizations". Already in year 1991, Drucker (1991) named the economy of the future as 'network society'. Moreover, according to Prahalad and Ramaswamy (2000), nowadays the focus is shifted from key competences of one company to key competences of a network.

Strong long-term relationships may help companies to support each other in three directions (Koutsch and Smirnova, 2004):

- economical (by cooperating in making investments, cost reduction programmes)
- strategic (developing key competences, knowledge and other intangible assets)
- behavioural (sharing common values, culture and goals, using social networks of each other).

In the proposed model by Morgan and Hunt, the relationship is based on trust and commitment. They define commitment as enduring desire to maintain valued relationship and believe in relationship. It is necessary that both parties believe that the relations are important and want to endure relations indefinitely. Morgan and Hunt define trust as the status, where one party has confidence in the reliability and integrity of the other partners and vice versa. They posit, that can be reached if companies or networks provide "resources, opportunities and benefits that are superior to the offering of alternative partners; maintaining high standards of corporate values and allying oneself with exchange partners having similar values and communicate valuable information, including expectations, market intelligence and evaluation of the partners performance and avoiding malevolently taking advantage of their exchange partners" [Morgan and Hunt, (1994), p.34].

Another interesting model was proposed by Möller and Hallinen (2000). The authors propose to divide marketing relationships into two levels: relationship based on markets (for example, can be used for indirect goods) and relationships based on networks (for example, can be used for direct goods). Figure 2 illustrates this idea.

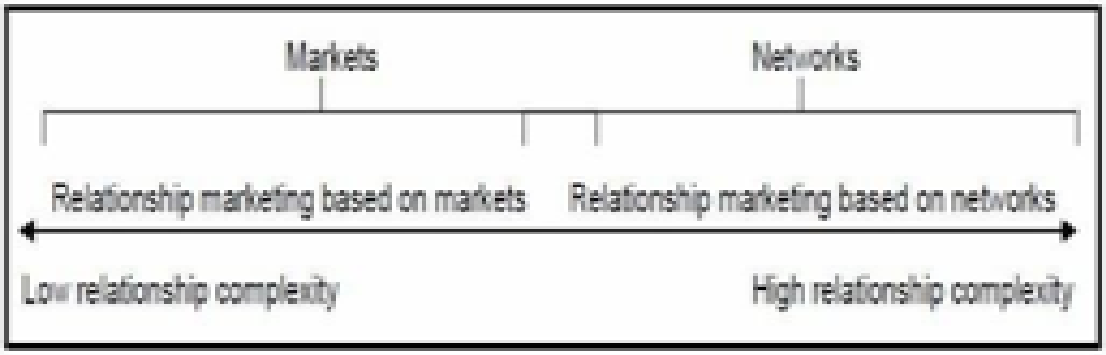

Figure 2 Two main forms of relationship marketing

The main characteristics of marketing relations based on markets are described as (Möller and Hallinen, 2000):

- focus on individual customer relations
- huge number of consumers
- low level of interdependences
- product or services can be easily replaced or substituted
- sellers are ore active than buyers
- focus on a number of interactions and less on the long-term relations
- emphasis on managerial, economic and psychological aspects of exchange.

III. B2B E-COMMERCE: THEORETICAL BACKGROUND AND MAJOR TRENDS

In business practice and among academics there are still some discussions concerning the definition of e-commerce. So it will be important to set a working definition for this paper. Within this article e-commerce will be defined as the use of the internet to transact business, digitally enabled commercial transactions between and among organisations and individuals (Laudon and Traver, 2011).

As nowadays e-commerce is still developing, new variants of existing types of e-commerce may appear. For example, B2G e-commerce can be defined as a part of B2B cooperating with government. Additionally, there are two more fast growing types of e-commerce based on technological distinction:

- peer-to-peer (P2P) e-commerce enables the internet users to share files and other information directly without any intermediary (Laudon and Traver, 2011)
- mobile commerce (M-commerce) is based on use of wireless digital devices, such as netbook, smartphones to transact on the web (Becker et al., 2012).

As working definition of B2B e-commerce for this research, B2B e-commerce will be defined as B2B commerce, which is enabled by the internet (Laudon and Traver, 2011). More concretely, "B2B e-commerce refers to substitution of computer data processing and internet communications for labor services in the production of economic transaction" (Luckey-Reiley and Spulber, 2001).

A. Evolution of e-technology in B2B e-commerce

In order to understand B2B e-commerce mechanisms better, the evolution of e-technology will be introduced in this part of the article. B2B e-commerce has gone through several technology driven stages, which are illustrated in Figure 3.

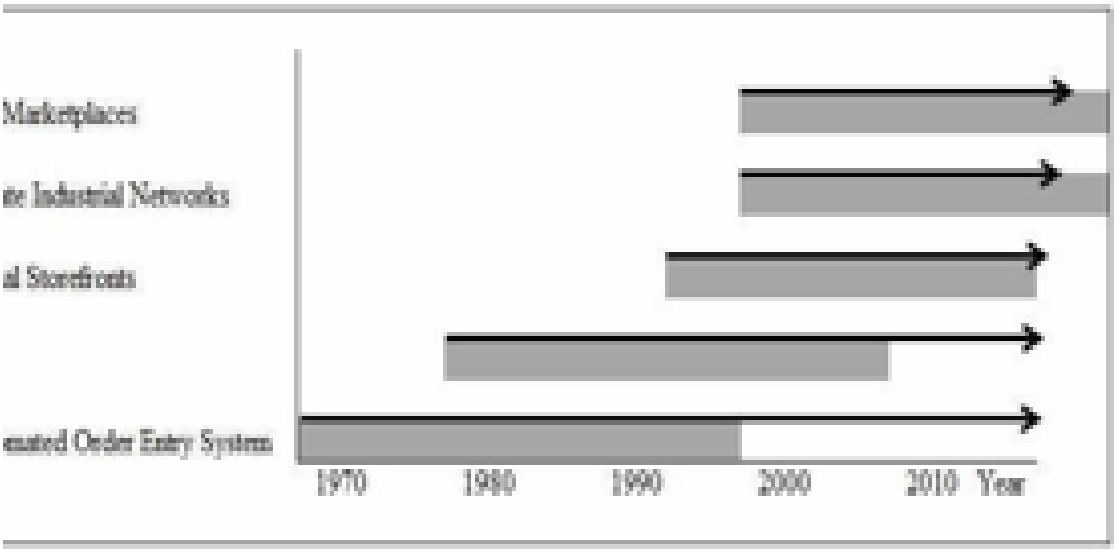

Figure 3 Evolution of the use of technology platforms in B2B e-commerce

In the late 1990s net marketplaces and private industrial networks emerged. They enabled to overcome the limitations of the previous e-technologies. Net marketplaces bring together a huge number of suppliers and purchasing firms together into a single digital marketplace operated over the internet (Zhang and Bhattacharyya, 2010). They can be defined as networked information systems that serve as infrastructure for information exchange and other transactions connected with buying or selling processes (Varadarajan and Jadaw, 2002). Net marketplaces are transaction-based and support many-to-many relationships. B2B net marketplaces boomed dramatically at the end of 1990 and beginning of 2000. Though that was a peak time for Net marketplaces, many of them still exist nowadays (Zhang and Bhattacharya, 2010).

In contrast, private industrial networks are the internet-based communication environment that enables business partner not just to buy or sell goods and services, but also to collaborate with each other, they are relationship-based. They encompass collaboration in products development and manufacturing, marketing activities, inventory management, and etc. Private industrial networks are owned by buyers. Nowadays this form of B2B e-commerce is the most prevalent (Laudon and Traver, 2011).

B. Types of B2B E-Commerce: Net Marketplaces and Private Industrial Networks

In literature on B2B E-Commerce there are different classifications of B2B E-Commerce. Nevertheless, the most often used criteria for classification is a number of agents (buyers and sellers involved into transactions), the characteristics of markets where company operates (vertical or horizontal) and the nature of buyer and seller relationships (either long-term orientated or transaction-based). Different authors name the types of B2B E-Commerce in a slightly different way, though the main idea is mostly the same (based on the criteria mentioned above). In this paper, the classification, proposed by Laudon and Traver [4] in their textbook on E-Commerce, will be reviewed and analyzed. Following this classification B2B E-Commerce can be generally classified into two types: net marketplaces and private industrial networks. The both types and subtypes of B2B E-Commerce will be discussed subsequently.

Net marketplaces bring together a huge number of suppliers and purchasing firms together into a single digital marketplace operated over the Internet [11]. As it is demonstrated in Fig.3, net marketplaces can be classified based on two parameters, “what businesses buy” (manufacturing/direct goods or operating/indirect goods) and “how businesses buy” (focus on spot purchasing or longterm relations) and reflects horizontal markets or vertical markets.

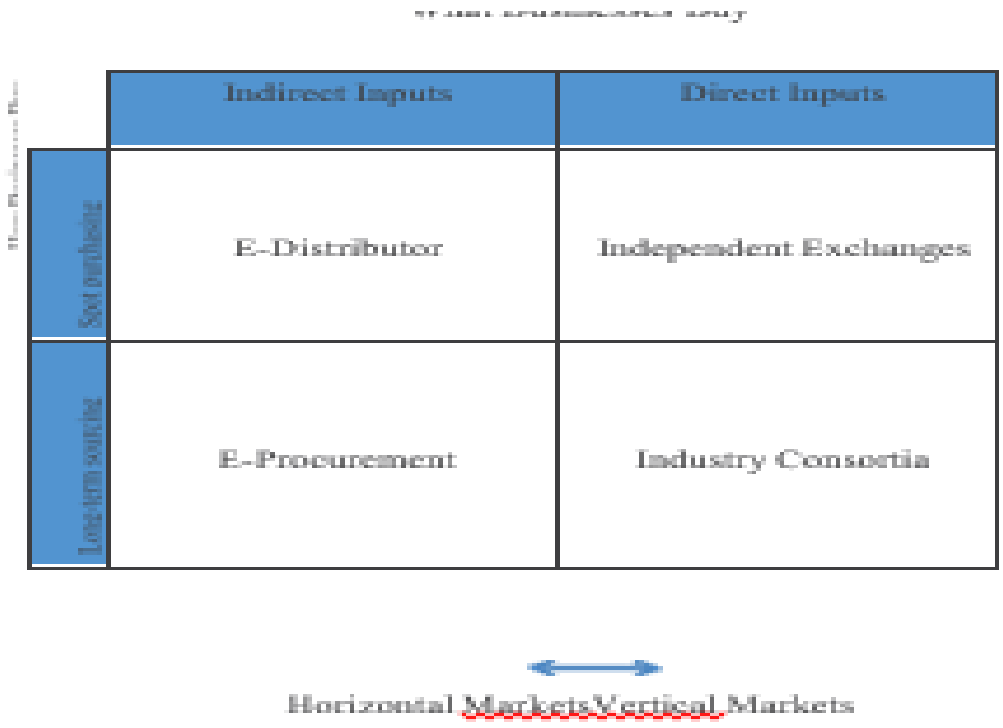

Figure 4. Four main types of net marketplaces [4].

Net marketplaces can be divided into four main types: Edistributors, E-procurement, independent exchanges and industry consortia [4]. Sequentially, these four subtypes of ECommerce will be described and illustrated with examples.

E-Distributors represent the most common and the easiest form of net marketplaces. They simply link suppliers and buyers together, playing a role of traditional intermediary [12]. Often E-Distributors represent the existing "brick-and-mortal" companies, which trade via catalogue and now shift a part of their business online [10]. American company Grainger.com represents an illustrative example for E-Distributor. Grainger is a leading distributor for MRO in the U.S.A. It works with more than 3,000 suppliers and has access to about 2 million customers in

157 countries. Though Grainger was founded as a "catalogue sales business", it recognized the opportunities of technological changes rather early. In 1996 Graiger.com provided the first transaction capable web site in the industry. On the web site of Grainger customers can easily search and compare products, create personal lists, review orders. All these features allow customer to reduce paper work and consequently administrative costs [13].

E-Procurement net marketplace is an independent intermediary which links many sellers and a huge amount of buyers together. This type of marketplaces is usually used for purchasing indirect goods on long-term basis. The value of goods sold by E-Distributor is relative low, whereas the transaction costs concerning these products are relative high due to purchasing frequency. So E-Distributors may add value to buyers by increasing efficiency in procurement [14]. For instance, Ariba.com is operating in this way. Ariba offers not only a network for buyers and sellers, but also a great number of specific customized services, such as management information and communication tools within the system. They may include reporting, automated messaging, and web meetings. As described in this example, E-Procurement net marketplaces add value for both parties, which are involved in the process [15].

Independent exchanges connect many buyers and sellers searching/selling direct goods on spot term in real time environment. They serve vertical market within single industry. The main advantage for buyers is lower prices due to strong competition in independent exchanges. Sellers benefit by receiving an easy access to potential customers [4]. Smarterwork.com can be named here as a very interesting example. Smarterwork illustrates this kind of net marketplaces, which offers mostly services. Smarterwork specializes on linking companies and qualified service providers together. They provide staff for a concrete project and their own facilities, like PC, software and office space. As soon as the project is over the contract between employee and the company will be also ended. It means that the company can save fix costs on personnel dramatically [16].

Industry consortiums are owned by groups of industrial companies. They serve vertical markets and bring together a great number of suppliers with a small number of very large buyers. They are used to form long-term relations for purchasing direct goods. The main goal of

industry consortium is to unify supply chains within the whole industry, across many tires through common data definition, network standards and common platforms [17]. GHX.com represents an illustrative example for industry consortia. It is a consortium for medical services suppliers. They bring companies from healthcare industry together to create new efficient processes and reduce errors in the healthcare supply chain. GHX customers can save money by connecting to GHX and using complementary software solutions to automate procurement processes [18].

Private industrial networks are owned by a single, often a leading company in industry. It sets the rules, establishes control mechanisms and invites firms to participate in its network. Private industrial networks focus on strategic direct goods and services and are interested in long-term relations. They can be defined as "extended enterprises", as this webenabled network of trans-organizational processes is closely tied to the existing ERP System of industrial company [19]. Private industrial network makes sense when there is an opportunity for competitive advantages and there is no public or industry sponsored marketplaces or they are inefficient [17]. Many global players, market-leaders are operating private industrial networks, such as GE, Nike, Wal-Mart, etc.

Today private industrial networks form the largest part of B2B E-Commerce. For example, some years ago Volkswagen Group introduced the Group Business Platform as a tool for communication and cooperation with its suppliers in order to optimize processes and improve the quality level. The goal of the company was not just to find partners, but also to integrate their suppliers into all business processes, such a procurement, logistics, quality, technical development, and sustainability [20].

B. Opportunities of E-Commerce in B2B Markets

After the main characteristics of B2B markets were analyzed, it is obvious that the main opportunities, which companies may expect from of E-Commerce, are the efficiency in SCM processes and enhancement of relations with their business partners. E-Commerce enables the cost reduction during every stage of the buying process, namely, before, during and after the purchase [10]. It was discovered that there are new methods which can be used and certain business activities can be completely restructured [21]. In summary, the following conclusions concerning cost efficiency as a consequence of using E-Commerce can be done:

- both demand and supply sites can improve productivity by using E-Commerce;
- increase the transparence of information, goods and financial flows;
- efficient reach of potential sellers and buyers and

as a result the improvement of matching the buyers and sellers; • reduction of the transaction costs at each stage of procurement processes;

- time and personnel reduction for procurement or selling processes.

Additionally, B2B E-Commerce is able to form and intensify collaboration between business partners. It acts as a dialogue simulator, facilitates interactivity and real time information exchange. By increasing collaboration between buyers and sellers, E-Commerce may improve the customization of offers, quality of products based on analysis on sales history and forecasts. It enables seamless information exchange that makes the collaboration easy and effective and leads in the future to the competitive advantages [14]. B2B E-Commerce technologies can be used to build up and sustain competitive advantages for companies [22].

C. Market Development of B2B E-Commerce

During the last decades B2B E-Commerce has been promptly growing all over the world. According to the study of the economies of thirteen countries (G8, Brazil, China, India, South Korea and Sweden, which contribute more than 70 percent of global gross domestic product) the Internet is now used in every country, in each sector and by most of the companies and counts for about 3.4 percent of GDP. If the Internet were a sector, it would be bigger than energy or agriculture industries and its contribution to GDP would be bigger than those of Spain or Canada Over the last 15 years the Internet accounted for about 10 percent of GPD growth within the studied countries. As well it has a great impact on the development of small and medium- sized enterprises (SME). SME with high Web presence grew two times quicker as those that had low level of presence [23].

Moreover, the main IT trends, like the increase of the Internet security and comfort level of online payments, cloud computing and software-as-a-service (SaaS), integration of enterprise resource planning systems (ERP) [4], demonstrate that the implementation and the utilization of B2B ECommerce is getting less costly, provides more security and enables the "ease of use" for the end-users. All these technical innovations and advances secure the future development of B2B E-Commerce.

Nevertheless, the implementation and realization of B2B E-commerce significantly differs from country to country. According to Berthon et al. B2B marketers have to consider "hard" terms such as infrastructure as well as "soft" terms, like values before building E-Commerce relationships in other countries [24]. If a customer trusts online supplier he is even more committed to open communication and share of information [25]. There are three drivers, which could help companies to decide whether to use B2B E-Commerce while entering new geographical markets [24]. These key drivers are the following [24]:

- E-readiness. It determines the ease with which a business relationship can be conducted.
- Country's values. They need to be understood as a fundamental facet of culture.
- Corruption. It engenders the loss of social integrity and promotes mistrust between social actors.

The authors mention that technical infrastructure is an important, but not a sufficient condition for development of B2B E-Commerce. Mostly the economic and social development, as well as the level of corruption may corrode E-Commerce [24]. Here it will be interesting to provide some examples. North America and Western Europe present the best conditions for developing E-Commerce relations. Asia Pacific can be the second best choice to invest in ECommerce. Central and Eastern Europe are still challenging a high level of corruption, which hampers the development of B2B E-Commerce. Africa, Middle East and Latin America are currently struggling with building the physical, economic and political infrastructure to provide a platform for E-Commerce [24]. The Economist Intelligence Unit publishes yearly "Digital Economy Ranking" Report, which provides an interesting benchmarking of the countries [26].

IV. EVALUATION OF E-COMMERCE OPPORTUNITIES

Though many different benefits of E-Commerce

for B2B companies were discussed, nevertheless it is crucial to keep in mind, that it is still not a universal medium for decreasing transactional costs and enhancing relationships with partners. It is very important to consider the existing company's strategy and analyze how E- Commerce can match it. In this context an interesting and practical approach was proposed by Feeny, which can help managers to start this strategic analysis [3].

During the first step Feeny proposes to construct a coherent map of e-opportunity, based on three dimensions: E-Operations, E-Marketing and E-Services [27]. The basic information on these three domains is summarized in Table 1. It is recommended for a manager to go through all these three domains and analyze the existing processes and strategy to check if there is a possibility to introduce ECommerce or to replace the current processes by E-Solutions [27]:

- Will E-Commerce strategically change the way a business manages itself and its supply chain?
- Can a company achieve strategic changes in downstream activities?
- Can E-Commerce give companies a new way to address an identified set of customer needs?

Table I. Three E-Opportunities Domains And Their Components [27]

buying processes and to build profitable relationships with business partners, these two issues were firstly described in detail. It demonstrated that the procurement process of industrial company is a highly complex process

Domain	Components
E-Operations (Web-based initiatives that improve the creation of existing products)	- Automation of administrative processes - Supply chain reconfiguration and integration - Re-engineering of primary infrastructure - Intensified competitive procurement - Increased parenting value
E-Marketing (Web-based initiatives that improve the marketing of existing products)	- Enhanced selling process - Enhanced customer usage experience - Enhanced customer buying experience
E-Services (Web-based initiatives that provide customer affiliated services)	- Understanding of customer needs - Provision of customer services - Knowledge of all relevant provides - Negotiation of customer requirements - Construction of customer options

involving many stakeholders. It consists of nine steps, from problem recognition to evaluation of the process

As soon as the first analysis is done, manager has to answer the question, if these developments can change the cost structure and positively influence the relationship with the existing customers and improve customer platform and penetration, considering the investment costs and time horizons. This evaluation can be used as a starting point for analyzing the use of E- Commerce as a competitive advantage [3].

V. CONCLUSION

The objective of this article was to explore how industrial companies use B2B e-commerce and to analyse the role of e-commerce for their businesses. This objective was reached by an analysis of the desk research and the paper represents a review of some theoretical approaches on the topic.

The objective and the chosen methods of the research defined the structure of the article. As the management target of B2B companies is to understand the business

performance. That means that during each stage of the process transactional costs occur. As it was shown, the use of e-commerce can significantly decrease these costs for information, communication and decision and thus contribute to profitability of a business. It reduces not only costs for locating an appropriate seller or buyer, obtaining price and product information, it also may affect the entire industry structure. E-commerce trends to raise bargaining power over suppliers, leading to less asymmetry between supply and demand sides. The internet provides new effective channel to reach end users directly and gives an opportunity for all companies to get an equal access to buyers and suppliers. That means that ECommerce can also facilitate building up and maintaining the relations with business partners, which appear to be one of the crucial assets. As it was demonstrated on different practical examples, e-commerce also supports the use of different kinds of additional services provided by industrial companies, which may increase the value of products and services and could be also considered as

competitive advantage of a company.

In practice industrial companies can use e-commerce in

form of net marketplaces or private industrial networks. Depending on what and how companies buy or sell, as well on the industry, e-distributor, independent exchanges, e- procurement or industry consortia models can be chosen as a form of net marketplace. Different examples of companies selling either goods or services, being 'brick- and-mortal' or virtual demonstrate successful use of such e-commerce types to collaborate with their business partners.

Despite of the recent economic recession B2B e-commerce continues to grow. Moreover, the internet technology provides new inexpensive opportunities for implementation of e-commerce. Though in general terms B2B e-commerce is growing rapidly all over the world, there are still differences in the extend of e-commerce use. Implementation of B2B e-commerce strongly differs from country to country, depending on such key drivers like e-readiness, country's values and level of corruption.

Moreover, it is crucial to emphasise that the use of e-commerce and its advantages still depend on a company and its business strategy. Though many different scholars and empirical evidences indicated, that e-commerce may play a critical role for facilitating efficiency and profitability of industrial companies, it appears to be crucial to examine whether it prevails also within different business strategies and may be considered as universal method, applicable in many companies to decrease costs and build closer partner relations. This question opens a number of interesting and challenging paths for future research.

The results of the study might have both theoretical and practical impact. As it represents a review and summarises a broad theoretical background on the topic, it could be chosen as a basis for further research on different strategies in B2B markets and analysis of the role of B2B e- commerce for them. for example, this research was recently used as the first step within a research paper devoted to the topic "business strategies and B2B e- commerce opportunities of global narrow specialized companies" (Fauska, 2012).

The paper also provides guidance for managers and gives them an outlook on how e-commerce can be used by their companies. Hence, it may support managers in decision making on e-commerce investments, during definition, implementation and execution of e-commerce strategy.

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Paying guest finder

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Abstract— **The software "PAYING GUEST FINDER" was created to manage numerous actions in the PG, as the name implies. The system will compare the user's request with the database's details, and once a match is made, the user is provided with the necessary information. From the system's admin page, he can enter information about the rooms. This will lessen the time new and returning students must spend looking for rooms and other essential items. A computerized system that is more user-friendly and more GUI focused is designed in response to the shortcomings of the existing system in order to be compatible with it.**

Keyword- Paying Guest, Graphical User Interface, Advertisement, Location, Accommodations, House

I. INTRODUCTION

Despite the many inherent benefits of traditional websites, mobile apps and mobile websites are becoming very popular. This is because majority of the consumers now basically browse the Internet using their mobile phones or tablets. PG finder is a website that seamlessly connects and interacts with everyone globally. PG finder is a valuable tool for the modern business. Any news, information, advertisements, displayed on this website reaches millions of potential customers. A mobile application, sometimes known as a mobile app, is a type of software created specifically for smartphones and tablet computers.

Frequently, websites that run in mobile web browsers rather than directly on mobile devices and desktop applications that run on desktop computers are contrasted with mobile apps. Moving away from the integrated software systems often seen on PCs are mobile applications. Instead, each app offers a few discrete and constrained functions, like a game, a calculator, or mobile Web browsing. Due to the early mobile devices' constrained hardware capabilities, websites may have avoided multitasking; yet, because they let users choose what their devices can do, their specialization is now part of what makes them desirable. A good and authorized PG can be located with the aid of the website PG finder.

II. LITERATURE REVIEW

Reference	Focus	Key Findings
1	International Research Journal of Engineering and Technology (IRJET)	This system enables the user to make their own online reservations for paying guests' rental homes, dining establishments, as well as stationary or school-related items..
2	Online Accommodation Submitted By: ROHIT JHA ABHISHEK ANAND SOUMYA SHRIVASTAVA	User can take a look on different aspects of the Information provided like location map, food, price, transportation facility and even security measuresand select a best PG oftheir choice.
3	"PG LOCATOR APP" Mr .Nawale Rohit Ramhari , Mr. Mouriya Narayan Dilip , Mr.Saindane Sumit Madhukar, Mr.Wagh Prasad Sunil	In the present system a customer can get only little information like address, contact number and food. Due to lack of information like price, exact location, security measures, the customer is unable to find the best PG of their choice.
4	PG Locator Akshatha.M1 , Bhavya .B. M2 Student1 , Assistant professor	Technology refers to the collection of tools that make it easier to use, create, manage and exchange information. In the earlier times, the use of tools by human beings was for the process of discovery and evolution..
5	Online Application for Booking Paying Guest and Explore Mess in Nearby Location	Idea behind project is to solve problem of people which they are facing when they shift to different city.

A literature review is primarily conducted to analyse the context of the current project, which aids in identifying weaknesses in the system in place and provides direction for how to address unresolved issues.Therefore, the following themes not only present the background but also expose the issues and shortcomings that prompted the development of this project. Numerous studies have been conducted on how people learn to behave in groups. The section that follows examines many sources that cover a range of subjects connected to group behaviour.

With the help of this method, users can book themselves independently online. The system can perform a variety of tasks, including: providing a query for arrival date and length of stay; providing the number of on rooms; viewing all available rooms and allowing the user to select one or more of them; recording the type of guests and how many will be in each room; providing the cost of booking; and asking the users if they were satisfied with their accommodations.Some figures with explanations are offered to help with system understanding.

The link between the web server and the end user is depicted in the first picture, along with a step-by-step breakdown of how users interact with statistics and the application. The interaction between the user and the screen is depicted in the second figure. When a user interacts with the interface, several processes are carried out, and the screen displays additional pages. The third graphic, however, demonstrates how each page is connected to the others.The first is when the user navigates through the pages in order after entering their information. The user has the option to navigate to the previous pages or the login page using the second method of navigation. The page will preserve the most recent page if one user's insert is rejected as the final one.

III. PROBLEM STATEMENT

Everyone is aware of how important patience is and should possess a sufficient amount of it. You will undoubtedly find it among those who reside as paying guests. As a paying visitor, you will need to learn to be very patient because every step will require you to adjust. Here are seven potential problems that you could run across as a student looking for dorms, apartments, or PGs.

Advertisements for PG Finder, apartments, and hostels will often claim that the rooms are large and airy, but in practise, things tend to be different.You will discover when you check out the PG that the rooms are not even roomy, which proves that you should never believe anything you read in an advertisement.
So, it is better to check everything by yourself.

IV. EXISTING SYSTEM

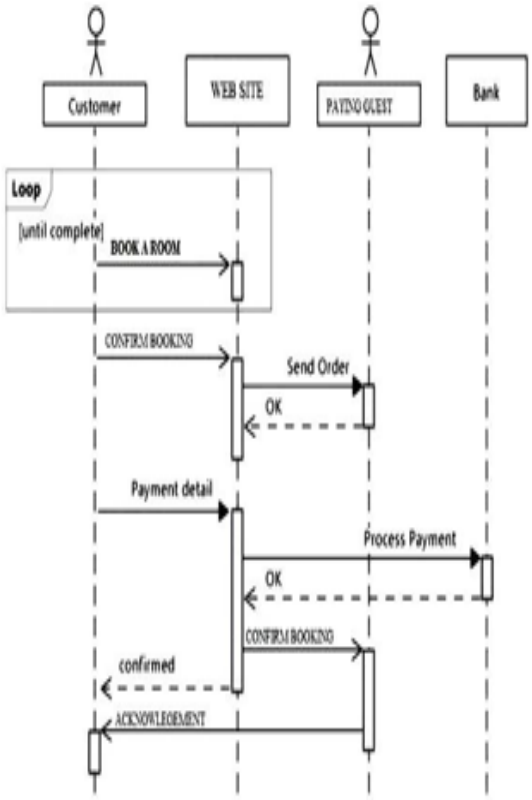

Figure -1: Sequence diagram

The goal of what we are attempting to illustrate in this research is partially satisfied by a variety of discrete applications in the Existing System. Due to their separate nature, each will collect its data in a unique way. As a result, there is a significant use of time and data. To own a paying rental guest and eat in a food zone, the user needs launch a different application. As a result, the system's integration with this application is inadequate. A person who uses NESTAWAY to book a room in a paying guest based on his location would not be able to reach a suitable dining zone because NESTAWAY only offers information on the infrastructure of the accommodation. Because of this, even though the current system resolves the issue, it does so in a busy, sluggish, and time-consuming manner, which provides us a suggestion to create an application based on the algorithm of merging various platforms.

Booking options for apartments and hotel rooms are offered, including OYO & NESTAWAY. Applications like ZOMATO are available to find, review, and visit eateries. There are currently no solutions for finding

stationery stores close by.
In the present system a customer can get only little information like address, contact number and food. Due to lack of information like price, exact location, security measures, the customer is unable to find the best PG of their choice. Often the customer may be misguided.

Disadvantages of Existing System
They are meant for hotel and flat services only. None offer a service for paying visitors. Lack of restaurant services at a reasonable price in the application. insufficient integration high consumption of data. takes a lot of time. many platforms for various jobs.

V. PROPOSED SYSTEM

General model of online accommodation is shown in fig in which administrator and staff at remote Server can send request to client system to capture their desktop.

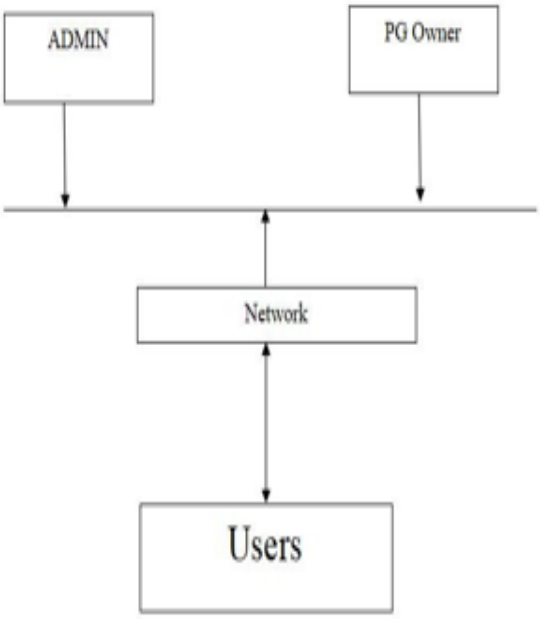

Figure 2:- General Model

The system is divided into various modules ,each module are further divided into sub-module. The connection of the main modules is shown with the help of DFDs.DFDs are made of the following representation

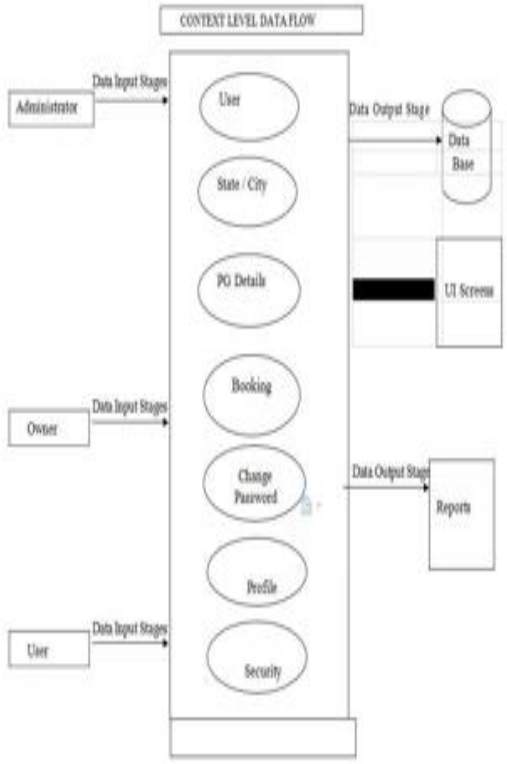

Figure -3: Data Flow Diagram for Context Level

This Data Flow Diagram For Context Level Shows Data Flow Of The System.

We offer a project that is a web application used to reserve paying guest lodging, a dining establishment or restaurant, as well as a store selling school supplies or other stationary close to the user's location. It is a platform-integrated programme that includes all three elements. They were discrete and random before in the current system, but it has been combined into one distinct application currently. This includes not only making things easier for the customers but also assisting different individuals in hosting their lodging on the website. A person that visits our website enters his or her location (or taken up manually). There will be several cloud storing features on our website.
The user will be able to locate every paying visitor in the area using these cloud services. The consumer can then get in touch with the specific host of the rental service to inquire about booking and room availability. The host can update the availability features by utilizing our application to access the cloud storage. The user will be able to explore our application using real-time tracking and locate food zones based on the position of paying customers. As a result, the paying customer won't have to worry about getting to the restaurant.

VI. ADVANTAGES OF PROPOSED SYSTEM

1. used to reserve lodging for paying visitors, a dining establishment, as well as stationary or school-related items.

2. Previously, they were discrete and random in the current system; today, they have been combined into one different website.
3. used to reserve lodging for paying visitors, a dining establishment, as well as stationary or school-related items.
4. Previously, they were separate and random in the current system; today, they have been combined into one unique application.

VII. RESULTS

Figure 4:- Home page
This is How The website Will Look Like When You First Open It

Figure 4:- Sign up page
This is where users can create a new account on the website.

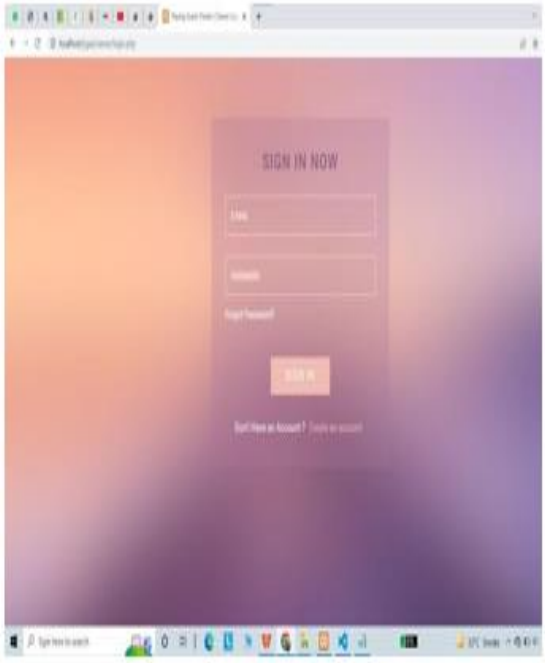

Figure 5: - Login Page

Figure 6: - Admin Dashboard Page

VIII. CONCLUSION AND FUTURE SCOPE

This integrates basic amenities for the users especially the students in one platform. It also adds the capability of promoting the hosts' lodging options through the internet application. Overall, this application will be a blessing for all students because it gives them access to a portable all-in- one application. In the current system, none of the programme enable a user-friendly environment where all three elements are combined into a single integrated platform. The website contains a number of conclusive elements that imply further development and the creation of a business perspective using different hosting platforms is possible. Cloud services are included, which makes it even more amazing. The proof that the website makes use of the positioning system might be a tool that helps the website in its design. Future website development will result from the website's adaptable and simple design. This website compiles all the everyday concerns that can be used as inspiration for business perception.This website has the potential to be a long-term business augmentation. Data transparency may result from the open and subjunctive nature of the communication between the client and the host. This application not only addresses problems, but also considers the preferences or choices of the users when they are in a different location."Time is money," as the saying goes from a managerial perspective, is true. Finally, the paper offers a suggestion to help people manage their time and data better, which is a benefit to everyone.

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A Survey of Methodologies used in Explainable Recommendation Systems

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Abstract— **Explanations in recommender systems help users better understand why a recommendation (or a list of recommendations) is generated. The increase in sophistication and complexityof recommendation algorithms has turned them into black boxes where the algorithmic reasoning behind the predictions is hard to understand by users. Explaining recommendations has become an important requirement for enhancing users' trust and satisfaction. However, explanation methods vary across different recommender models, increasing engineering costs. As recommender systems become ever more inscrutable, directly explaining recommender systems sometimes becomes impossible. This paper aims at exploring the concept of using SHAP (SHapley Additive exPlanations) values to provide counterfactual explanations for recommendations. By analyzing the impact of different features on the recommendation outcome, SHAP values can help to identify areas of improvement for the recommendation system. The paper also discusses the use of interpretable machine learning techniques for generating product feature recommendations that are easily understood by users. Finally, the article proposes the use of local surrogate models to explain individual recommendations, by using a simplified model that is easier to interpret than the original recommendation algorithm. Overall, the article provides insights into the challenges of explaining recommendations and offers potential solutions for creating more transparent and user-friendly recommendation systems.**

Keyword -Explanations, Recommendation systems, Shap-enhanced, Interpretable Machine Learning.

I. INTRODUCTION

Recommendation systems have been a fundamental component of various digital platforms such as e-commerce, social media, and entertainment services. These systems are designed to predict users' preferences and suggest relevant items, such as products, movies, or music. However, traditional recommendation systems often lack transparency and interpretability, which can lead to distrust and dissatisfaction among users. Explainable recommendation systems (XRS) aim to address this issue by providing clear and understandable explanations of how recommendations are generated, helping users to make informed decisions and build trust in the system.

As recommendation systems become more prevalent in our daily lives, it is increasingly important to ensure that these systems are transparent and understandable to their users. Explainable recommendation systems are designed to provide users with insight into why certain recommendations are being made, thereby increasing transparency and user trust. These systems not only enhance the user experience but also provide businesses with opportunities to optimize their recommendation strategies. In this article, we will explore the concept of explainable recommendation systems and their importance in promoting user understanding and trust. We will also discuss the importance & challenges associated with developing these systems.

II. IMPORTANCE OF XRS

Explainable recommendation systems are important because they help to improve the transparency and accountability of the recommendation process. By providing clear and understandable reasons for why certain recommendations are being made, users can have more trust in the system and feel more confident in the recommendations they receive. Additionally, explainable recommendation systems can help to reduce bias and discrimination in the recommendation process. By identifying and explaining the factors that are being used to make recommendations, it becomes easier to identify and address any potential biases or discriminatory practices. Moreover, explainable recommendation systems can be used to provide educational or informative recommendations that help users learn more about a particular topic or product. This approach can encourage users to explore new areas of interest and promote lifelong learning. Finally, explainable recommendation systems can help to improve user satisfaction and engagement. By providing clear and meaningful explanations for recommendations, users are more likely to understand and appreciate the value of the system, and are more likely to continue using it over time. In summary, explainable recommendation systems provide transparency, trust, and accountability in recommendation systems. They can also help identify biases and inaccuracies and provide educational or informative recommendations.

III. CHALLENGES FACED BY XRS

Let's review a set of common challenges faced by Explainable Recommendation systems:

1. Lack of standardized interpretability metrics: There is a lack of standardized metrics to measure the interpretability of recommendation systems. This makes it challenging to compare the interpretability of different

systems.

2. Difficulty in balancing accuracy and interpretability: Explainable recommendation systems often struggle to balance accuracy and interpretability. More complex models may provide higher accuracy, but may be difficult to interpret. Simpler models may be more interpretable, but may not provide as high accuracy.
3. Difficulty in understanding complex models: Complex models such as deep learning models can be difficult to understand and interpret. This makes it challenging to explain the recommendations generated by these models.
4. Limited availability of labeled data: Explainable recommendation systems require labeled data to train interpretable models. However, labeled data is often limited, making it challenging to train these models.
5. Privacy concerns: Explainable recommendation systems may collect and use sensitive user data to generate recommendations. This can raise privacy concerns and may limit the adoption of these systems.
6. User trust: Users may not trust the recommendations generated by explainable recommendation systems if they do not understand how the system works. This can limit the adoption and effectiveness of these systems.
7. Difficulty in handling context: Explainable recommendation systems may struggle to handle context-dependent recommendations. For example, recommending a winter coat may be appropriate in one context, but not in another.

IV. LITERATURE SURVEY

A. Shap-enhanced counterfactual explanations for recommendations

In this paper, a method for explaining recommendations in a recommendation system is presented. The method uses SHAP (SHapley Additive exPlanations) to calculate the contribution of each feature in making a recommendation. Instead of using the SHAP outputs directly, the method uses them to select possible candidates for counterfactual explanations, which are easier to understand and more faithful. The explanation method can be applied at two levels: list-level explanations that consider the recommendation list as a whole and instance-level explanation that only explain a single instance in the list. Experiments showed that SHAP can reduce the time needed for searching counterfactual explanations under certain conditions. The authors plan to evaluate the explanation method through a user study, to extend the approach to large-scale data and other recommendation systems that do not involve features, and to incorporate contextual information and other side information into the explanations.

The authors of this paper present a case study to explain recommendations made by a context-aware recommendation system (CARS) that was proposed in a previous paper. The dataset used is LDOS-CoMoDa, a dataset for context-aware movie recommendation that includes 121 users, 1197 movies, and 12 context factors. The authors chose to focus on the three most impacting context factors: "social", "mood", and "physical". The goal of the recommendation system is to generate recommendations for a user given their contextual situation, which is composed of several contextual conditions. To apply Algorithms to the CARS, the authors compute counterfactual explanations for the recommendations. In this case, the contextual factors are all categorical and the values of the contextual factors are changed randomly to identify counterfactual explanations. The authors present an example where the user's mood is positive and is identified as the most impacting factor. Changing the user's mood from positive to negative results in a change in the recommended movie list. The authors explain the recommendations at the instance level (Top-1), meaning they explain the reasoning behind a single recommendation.

Let’s have an overview on the contributions of the paper. The paper "Shap-enhanced counterfactual explanations for recommendations" is significant and contributes to the field of machine learning in several ways:

- Explanation: The paper provides a way to explain the recommendations made by machine learning models, which is important for building trust and improving transparency in the AI field.
- Counterfactual explanations: The paper introduces the concept of counterfactual explanations for recommendations, which allows for a better understanding of how a particular recommendation was made. The approach helps users to understand the impact of changing certain features on the recommendation and how it would have affected the outcome.
- Model-agnostic approach: The approach is modelagnostic, meaning it can be applied to any machine learning model, regardless of the underlying algorithm. This makes the method more widely applicable and accessible.
- Empirical evaluation: The paper provides empirical evidence of the effectiveness of the approach through experiments on real-world dataset. Let’s have a glance on the strengths and weaknesses of the approach:

a) Strengths

- The paper presents a novel approach to provide counterfactual explanations for recommendation systems, by incorporating the SHAP values.
- The results demonstrate that the SHAP-enhanced explanations provide better explanations compared to traditional methods, as they are able to capture non-linear relationships between features and model predictions.
- The approach is flexible and can be applied to various recommendation systems, including both

collaborative filtering and matrix factorization models.

- The paper provides a comprehensive evaluation of the proposed approach, including both qualitative and quantitative analysis.

b) Weaknesses:

- The study only focuses on a small dataset, and it may not be generalizable to other recommendation systems or datasets.
- The evaluation metrics used in the paper are limited, and it would be beneficial to consider other metrics to evaluate the quality of explanations.
- The paper does not provide a thorough discussion on the limitations of the proposed approach and its potential drawbacks.
- The study does not consider the scalability of the approach, and it may not be suitable for large-scale recommendation systems.
- Overall, the paper presents a promising approach to provide counterfactual explanations for recommendation systems, but further research is needed to validate its effectiveness and generalizability. [1]

B. Acronyms Online Product Feature Recommendations with Interpretable Machine Learning

The paper deals with the problem of helping customers purchase the best product among alternative products. The authors propose an interpretable machine learning approach to determine the key features of a product that best explain the price and help customers differentiate the most suitable product. The problem is formulated as a supervised machine learning problem based on price and evaluated using linear and tree models with Shapley Values. The results of offline evaluation show that the proposed method outperforms the baseline and is comparable in conversion rate to the baseline in online A/B tests. The authors also involve human experts to evaluate the relevance of the recommendations.

The authors focus on building a product feature recommendation system for online customers. The aim of this system is to help customers differentiate specific products from a set of similar products based on recommended features. The paper uses interpretable machine learning techniques to explain how the machine learning models work and to facilitate human understanding of the final model. The authors select SHAP (SHapley Additive exPlanations), a model-agnostic method, as the tool to interpret the machine learning models and understand the feature importance. The paper describes the process of processing the raw data, extracting features, and building regression models using Linear Regression, LightGBM and CatBoost. The authors use these regression models to learn the feature importance and understand what features contribute more to the product's price. The authors also use the feature direction to understand if a feature positively or negatively contributes to the product price. The final feature ranking list is computed by averaging the Shapley Values for each feature from all three regression models. The authors evaluate the proposed method against a baseline algorithm Left Nav Algorithm and find that it scores higher on offline evaluation metrics and is comparable with the baseline algorithm in online A/B tests.

Let’s have an overview on the contributions of the paper.

The paper "Online Product Feature Recommendations with Interpretable Machine Learning" is significant because it addresses the need for interpretable product feature recommendations for customers in e-commerce settings.

It contributes to the field by introducing a new approach to product feature recommendations that utilizes interpretable machine learning to generate feature recommendations. The use of the price as the training label and the study of the Shapley Values provide a unique and effective solution to the problem of product feature recommendations. The results of the offline evaluation and online A/B tests demonstrate the effectiveness of the proposed approach, making it a significant contribution to the field of ecommerce product recommendations.

Let’s have a glance on the strengths and weaknesses of the approach:

a) Strengths:

- The use of the model-agnostic method, Shapley Values, allows for interpretation of the contribution of features to the model predictions based on data visualizations.
- The approach has been evaluated against a strong baseline and has achieved higher scores in offline evaluations on metrics such as NDCG, precision, recall and coverage.

b) Weaknesses:

- The approach is limited to the use of the product price as the training label and may not be suitable for other types of training labels.
- The use of human experts to label the top features may introduce bias and subjectivity into the evaluation process.
- The online A/B tests on conversion rate were only comparable with the baseline and may not have a significant improvement over existing approaches. [2]

C. Towards Explaining Recommendations Through Local Surrogate Models

The paper aims to provide an explanation for recommendations generated by machine learning models. The authors address the issue of limited interpretability in existing recommendation systems and present a new approach to enhance their explainability. The paper proposes the use of local surrogate models, which are simple and interpretable models that are trained to approximate the behavior of the complex recommendation model in a local region around a specific instance. The authors argue that these local

surrogate models can provide a better explanation of the recommendation compared to global models that attempt to explain the behavior of the recommendation model for the entire data set. The authors evaluate the performance of the proposed approach on a movie recommendation task, using a matrix factorization model as the recommendation model. The results show that the local surrogate models can effectively explain the recommendations generated by the complex model, by highlighting the features that contribute most to the prediction. The paper concludes that the use of local surrogate models can provide a simple and interpretable explanation for recommendations generated by complex machine learning models, helping users to understand the reasoning behind the recommendations. This can increase the transparency and trust of the recommendation system, leading to a more positive user experience.

Let's have an overview on the contributions of the paper. Overall, the paper contributes to the field by presenting a novel approach to enhance the interpretability of recommendation systems, which can benefit both users and practitioners of machine learning-based recommendation systems.

Let's have a glance on the strengths and weaknesses of the approach:

a) Strengths:

- Local interpretability: The method proposed in the paper provides local interpretability of recommendation systems, which means that the reasons for a particular recommendation can be explained at the individual user level. This is useful for building trust with users and for identifying potential biases or inaccuracies in the system.
- Scalability: The method is scalable and can be applied to large datasets and complex recommendation algorithms. This is important for real-world applications where recommendation systems may have millions of users and items.
- Flexibility: The proposed method is flexible and can be applied to a wide range of recommendation algorithms, including collaborative filtering and content-based approaches. This means that it can be adapted to different domains and applications.
- Accuracy: The paper reports that the proposed method is able to achieve high accuracy in predicting user preferences and explaining recommendations. This is important for building trust with users and for improving the overall performance of recommendation systems.
- Novelty: The proposed method is a novel approach to explaining recommendation systems, which means that it offers a new perspective on this important problem. This can lead to new insights and improvements in recommendation systems.

b) Weaknesses:

- Limited interpretability: Local surrogate models are designed to be simpler and more interpretable than the original machine learning model, but they can still be difficult to interpret in some cases. The interpretation of these models is limited to the specific features used by the surrogate model and does not necessarily provide a complete understanding of the original model.
- Data dependency: The effectiveness of local surrogate models is highly dependent on the data used to train them. If the data is not representative or if there are biases in the data, the explanations provided by the surrogate model may not be accurate or trustworthy.
- Scalability: Local surrogate models require the computation of a new model for each prediction, which can be computationally expensive and timeconsuming. This can limit the scalability of the technique, particularly in real-time applications where speed is important.
- Lack of generality: Local surrogate models only explain the predictions for a single instance and do not provide a global understanding of the model. This can limit the usefulness of the technique for understanding the behavior of the model as a whole.
- Interpretation bias: The interpretation of local surrogate models may be biased towards the assumptions and choices made by the modeler. This can limit the ability of the technique to

provide unbiased and objective explanations. [3]

V. CONCLUSION

In recent years, there has been a growing interest in developing interpretable machine learning models for making recommendations in e-commerce and other domains. One approach to achieving interpretability is through the use of Shapley values to generate counterfactual explanations for recommendations. These explanations can help users understand why certain products or features are recommended to them and can increase their trust in the system.

The paper "Shap-enhanced counterfactual explanations for recommendations" proposes a novel method for generating counterfactual explanations that combines Shapley values with causal inference techniques. The method is evaluated on a real-world e-commerce dataset and is shown to outperform existing methods in terms of both the quality of the explanations and the accuracy of the recommendations. Another paper, "Online Product Feature Recommendations with Interpretable Machine Learning", proposes a framework for making feature recommendations in an online setting using interpretable machine learning models. The framework uses a combination of collaborative filtering and decision trees to generate recommendations and provides interpretable explanations for the recommendations using Shapley values. [4] Finally, the paper "Towards Explaining Recommendations through Local Surrogate Models" proposes a method for generating local surrogate models that can provide explanations for individual

recommendations. The method is evaluated on a movie recommendation dataset and is shown to provide accurate and interpretable explanations for the recommendations. [5]

In conclusion, these papers demonstrate the potential of interpretable machine learning models and Shapley values for generating accurate and interpretable recommendations and explanations in e-commerce and other domains. The proposed methods can help increase user trust and satisfaction with recommendation systems and can provide valuable insights into how these systems make recommendations.

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Edge Computing & Emerging Applications

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Abstract— **In last few years, the Edge computing paradigm has**

gained traction in both research field and industrial applications. With the proliferation in the area of Internet of Things (IoT), the number of smart devices getting connected to the Internet is increasing at a rapid pace thereby resulting in generation of large-scale data, which in turn has led to an increase in issues such as high bandwidth load, privacy issues, lesser response speeds, and security concerns in traditional cloud computing models. Cloud computing is no longer sufficient to support the diverse needs of today's intelligent society for data processing, resulting in emergence of edge computing technologies. In this paper, we look at the concept of edge computing and its architecture, how machine learning is leveraged for resource management of Edge devices followed by Real world applications of EC. We also review the various performance metrices of EC, vis-à-vis ML algorithm performance under different application scenarios. Finally, we discuss the remaining challenges and promising areas for future research in the area of Edge computing.

Keyword– Edge Computing, Cloud Computing, IoT, Resource Management, Latency

I. EVOLUTION LEADING TO IOT AND COMPUTING

When the computers were launched, they were huge, heavy in built with complex architecture and could only be accessed by directly being present at the computer location. However, with the invention of personal computers, the paradigm changed and now the computing can happen in a much more distributed fashion. During this era, personal computing was the prevalent computing model. The applications were executed, and the data was stored locally on a user's device, or sometimes within an on-premises data center. In a conventional setting, the data is generated on the user's computer or any given client application. It is then moved to the server through various mediums like intranet, LAN, etc., where the data is stored and worked upon. This methodology is a classic and proven approach to client-server computing.

With the aggressive growth in the volume of data being produced and the huge number of devices getting connected to the internet, it is increasing becoming difficult for traditional data center setups to accommodate the desired speed of computations. As per Gartner's study, 75 percent of enterprise data generation will happen at outside of centralized data centers by 2025. This huge amount of data puts unusual burden on the internet, which then results in congestion and disruption to end users.

Current advancements in computing, algorithms, connectivity and deep learning are reforming human-machine interface. By implementing these innovations to consumer products can deliver a more robust and enhanced user experience like in case of mobile devices. Similarly, in case of transportation, vehicles can include smart features that make them more efficient, reliable and safer. In industrial applications, developers can attain higher levels of efficiency, scalability of manufacturing processes and precision. Consumers also can reap the benefits of the Internet of things (IoT) and smart home automation and live a stress-free life. With the evolution of IoT technology and sensors in recent times, managing and utilizing the data which is continuously generated by millions of connected devices is not easy. To deliver the potential benefits of artificial intelligence (AI), there is a need of large amounts of sensor data for virtually instantaneous decision making. These new demands are driving the industry toward Cloud computing, Edge computing, Fog Computing etc. If you use a computer or mobile device at home or at work, you almost certainly use some form of cloud computing every day, whether it's a cloud application like Gmail or be it a streaming media like Spotify, or cloud file storage like OneDrive. One of the most renowned industry analyst, Gartner has predicted that by 2023 the across the globe the end-user public cloud spending will touch nearly USD 600 billion. Cloud computing is on-demand access, via the internet, to computing resources—applications, servers (physical servers and virtual servers), data storage, development tools, networking capabilities, and more—hosted at a remote data center managed by a cloud services provider. Cloud services are centralized in a "cloud" or a set of data centers which can be accessed from any device over the Internet.

Transmittance of the entire data to the cloud requires an ultrahigh network bandwidth thereby cloud computing can introduce latency because of the distance between users and the data centers where cloud services are hosted. Restricted capacities, resource-limited devices, continual services with sporadic connectivity, security etc. are few other challenges with cloud computing paradigm. To address the above issues the emerging paradigm of computing is Edge computing. With this computing in place we move computing closer to end users to minimize the distance that data must travel, while still retaining the centralized nature of cloud computing. This paper attempts to explain the various facets of Edge Computing In order to better understand AI/ML for edge computing, in this paper we attempt to do a comprehensive overview of this field. In order to plan the review procedure there is a need of Research

Questions (RQ). Table 1 displays the research questions, the rationale behind them, and the relationships between various parts and subsections of this paper where we are addressing these RQs.

Table 1 Research Questions being addressed in the paper

S. No	Research Question	Motivation	Section Mapping
RQ 2	In edge computing, what resource management methods are available that are based on ML?	The purpose of this question is to delve into the numerous methods employed in either the simulation or realtime application of AI/ML-based edge computing	III
RQ 3	Where is ML-based edge Computing frameworks stand right now?	This question is useful for determining the nature of research that has been conducted utilising ML-based edge computing.	IV
RQ 4	Which kind of architecture is used the area of edge computing.	This inquiry probes the Multiple Architecture used for ML-driven edge computing	V
RQ 5	What are the most common applications of IoT-enabled Edge?	Use cases for IoTenabled Edge AI are discovered and discussed in the paper.	VI
RQ 6	How can the efficiency of ML based edge computing be measured, & what metrics are used for this purpose?	The effectiveness of AI/ML-based edge computing in terms of delay, cost, and power usage.	VII
RQ 7	What are the Advantages offered by Edge Computing technology	Understanding the positive aspects of Edge computing	VIII
RQ 8	What are the shortcomings / challenges faced in Edge computing.	Finding out the various challenges posed by edge computing.	IX
RQ 9	How will machine learning impact edge computing in the future?	Finding out where edge computing research is headed & what crucial problems remains unanswered	X

Now we will address these research questions in the sections described going forward in the paper

II. INTRODUCTION TO EDGE COMPUTING

Edge computing has become one of the most effective solutions to the network problems related with moving large volumes of data generated in today's scenario. The concept of edge computing is simple - instead of, the data center is brought close to the data.

The idea of edge computing is to bring the data center close to the data instead of moving the data close to the data center. The storage and computing resources of the data center are positioned nearby or at the same location where the data is generated.

The core idea is to make computing closer to the source of the data. This brings the service and utilities of cloud computing closer to the end user and is characterized by fast processing and quick application response time.

Researchers have different definitions of edge computing. Shi et al. [1] introduced the emergence of the concept of edge computing: ''Edge computing is a new computing mode of network edge execution. The

downlink data of edge computing represents cloud service, the uplink data represents the Internet of

Everything, and the edge of edge computing refers to the arbitrary computing and network resources between the data source and the path of cloud computing center.''

Zha et al. [2] proposed the definitions as - ''Edge computing is a new computing model that unifies resources that are close to the user in geographical distance or network distance to provide computing, storage, and network for applications service.''

The recently developed IoT enabled applications such as ARVR, surveillance and real time traffic monitoring needs quick processing and faster response time. User run these applications on their resource-constrained mobile devices and the core service and processing are performed on cloud servers. Leveraging services of cloud by mobile devices result in high latency and mobility-related issues Edge computing fulfills the above-mentioned application requirements by bringing the processing to the edge of the network. Edge computing is defined as a paradigm enabling the technologies to allow computing at the network edge, on downstream and upstream data on cloud and IoT services behalf, respectively. This model relies on a novel concept and regarding some similarity in nature, "edge computing" in literature could imply other architectures like Mobile Edge Computing (MEC), cloudlet computing, or fog computing (FC). Edge computing is recognized as a link which bridges the IoTs to the nearby physical edge devices for enabling the users to run the newly emerged IoT applications in their device such as mobile devices, tablets etc. Below figure depicts edge computing approach [3]–

Figure 1 Edge computing approach by IoT and edge device

The data flow diagram for edge computing is depicted as below

Figure 2 Edge computing approach by IoT and edge device

From the above two figures it is clear that the objective of Edge computing is to migrate the cloud's network, computing, storage capabilities and resources to the edge of the network and provide intelligent services at the edge to meet the critical needs of the IT industry in agile, real-time business scenarios and meets the requirements of low latency and high bandwidth on the network.

III. RESOURCE MANAGEMENT FOR EDGE COMPUTING

The development of Edge computing is seen as a solution to problems of network traffic, latency, power consumption etc. for Cloud-based IoT systems. Edge nodes are located close to the IoT device as contrary to the cloud data centers. As a result the execution time and bandwidth issues can be resolved however, we should remember that edge nodes are not designed to deliver high degrees of processing power or huge storage ability which is prevalent in cloud data centers [4].

Therefore, one of the difficulties that need to be solved in edge computing is resource management, which consists of resource provisioning, task offloading and resource scheduling.

Resource provisioning- Resource provisioning is defined as selection, implementation and run time management of hardware and software resources for effective performance of the applications. There are fluctuations in IoT devices' workload that leads to the issue of over and under provisioning. In the case of overprovisioning, a larger number of resources is assigned as compared with the desired IoT workload, which results in customers paying more for the services which they have used [5]. In case of under provisioning, lesser number of resources are allotted for the IoT services, as per the necessity of the IoT workload and it increases the chances violation of the of Service level agreements [6]. Hence, an efficient mechanism is desired to overcome the explained challenges and provide adequate resources based on the service demands.

Task offloading – The designed architecture of edge networks is such that with limited resource it becomes tricky to assign optimal resource (cloud or edge) for computation-intensive tasks in applications such as that of ARVR, multimedia delivery and vehicular networks [4]. As a result, the offloading decision becomes of paramount importance which is dependent on several factors like types of workloads, priority, communication link, deadlines, capacity of edge nodes etc.

Resource scheduling and allocation – In order to process the IoT requests during the runtime of an application, the number of edge nodes which are available to process the requests is fixed and hence we require an effective scheduling technique that will allocate optimum resources for the upcoming workload and execute it within the timeframe [7].

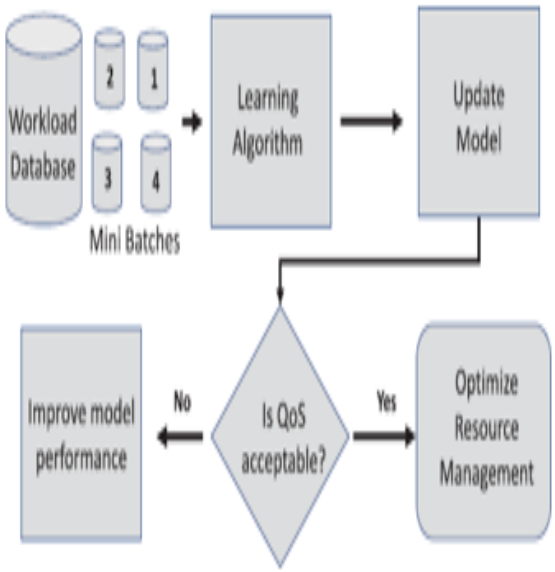
The methodologies for ensuring Resource management for edge computing as discussed above is addressed using diverse techniques. One of these methods that have been gaining popularity recently to solve resource management problems in Edge computing is by using Machine Learning (ML) and the same is described in the next section of the paper.

IV RESOURCE MANAGEMENT FOR EC USING MACHINE LEARNING

In this section, we examine Online vs Offline ML options for ensuring resource management of edge computing.

Online Machine Learning - One of the design options which is used while developing edge computing is Online ML. In this framework, the algorithm is constantly learning by leveraging new data [8]. As a result, real-time data must be used where Online ML is used for edge computing. A good example for the usage of this technique is models which predicts the stock market [9]. Fig. 3 shows the diagrammatic view of Online ML concept [9]. The algo. keeps learning till new data is fed in the edge device and the process is fast and inexpensive. Online ML is extensively used for scenarios where data flow is frequently changing.

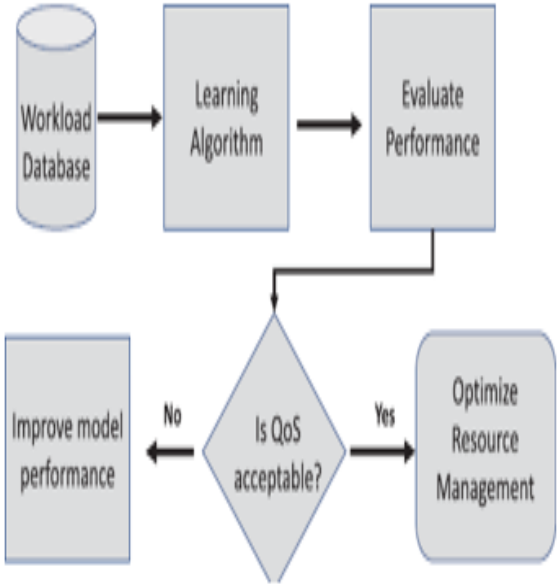
Figure 3 Online ML Scheme for Edge Computing



Offline Machine Learning - In contrast to Online ML, there is no continuous flow of data in case of Offline ML or Batch Learning. The model here is trained using a definite set of data. Once the model is trained, performance of the test set is evaluated and if the test set performance is within acceptable defined limits, the learning phase is terminated.

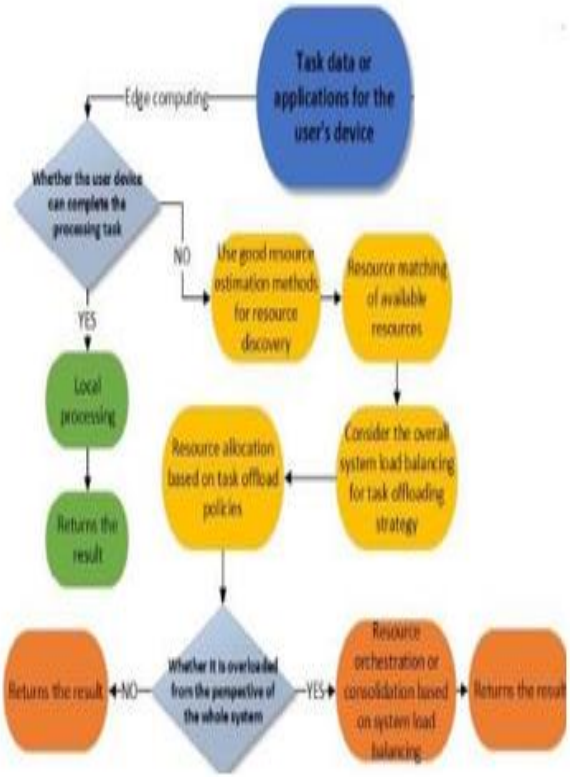
In case the model further needs to be trained using new set of data, then in that case both the old and new data are used together for training purpose. Fig. 4 gives the working schema of Offline ML [9]. As compared to online ML, the amount of data used here to train the model is quite larger. As a result, CPU and RAM requirements will be higher to train the model in Offline ML and additional time is required to train the model as well.

Figure 4 Online ML Scheme for Edge Computing



In the edge computing paradigm, there are various techniques/ methodologies / design options as explained in this section. For ensuring optimal resource optimization either by offloading task data or by placing applications on another device or multiple devices [10], we can sum up the journey of Resource Management through Figure 5.

Figure 5 Flow Chart for Resource Management for Edge



V ARCHITECTURE OF EDGE COMPUTING

With the advancement in IoT era and the development of 5G, edge computing is gaining momentum and is considered as one of the important technologies for the new generation of communications network [11]. Edge computing architecture is a combined network structure which extends cloud services to the edge of the network by introducing edge devices between terminal devices and cloud computing [12][13].

The construct of cloud-edge computing consists of terminal layer, edge layer and cloud computing layer and these are explained as below –

1) Terminal Layer - The terminal layer comprises of various types of devices which are connected to the edge network like mobile terminals and numerous Internet of Things devices such as camera's, sensors, smart cars etc. In the terminal layer, the device performs the dual role of being a data consumer and that of a data provider. In order to reduce the terminal service delay, the perception of the various terminal devices is considered and not the computing power. As a result, the millions of devices which are the part of terminal layer

only collect the raw data and upload it to the upper layer, where it is then stored and calculated.

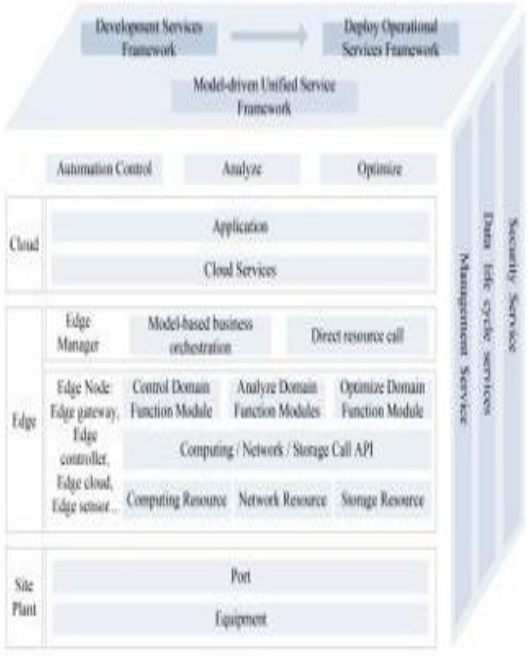
2) Boundary Layer - The boundary layer is the core of the three-tier architecture. The boundary layer is located at the network edge and comprises of edge nodes largely distributed between cloud and terminal devices. This usually includes access points, routers, base stations, gateways, switches etc. The edge layer supports the access of terminal devices downward, and storage along with computation of the data uploaded by terminal devices. The layer connects with the cloud and uploads the processed data to the cloud [14]. As the edge layer is at the proximity to the user, the data transmission to the edge layer is faster for real-time data analysis and intelligent processing.

3) Cloud Layer – Amongst the various services of cloud-edge computing, cloud computing provides the most effective data processing capability. The cloud computing layer consists of several storage devices and high-performance servers. Powerful computing and storage capabilities plays a significant role in areas requiring large amounts of data analysis such as regular maintenance and business decision support. The cloud computing center can store the reported data of the edge computing layer permanently and can complete the analysis tasks that the edge computing layer cannot handle by its own and also enable the processing tasks that needs integration of the global information. Also, the cloud module can dynamically adjust the deployment strategy and algorithm of the edge computing layer according to the requirements.

The edge reference framework has an underlying service layer that binds the entire framework, including data lifecycle services, management services, and security services. The data lifecycle service provides unified management for the preprocessing, analysis, distribution, and execution of machine data, as well as visualization and storage. Management services provide integrated management in terms of monitoring the operation of the architecture and providing info to the management platform. The security service can define the business logic of the entire life cycle of data through the business orchestration layer, flexibly deploy and optimize the data service, and meet the real-time requirements of the business. Security services cover all levels of edge computing architecture adapt to the specific architecture of edge computing and make use of the unified security management and perception system to ensure the safe and reliable operation of the entire architecture.

From the viewpoint of vertical structure, the model-drives unified service framework at the top of the scale to realize the development and deployment of services. In line with general framework of edge computing calculation, it is divided into cloud, field layer and edge layer. Also, the edge layer comprises of two integral parts viz. the edge node and the edge manager. Edge node is simply the hardware, which holds the business of edge computing and the edge manager uses the software capabilities to equally manage all the edge nodes Also, as per the hardware characteristics and service types, edge computing nodes are divided into edge gateways which process and convert network protocols, edge controllers which controls the real- time closed-loop services, edge clouds which process large-scale data, and edges which collect and process low-cost information Sensors, etc. The control, analysis and optimization domain function module is used for information transmission of upper and lower layers and the planning of local edge resources. Edge computing reference architecture provides four service development frameworks from the terminal to the cloud, including real-time computing systems, lightweight computing systems, intelligent gateway systems and intelligent distributed systems. All the layers and the architecture can be represented [15] as below –

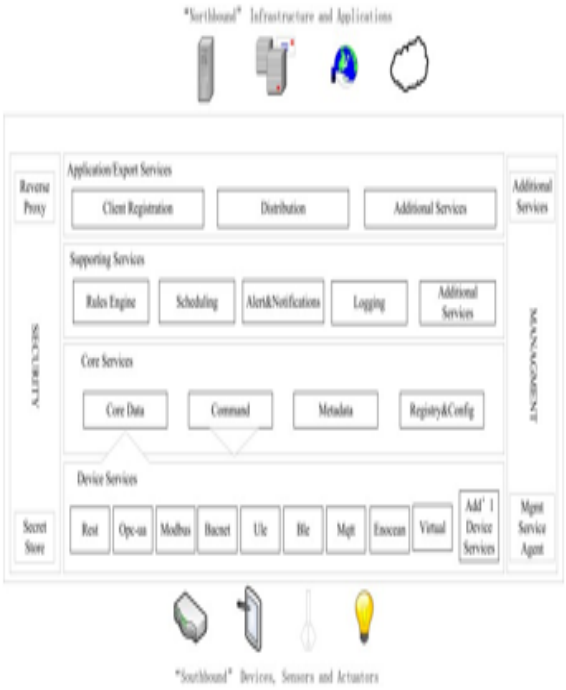
Figure 6 Edge computing architecture



EdgeX Foundry is a neutral open-source project hosted by the Linux foundation and is an universal open framework for computing on the edge of the Internet of Things. This is hosted on a reference software platform which is completely independent of operating systems and hardware. The Edge X framework enables a plug-and- play component ecosystem to integrate the computing open platform at the edge of the Internet of Things and accelerate the deployment of solutions.

The edge x foundry architecture [9] is depicted as below –

Figure 7 Edge X Foundry Architecture



As can be seen from the figure 7, ‘‘Southbound’’ comprises of all IoT application devices which directly communicates with the edge network. Cloud computing center along with the communication network constitutes the ‘‘Northbound’’. The ‘‘Southbound’’ is the source of the data, while the ‘‘Northbound’’ is used to collect the data from the south side and store, integrate and analyze the data.

The EdgeX Foundry is located between the South and Northbound and comprises of a collection of microservices which is divided into four service layers and two underlying enhanced system services. From the vertical viewpoint, Software development kit (SDK) is provided by the device service layer and is used to create the communication channels with the ‘‘Southbound’’. The device service layer converts the data from the device and sends it across to the core service layer. It can also receive commands from other microservices and pass them to devices. The core service layer which is at the center of the architecture is the key layer which helps to realize the edge capabilities. The core service layer comprises of four micro-service components namely the core data, commands, metadata, registry and configuration. The core data service provides management services and storage for the device data. The command service is responsible for defining the operation commands in the device file into a general API, caching and managing commands, and can pass the requirements of the cloud computing center to the device side. Metadata provides pairing of devices and services. Registration and configuration services is leveraged to provide configuration information for other micro-services. The support service layer is used to provide edge analysis and intelligent services, and to provide the framework itself with rules engine, alerting, logging and scheduling services. The application and export service layer can be connected with the cloud computing center to transfer data to the cloud computing center to ensure the independent operation of EdgeX Foundry. In the export service layer, the client registration service records the relevant information of the back-end registered system, and the distribution service exports the corresponding data to the specified client. Thus, we see that Edge X provides a scalable and an open-source platform, in which we can run all the micro-services on several operating systems in the form of containers and support dynamic addition or reduction of functions.

VI Application of Edge Computing

With the increase in the usage of internet-connected devices across the world, it is observed that adoption of edge computing has not only helped the organizations to improve their revenues but has also acted as an enabler for the companies in providing better service delivery for end users. The objective here is to provide access to high computing capabilities without increasing the complexity to the end user devices & without adding to network congestion. Few applications of Edge computing are described as below – Autonomous Vehicles - To ensure safety of the passengers an autonomous vehicle requires to simultaneously collect and process the data about its location, traffic conditions, direction, speed, and many more - all-in real-time scenario. To achieve this sufficient onboard computing capacity is desired and to achieve this every autonomous vehicle, in effect, is its own network edge. These Edge devices collect data from vehicle cameras & sensors, process it on the go & makes the decisions in milliseconds, with almost zero latency. Smart Cities, Clean Energy and Green Technology – With the increase

in Green technology movement across various domains, IoT device usage is also on the rise. Cities and smart grid systems use edge computing devices to monitor public buildings and facilities for achieving higher efficiency in heating, lighting, clean energy etc.

Few examples are given below -

- Intelligent lighting controls use edge computing devices to control individual lights or groups of lights in order to maximize efficiency while ensuring safety in public spaces.
- Solar fields uses embedded edge computing devices to sense changes in weather, adjust positioning & report metrics such as battery usage.
- Wind farms use edge computing to connect to cell towers and route sensor data to substations using cellular routers and switches

Healthcare and Medical Applications - The healthcare and medical industries collect patient related data from sensors, monitors, wearables and other apparatus to provide healthcare professionals with well-timed and correct insights on patients health condition. Edge computing solutions equipped with AI and machine learning capabilities also helps in identifying the outlier data so that medical professionals can respond to health concerns on real time basis with minimum false alarms.

Manufacturing Industries - Industrial IoT has added millions of connected devices in manufacturing plants to gather data on production line performance and the quality of finished products. Due to minimal latency of edge computing devices, the concerned persons on assembly line are able to get an immediate insight to problem which in turn helps to him to drive improvements to achieve the

5G and Mobile Services – Edge computing in telecom, often described as Mobile Edge Computing MEC, offers execution resources (compute and storage) for applications with networking close to the end users. The edge computing nodes enable content delivery, localized data processing and low-latency SaaS platform in end-user applications. MEC also helps in easing out network congestion for embedded applications which uses high bandwidth data streams.

VII PERFORMANCE METRICES FOR EDGE COMPUTING

The merit of any architecture in edge computing paradigm is gauged by using one or multiple performance metrics and as a result these metrics play an important role in the assessment of the architecture [16]. Performance metrics are mostly dependent on the type of layers (Terminal /boundary/ Cloud layer) or the computing model where the architecture is performed. The performance of the layers is measured in multiple terms.

Monitoring related metrics are used for monitoring the performance of the entire architecture. Some of the Monitoring related metrices are given below -

1. Resource Utilization: This parameter lets us know the percentage of the resource utilized for completing a specific inbound workload.
2. Throughput: This is ratio of the number of tasks arrived at to the number of tasks completed for a given period of time.
3. Resource Load: This parameter is the ratio of the number of tasks waiting in the queue to be executed to the number of tasks running at the same point in time.
4. Latency: This is the measure of the time gap which is observed between the actual response time and preferred response time.
5. Maximum Running Resource: This metric measures the highest number of resources used.
6. Virtual Machine Runtime: This parameter lets us know the borrowed time of the VM.
7. SLA Violation: This parameter measures the number of tasks which has been delayed more than the provided desired time.
8. Fault tolerance: This metric provides us with the ratio of the number of detected faults to the number of faults which exists.

Statistical Analysis related metrics-

This is a process to statistically gauge the performance of ML based algorithm for a given time series data [17]. Summary of various studies done in this regard is encapsulated below –

Work	Application	Method/ Algorithm	Parameter	Result
18	Resource allocation edge computing network for multiple user	Deep Q-Learning	Data packet size, Channel quality, and waiting time	Deep Q-learning surpasses random and equal scheduling
19	Intelligent offloading systemfor vehicular networks	Mobility-Aware Double DQN (MADD), Dynamic Matching Algorithm	Task scheduling & resource allocation (Quality of Experience)	MADD algorithm performanceis 20% which is 12% higher than greedy algorithm
20	Computation offloading in Virtual Edge computing systems (Sliced Radio Access Networks)	Integrated Double Deep Q-Network with Q - Function decomposition technique	Maximizing Long term utility performance	Outperforms over three baseline schemes, namely, mobile execution, server execution, and greedy execution
21	Resource allocation in IoT network	E-greedy Q-learning	Long term weighted sum cost (task execution latency and power consumption)	Better trade-off is achieved between edge & local computing Modes
22	Intelligent Resource Allocation Framework (iRAF) for Edge paradigm	Deep Neural Network for prediction and Monte Carlo Tree Search approach for generating training data	Network states & task characteristicslike utilization of edge network resources, the channel quality, latency requirement of services.	iRAF achieves 51.71% and 59.27% performance over deep learning and greedy search methods respectively

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Planning related metrics: -

The Planning metrices helps in making decision regarding optimization. Few planning metrices are explained as below –

1. Decision Number: This metric gives us the total number of decisions made during the Edge Computing process.
2. Contradictory Decision: This gives us a measure of the number of instances wherein an already taken decision is reversed, because of some incorrect decision in the process.
3. Completion Ratio: This is defined as the ratio in which the sources compete for the various resources.

4. Cache Hit Ratio: This ratio gives us a measure of the success of the service caching system in reducing the losses encountered during data transmission within the network.

VIII Advantages of Edge Computing

From the above applications it is evident that Edge computing has emerged as one of the most effective solutions to network problems associated with transferring huge volumes of data generated in today's scenario. Below are few key benefits which is realized through edge computing: -

Elimination of Latency-

Latency measures the time required to transfer data between two points in a given network. Significant distances between the two points combined with some network congestion can result in transmission delays. As edge computing brings both the points to each other's proximity, latency issues are almost reduced to zero.

Saving the Bandwidth –

Bandwidth indicates the speed at which a given amount of data is transferred through the network. All the networks works on a defined amount of bandwidth which in turn restricts the volume of data which can be transferred between the devices By installing the data server near the points wherein the data is being generated i.e. edge computing enables several devices to run over a relatively smaller and much more efficient bandwidth.

Reducing the Congestion-

High levels of congestion is experienced on the networks due to large volume of data being generated by billions of devices every day. With the implementation of edge computing, the essential analysis is carried out at the local storage and local servers which in turns prevents congestion

IX Challenges of Edge Computing

Edge computing is still in its early years and faces some drawbacks. The major challenges in Edge Computing are described as below:

Implementation Costs - The costs associated with implementation of an edge infrastructure for a company involves both complexity and higher cost implications. The implementation requires carving out clear scope and purpose before implementation.

Incomplete Data – With the limited computational capabilities in Edge computing, the EC infrastructure setup process partial sets of information. As a result, organization may lose important data, information and time.

Security- Due to the Distributed nature of Edge Computing architecture, ensuring adequate security measures is one of the key challenges [23]. Below are the various types of security threats which EC architecture is prone to: -

- Phishing – This is a technique to obtain sensitive or confidential information from the end user who is connected to the cloud by using an IoT equipment. Cybercriminals circulate electronic content to a wide range of users / victims which encourages them to take specific actions, such as clicking on a link or replying to email etc. When the users do so, they unknowingly provide personal sensitive information like their username, password, financial details etc. The various phishing methods include email, online advertising, SMS etc.
- Malware - This is specially designed to harm an edge device, system, or data. There are different types of malwares which tries to breach the security of edge devices.

- Rootkit – This is a specific type of Malware which secretly starts accessing various parts of an edge device, software, or system. This modifies the hardware and the Operating system in such a way that it remains unknown to the edge user.
- Trojan – This is a form of malware which is non-replicating in nature however contains a hidden functionality. The Trojan usually does not try to propagate or inject itself into other files but does its assigned job for which it was made.
- Backdoor – This is a type of Malware which targets remote accessing capability into a edge device, or software, by bypassing traditional security measures installed in the devices.

Partition and Offloading tasks (resource allocation) - Workload allocation is not a simple task. Distributed computing like that of Edge computing, should also consider the location as an added aspect of computation. Resource mobility defines how to dynamically discover the resources in the network and manage all the required available resources, including long term and short-term resources. Also, in certain situations, when the edge devices are damaged, then the most important aspect is to ensure that the system resumes as fast as possible, with

the best replacements [24].

X Future Scope in Edge Computing

Constant evolution in the field of computer science, its corresponding technologies and faster development life cycles leads to unresolved issues like scalability, mobility, security and privacy, device heterogeneity, reliability, resource management, computation offloading, etc. The area of Edge Computing also continues to pose the above challenges and, in the days, to come by, we need to address these issues. Some of the most persistent issues which needs to be taken care of in future are discussed below –

Mobility – With the increase in the number of mobile devices getting connected to the edge network at a rapid pace. it is bringing forward critical challenges which needs to be addressed. With the increase in Mobility the instances of disconnections between edge devices and the edge network are also increasing thereby lowering the global quality of the services and its related parameters of such as losses, bandwidth and delay.

Security & Privacy – For any given heterogeneous edge networks, security requirements vary from device to device depending upon the applications used. While few devices can operate with lower processing capabilities demand lightweight security and on other hand delay-sensitive networks, such as vehicular networks, demand highly efficient security mechanisms to address their applications.

Heterogeneity – With the increasing number and variety of connected devices like mobile, along with the upgradation of various network access technologies like 3G, 4G, Wi-Fi, WiMAX, and the upcoming 5G, the edge eco system envisages the integration of current devices with the IoT which in turn contributes to a highly heterogeneous environment. This heterogeneity not only demands an additional effort to be made to ensure seamless handover between different network technologies but also it needs to manage several requirements from devices with requires distinctive resources from the network, like storage and computational speed. A combination of network and device management which ensures the desired computational timings and optimizes the communications along with efficient usage of devices will be the prerequisite for the success of the EC paradigm.

XI. Conclusion

Edge computing provides data storage and computing at the edge of the network, and provides Internet intelligent services nearby, providing support for the digital transformation of various industries, and meeting the requirements of different industries for data diversification. In the future, with the continuous development of the

Internet and human society, edge computing will play a more important role and effectively promote the development of various industries

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Enhancing the Cervical Cancer risk factor prediction by using ML model

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Abstract— **The most prevalent cancer among women worldwide is cervical cancer. In any country, preventative interventions are more cost-effective than curative ones. Early diagnosis of an illness yields better treatment outcomes than late diagnosis. The two major risk factors that might lead to cervical cancer include the use of hormonal preventives and age issues. Carry out cervical cancer screening tests to improve survival and decrease mortality at the earliest possible stage. This research aims to apply the different machine-learning models to find cervical cancer risk factors. Those models include the UCI voting method and ceasefires Decision tree, logistic regression, and random forest techniques. To handle unbalanced datasets, use the principal component analysis (PCA) and synthetic minority oversampling method (SMOTE). In data collection processes, datasets are validated, and the validation process is continued ten times to avoid any overfit data. This final validated dataset contains four variables with 32 different risk factors. The variables include Biopsy, Hinselmann, Cytology and Schiller. The accuracy, sensitivity, and area under the receiver operating characteristic curve (ROC AUC) of the predictive models developed for each of the four target variables were found to increase at more excellent rates with the use of the voting classifier, PCA, and SMOTE approaches. All target variables' accuracy, sensitivity, and PPA ratios increased in the SMOTE-voting model, respectively. The principal component analysis technique sped up model performance while decreasing the time it took to handle computational data. Finally, we compared our models' performance to that of numerous other research and found that, by specific criteria, our models were better able to detect cervical cancer.**

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I. INTRODUCTION

Approximately 6,000 Indian women and almost 355,000 women globally succumb to cervical cancer yearly [1]. Early detection and diagnosis utilising machine learning and artificial intelligence may significantly reduce mortality rates from cervical cancer. Researchers are using artificial intelligence and portable video imaging to build diagnostic tools to identify cervical cancer signs in women with limited access to healthcare. Countries with widespread screening programs for aberrant cells and the papillomavirus have seen a steep decline in cervical cancer occurrences. This, along with the fact that many countries with lower incomes lack access to diagnostic services and HPV vaccinations, means that the projected number of cases globally will increase by the next 10 years. There is a raise for gynecological examinations in women throughout the globe, making it all the more important to develop innovative analytic procedures that account for regional variations.

Applied Machine learning (ML) and deep learning (DL) to a wide variety of fields, including but not limited to cancer diagnosis (including but not limited to a brain tumour, cervical cancer, breast cancer, COPD), activity recognition (including but not limited to activity, exercise, and temperature detection), and cognitive health assessment (including but not limited to a review of dementia patients) (1–3, 3–10). Because of technological advancements, current medical diagnosis is more accurate than ever before (11–14). Global cancer statistics (15) says that each year there are 493,000 new cases of cervical malignancy, of which 15,000 are female malignancy cases. The fatality rate from this illness is very high (83%), mainly because it is only prevalent in 16 underdeveloped nations and also in 17 African countries. For example, in Uganda, where 65% of cervical cancer cases are proven (18).

II. PROPOSED METHODOLOGY:

2.1. Logistic regression process (LR):

Over the last two decades, medical researchers have widely used the statistical method of LR. Use method when a dataset's dependent variables take on a binary form. LR may be used as a predictive model which connects a single binary dependent variable and any number of independent variables. The correlation between the dependent and independent variables is related using linear regression. LR will help to get the output as an accurately predicted value by supporting the linear regression. Logistic regression creates a curve between 0 and 1 in the slope. There are many parallels between linear regression and this kind of regression. The natural logarithm of the probability for the target variables may be substituted for the possibilities when drawing the regression curve. There is also no need for

predictors to have normal distributions or consistent variances.

A. Decision tree (DT):

Among the many machine learning methods, DT sees widespread use. Apply the DT to do regression or classification of a dataset. As a result of answering a series of questions, segregate the data in this process. The virtual node, or root of the tree, contains all samples and is the starting point. Each primary node is subdivided into many subsidiary nodes or split in two ways. The "divide and conquer" technique is used for the tree's creation. This method ensures that all training samples are labelled consistently. Differently labelled training samples are stored in their subtree [9], [18]. A DT's numerous benefits include its versatility in dealing with data, it's capacity to recover lost values, its high potential for initial correctness, and its straightforward installation [16].

B. Random forest(RF):

The RF algorithm is a machine learning (ML) algorithm. It combines many decision trees into a single robust learner and uses them for unsupervised and supervised classification and ensemble learning. RF uses classification and regression tree (CART) technology based on bootstrap aggregation techniques to improve a non-correlated mix of many decision trees. The goal is to correctly categorise data and understand the connection between y-values and their respective independent factors (x) [10], [14]. Random subsets using train data generate decision trees, and then those trees are analysed separately using methods like information gain and the GINI index (DT). More excellent trees equal more accuracy. Each DT does not influence the creation of the features, make up the classification or the creation of the target variable; instead, each DT acts as a vote for a particular class. Then RF takes the average of all the trees if there is a regression issue or the classification with the most votes if there is a classification difficulty [9], [21].

C. Ensemble Learning (EL):

In recent years, EL's effectiveness as a method has led to its widespread use. Incorporating numerous independent machine learning algorithms, it boosts classification accuracy beyond that of typical machine learning algorithms. This method reduces the risk of overfitting the training data by integrating and averaging many classification models, which is especially helpful when working with a limited sample size. It improves the training dataset's efficiency, which is crucial for many biological applications with little data. The goals of EL approaches are improved categorization of the training data and enhanced generalization to novel data [22], [23]. Techniques like boosting, bagging, and voting are a few well-known ensemble approaches.

2.2. Imbalance issue in dataset:

The dataset may be unbalanced if there is a large discrepancy in the number of instances between the classes. Unbalance datasets are one of the issues in predicting the output, so the need to maintain the unbalanced datasets should not be more than 10% in overall datasets. For the vast majority of students, on the other hand, this accuracy nears a perfect 100 [20]. If you want to fix the issue of an imbalanced dataset, one of the finest things you can do is use a sampling technique. Numerous research has shown the superior performance of classifiers when using a balanced dataset instead of an unbalanced one. Adjusting the initial dataset by increasing the minority class (known as the oversampling method) or reducing the majority class (also known as the undersampling approach) is one use the sampling technique to produce a nearly equal representation of types (known as the under-sampling strategy) [21].

2.3. Feature selection process:

May improve a model's efficiency with the use of feature selection algorithms. In addition to strengthening the model, these methods may reduce noise in the dataset, clarify the classification techniques used by the model, and streamline their application.
(PCA) to reduce the size of a dataset while still retaining the most important details may be used to extract new, tiny, independent features. The associated characteristics may be merged as main components when using the statistical dimensionality reduction method [22]. Eigenvector advantage is used in the mathematical procedure of principal component analysis (PCA) to describe the feature orientation. In this case, transform the x-dimensional feature space into the y-dimensional main component space, where y x. They use a covariance matrix to determine eigenvectors and eigenvalues. When analysing the cervical cancer dataset, the main component is the eigenvector, with the largest eigenvalue since it best characterises the most important associations between characteristics [11].

2.4. Validation process:

Validation process is a resampling procedure for a small data sample used for testing and verifying ML models. The dataset Using cross-validation k-fold methodology, arbitrarily split into k (the number of folds) identical portions. After that, we use the remaining k-1 pieces as training data while keeping one piece as validation data for testing the model. Next, k iterations of the CV procedure are performed, with a new set of folds serving

as the test subject each time. After doing k-folds, results are combined by averaging the values [26], [11]. Unlike k-fold, Stratified K- Fold is useful when dealing with data that is not evenly distributed. Firstly, stratified k-fold performs a single shuffle before dividing and preserves row labels. In the next step, information is divided into k equal pieces. The goal is to have a uniform various models for predicting cervical cancer and to acquire insights into clinical diagnoses.

III. IMPLEMENTATION WITH RESULTS:

During the modelling phase, we put four different prediction models for each target variable in place, compared their findings, and picked the one with the highest sensitivity for spotting cervical cancer. The Jupyter Notebook, a freely distributable environment for the development and execution of Python 3.3 programmes, was used to build these prediction models. These construct the models using several Python packages, including Scikit-learn, matplotlib, NumPy, and pandas.

As a part of preprocessing, data is cleaned and organized, principal component analysis (PCA) with 11 main distribution of class percentages across folds [17].

2.5. Evaluation process:

Obtaining a correct cancer diagnosis for a patient is crucial for their well-being. Thus this is one example of how may use total accuracy to evaluate the model in biological data. Therefore, multiple metrics, including overall accuracy, are utilised to evaluate and contrast components was employed as a feature reduction approach and the time period needed to analyze them. The dataset was then partitioned into test and training sets. For this reason, use SMOTE technology in the training set to help achieve balance to the minority class's most excellent accuracy and prevent classification misleading caused by the imbalanced dataset.

As illustrated in Fig. 1, the voting classifier selects highly predicted classes as test sample class variables by combining three classifier prediction outputs. Logistic regression, random forest, and decision tree classifiers. Used The stratified 10-fold validation approach to avoid overfitting. Then, they assess the model's accuracy, sensitivity, specificity, precision (PPA), null predictive accuracy (NPA), f1-score, and receiver operating characteristic area under the curve (ROC AUC).

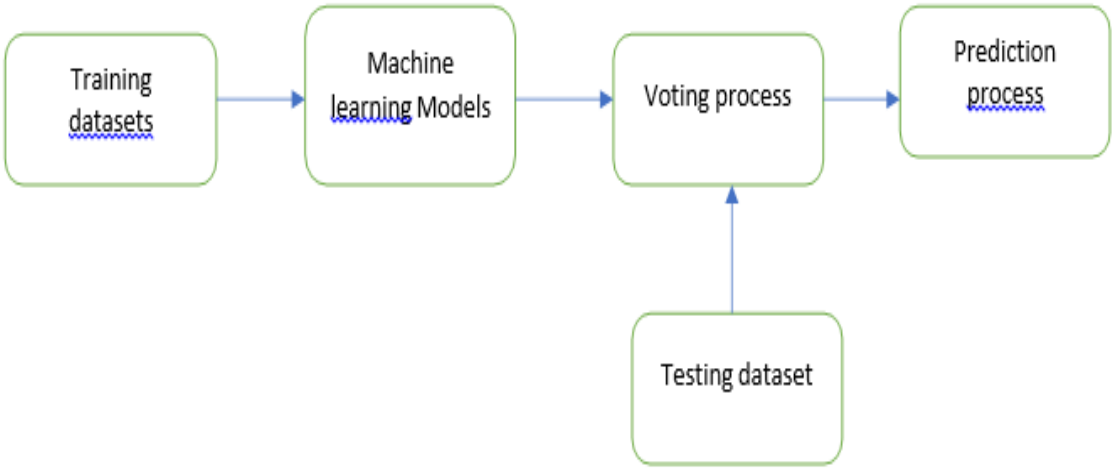

Figure 1: The voting classifier.

3.1. Hinselmann test result:

Collected a total of 1401 standard samples and 149 malignant ones. The voting model's overall accuracy jumped from 96.69 to 97.82% compared to its performance before SMOTE was included. The usage of SMOTE resulted in a 0.94% increase in accuracy, a 0.95% increase in sensitivity, and a 97.82% increase in the ROC AUC metric rate, as shown in Table-1.

Matrices %	Prior to SMOTE		Later SMOTE	
	Voting	Voting for PCA	Voting	Voting for PCA
Accuracy	96.69	97.93	97.82	98.92
Sensitivity	51	51	97.88	96.52
Specificity	99	99	98.79	98.79
PPA	49.2	49.2	78	79.9
NPA	96.3	96.3	99.5	97.7
F-score	51.1	51.1	97.23	97.83
ROC	66.72	66.72	98.32	99.1

Table 1: Hinselmann test – prediction result

Eleven main components are optimal for SMOTE-voting-PCA. This example has a negative prediction accuracy of 98.56%, measured by the ROC AUC scale; SMOTE-voting-PCA improved sensitivity by 47.48% and accuracy by 32.92% compared to voting before SMOTE. Moreover, SMOTE voting-PCA had an overall accuracy of about 98%. Thus, the voting classifier's function may be realised using the SMOTE and PCA techniques.

3.2. Schiller test result:

The voting classifier used before SMOTE achieved an overall accuracy of 91.19 per cent, based on a dataset that included 123 patients and 1125 control samples. Compared to the previous voting model, SMOTE-Voting improves accuracy by 96.32 percentage points, sensitivity by 41.23 percentage points, positive predictive accuracy by 24.2 percentage points, negative predictive accuracy by 6.2 percentage points, and ROC by 32.1 percentage points.

To put it another way, when comparing the voting model to the voting PCA with 11 significant components, the sensitivity, NPA, and f1-score all dropped by 3%, 0.43 percentage points, and 5%, respectively. Table 2 shows the best balance of accuracy, sensitivity, PPA, NPA, and f1-score by achieving the 11-component SMOTE voting PCA model for the Schiller test.

Matrices %	Prior to SMOTE		Later SMOTE	
	Voting	Voting for PCA	Voting	Voting for PCA
Accuracy	91.19	91.32	96.32	98.52
Sensitivity	56	54	95.72	98.72
Specificity	97.23	99.23	98.2	98.99
PPA	63	64	85.52	96.13
NPA	93.32	92.31	98.1	99.52
F-score	58.0	54	96.23	98.82
ROC	69.23	62.74	92.23	99.89

3.3. Cytology Test result:

Matrices %	Prior to SMOTE		Later SMOTE	
	Voting	Voting for PCA	Voting	Voting for PCA
Accuracy	95.32	95.62	92.72	92.88
Sensitivity	53.2	53.2	92.22	93.14
Specificity	99.22	99.88	96.22	95.62
PPA	61.00	74	63	70.12
NPA	96.23	96.32	96.32	98.32
F-score	54	55	92.32	94.23
ROC	61.42	49.22	73.22	94.32

With 132 malignant and 923 benign samples, the previous voting model obtained a total accuracy of 94.29% before SMOTE was included. Although the accuracy dropped to 92.72% after SMOTE, the sensitivity and ROC AUC rate improved, making this a improved result than the voting model later SMOTE.

Table V demonstrates that compared to the other models, the NPA, f1-score, ROC AUC, and sensitivity were all higher in the SMOTE-voting-PCA model with 11 main components.

Table 3: Cytology test- results prediction

3.4. Biopsy test result:

With 74 malignant and 1125 benign samples, the voting model attained an accuracy of 94.22% without using SMOTE. Table 4 demonstrates that, across the board, the voting and voting-PCA pre-SMOTE models performed similarly.

Accuracy, sensitivity, PPA, NPA, and ROC AUC were all higher in the SMOTE-voting-PCA model than in the SMOTE-voting model after SMOTE, by 4.11%, 2.55%, 7.82%, 0.89%, and 6.62%, respectively. As a consequence, Table 4 shows the findings of the examination.

Matrices %	Prior to SMOTE		Later SMOTE	
	Voting	Voting for PCA	Voting	Voting for PCA
Accuracy	94.22	94.26	96.32	98.52
Sensitivity	52	53	96.82	98.82
Specificity	99.32	99.6	97.32	99.1
PPA	60	65	84.23	90.1
NPA	94.73	94.72	98.72	99.01
F-score	53	54	96.22	98.32
ROC	66.22	53.54	95.62	99.6

IV. CONCLUSION:

Early diagnosis of cervical cancer increases the

effectiveness of treatment. If caught early enough, cervical cancer has one of the best survival rates of any illness. This study addresses these issues and develops a model for detecting cervical cancer using machine-learning techniques that is sensitive and accurate. It also produces a strategy for handling imbalanced datasets, which reduces prediction efficiency and increases false categorization. In this research, using one of the ensemble approaches (the voting method), we integrated the three models of machine learning algorithms for predicting cervical cancer. Four target variables are considered from different datasets, and PCA and SMOTE techniques are applied to improve model accuracy and maintain the balance of the dataset, respectively. From the results, it is evident that the voting approach, along with SMOTE and PCA technology to develop a prediction model, the Schiller target variable obtained an accuracy, sensitivity, and ROC AUC of 99.52%, 99.23%, and 99.89%, respectively.

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PUF based Lightweight Authentication Protocol for IoT Devices

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Abstract— **The Internet of things (IoTs) carries the secure transmission and storage of a large amount of sensitive information. This paper uses the anti-tampering and anti-cloning features of the hardware physical unclonable function (PUF) to generate a shared key, combined with security primitives such as MASK algorithm and Hash function and proposes a lightweight Anonymous key sharing security authentication protocol. Through the security analysis and verification of Ban logic and the proper tool ProVerif. It is proved that the protocol can defend against man-in-the-middle attacks, desynchronization attacks, impersonation attacks, modeling attacks, etc. By comparing other protocols, it is verified that the protocol has the advantages of low computing cost, small communication overhead and storage capacity, and high-security performance; it is suitable for secure communication transmission of resource- constrained devices.**

Keyword- Lightweight Authentication, Internet of Things, Authentication protocol, desynchronization attacks, anti-tampering

I. INTRODUCTION

With the rapid development of sensing, automation and communication technologies, the massive data generated by the IoTs (IoT) has dramatically threatened the effective and safe transmission, storage and protection between devices [1]. Traditional network Security protocols will use complex security primitives such as encryption algorithms [2], digital signatures, Hash functions [3], and message verification codes to ensure the confidentiality, integrity, and non-repudiation of information transmission [4]. , However, usually small size, strong resource constraints and low hardware processing capability, so the security primitives with slow transmission rate and high communication overhead are not suitable for the authentication of lightweight devices [5].

The secure communication of the IoTs assumes that hardware devices and systems are safe. Still, malicious attackers can destroy confidential device information using chip cloning and dissection [6]. Information encryption is an effective way to protect information security certification. Still, encryption the algorithm's key is usually stored in non-volatile memory (NVM), and the attacker can successfully read the private information in the memory through a side channel and physical attacks [7]. Physically unclonable function (PUF) is an emerging The hardware security primitives of the chip use the random process deviation that cannot be controlled in the manufacturing process of the chip to generate the unique digital signature of the device [8]. It is susceptible to physical tampering, does not need to be stored, has low hardware overhead, can solve the security problems faced by traditional keys, and is suitable for lightweight IoTs device security authentication protocols [9-11].

Key-sharing authentication protocols are usually completed using public key algorithms and digital signatures at the software layer. Still, these encryption primitives run slowly and have high communication overhead, and new quantum computing methods can effectively crack public key algorithms. To solve the problem of IoTs devices In terms of security issues in channel transmission and critical storage, this paper uses reconfigurable CROPUF anti-tampering and anti-cloning features to generate shared keys, replacing asymmetric encryption algorithms and digital signatures with high communication overhead, combined with MASK algorithm and Hash function A lightweight anonymous key sharing security authentication protocol is proposed for encryption methods such as. The protocol ensures security properties such as anonymity, availability, integrity, and forward/backward secrecy. Some authors are also proposing lightweight authentication schemes [12-14] to maintain secure communication over the IoT devices.

II. MATHEMATICAL THEORETICAL KNOWLEDGE AND RELATED WORK

1.1. PUF-based key-sharing mechanism

Author [15] used CRO PUF to generate the same shared key for devices, which is suitable for one- to-many security authentication protocols. This mechanism obtains shared keys between devices through two stages.

Phase 1: Generate a reliable response to the shared key. Obtain the high-precision delay matrix S of the CRO PUF through modeling; calculate the delay difference between all paths and sort them in descending order of absolute value. Consider the influence of different temperatures to determine threshold U. When the total value of the delay difference between the two paths is greater than the threshold, the output response is stable.

Phase 2: Generate incentives for the shared key. Store all

the paths of the delay matrix S in the set E, and enumerate all the bits of the shared key L. Randomly select two shared key L. One bit Li, if Li is equal to 1 and the delay difference is more significant than U, it means that a configuration stimulus Di that can produce a stable response of 1 has been found; if Li is equal to 0 and the delay difference is less than -U, it means that a

configuration that can generate a stable response of 0 has been found Incentive Di; otherwise, reselect the shared key L.

1.2. MASK and UNMASK algorithms

The MASK algorithm proposed by author [16] contains three parameters: the input vector s = [s1, s2, s3, ..., sl] with a length of l bits, and a set of l positive integers L = { l1, l2, l3, ..., ll|li ∈ A+ } and generate l-bit output vector sm = [sm1, sm2, sm3,..., sml]. MASK algorithm uses positive integer set L as auxiliary data and inputs vector r with length l-bit to generate an Output function sm of equal length. A set of positive integers L generates $L \rightarrow$ PRNGi(x) through a pseudo-random number generator, where y is an input vector of length n bits, and y = [y1, y2, y3, ..., yn]. Similarly, the reversible transformation UNMASK function of the MASK function uses the positive integer set L to convert the output function sm into a restored output function r.

1) Integer set generation: The vector y is used as the seed of the pseudo-random number generator PRNG circuit to generate a set of positive integers l { l1, l2, l3, ..., ll|li ∈ A+ }. The integer set L contains l n-bit positive Integer; the maximum value of any positive integer is 2n - 1.

2) Function range transformation: define a range function Range() as a linear mapping transformation, given an l-digit integer { k|k ∈ K }, whose value range is [0, 2l - 1], generate an m- digit The new set R= { r|r ∈ Z+ } with integers in the Range [0, 2m - 1], where m ≤ l. The following equation governs the linear range mapping:

$(M\text{old} - M\text{oldamin}) \times (M\text{neemax} - M\text{neemin})$

different ways from the set E for each of the

$M\text{new} = [$

$(M\text{oldmax}$

$]$

$- M\text{oldanin})$

Mold ∈ L is the input of the Range () function, Moldamin and Moldmax are the minimum and maximum values in the Range [0, 2l - 1], Nnewmin and Nnewmax are the minimum values in the new Range [0, 2m - 1] with the maximum value.

3) Bit obfuscation: The MASK function finally completes the bit obfuscation of the sequence based on the Fisher-Yates Shuffler shuffling algorithm, and a finite series of n different elements generates an n! a random permutation algorithm.

The MASK algorithm has two advantages: 1) It effectively hides the relationship between device PUF excitation and response; 2) It verifies the device's input. The PUF will not be activated without verifying the input stream, so the device will not generate any response, effectively preventing the device from any brute force attack.

III. PROTOCOL DESIGN AND ANALYSIS

This paper proposes a lightweight key-sharing authentication protocol based on the IoT device embedded with PUF, including the protocol registration phase, two-way authentication and firmware update phase. The related symbols of the protocol are shown in Table 1.

Table 1 Description of protocol-related symbols

Symbol	Meaning
CRO PUF	Reconfigurable Ring Oscillator PUF
Delay Matrix M_A/M_B	Delay Matrix M_A or M_B
(C,R)	Stimulus C and response R generated by PUF
timestamp()	Timestamp function
(n_{i1}, n_{i2})	pseudo random number
Hash(·)	one-way hash function
Fisher - Shuffler()	Shuffle Confusion Algorithm
PRNG()/TRNG()	Pseudo/True Random Number Generator

IV. FORMAL SECURITY PROOF

4.1 Formal Security Analysis

This protocol ensures the channel transmission security of IoT devices and can also defend against physical attacks on PUF by attackers. The specific security analysis is as follows.

1) Modeling attack. The machine learning modeling attack is aimed at a strong PUF with a publicly accessible CRP interface. The attacker collects many CRPs, trains, learns, and optimizes an accurate model to predict response.

2) However, the reconfigurable CRO PUF is a weak PUF used for key generation. There is no access interface to read the key generated inside the chip, and the key will not be exposed to attackers. At the same time, due to the protection of the protocol mechanism, it is protected by the MASK algorithm (DA , DB) value. The Fisher-Shuffler confusion algorithm divides the response value into two parts (sA1, sA2) and (sB1, sB2) and uses the Hash algorithm and random number generator to protect part of the response value sA1in the device. Since the Hash function is one-way, the attacker cannot obtain the real CRP value by eavesdropping on the content eA, so it is difficult for the attacker to carry out machine-learning modeling attacks on PUF.

3) Untraceability. In the IoT device identity authentication process, if the attacker cannot effectively associate the request and response information of the two authentications, the input and output results cannot be mapped, and the device is considered untraceable. The attacker passes When eavesdropping to obtain messages EA and EB because the incentives DA and DB are encrypted and protected by the MASK function; the attacker cannot infer the value of the incentive DA and DB. After the attacker eavesdrops on the messages eA and eB, that is, eA ←HashA(sA1, PRNG(nB2)), eB←Hash(sA2, PRNG(nA2)). Due to the uniqueness of the hash function, it cannot obtain the values of the shared keys SA and SB. Therefore, this protocol can prevent location tracking, as shown in figure 1.

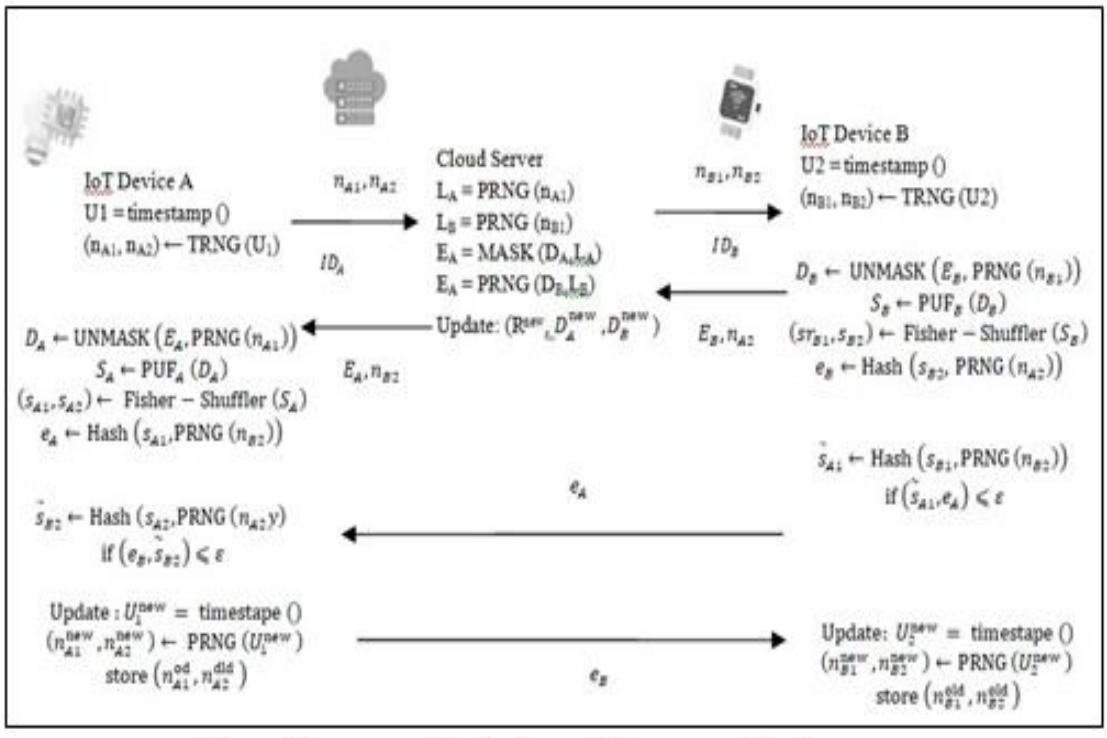

Figure 1 Two-way authentication and firmware update phase

4) Desynchronization attack. In the update phase of the protocol, the device generates new random numbers (*n*new, *n*new) and (*n*new, *n*new) and also stores the random numbers (*n*old, *n*old)and

(*n*old, *n*old). When device B is attacked by desynchronization, the random number of device A will *B*1 *B*2
be updated typically, but the random number of device B will not be updated. When the next authentication round is performed, the server will return the value EA, *n*old, given to device A, and
the value EB, *n*new, is returned to devise B. Since the verification value *e*old returned by device A
*A*2 *A*
is consistent with the previous authentication round, the dnew B returned by device B is different from the last round. Therefore it is possible to detect that the devices are not synchronized.

5) Replay attack. The protocol mechanism uses timestamps and updated random numbers (nA1, nA2) and (nB1, nB2) to defend against replay attacks. Taking the authentication of device A as an
example, assuming that the i-th and i+1 random numbers are (*n*i , *n*i) and (*n*i+1, *n*i+1),, when

the attacker obtains the i-th session message *E*i+1, *e*i+1, and performs the i+1th authentication,
A *B*
device A receives The session message of has been updated to *E*i+1, *e*i+1. Therefore, the attacker

authentication will fail, and the replay attack will be detected.

6) Counterfeit attack.

When the attacker pretends to be a legitimate device, it must send valid messages eA and eB. Using device A as an example, because the generation of information eA requires valid sA1, the input of the PUF is protected by the MASK function to stimulate CA. At the same time, the response SA is protected by the obfuscation algorithm. Due to the uniqueness of the Hash function, effective information sA1cannot be obtained even if the information eA is obtained. Therefore, in this protocol mechanism, the attacker cannot pretend to be a legitimate device and authenticate with the server. Similarly, when the attacker Masquerades as a server, the value of incentive DA and DB cannot be obtained, so mutual authentication with the device cannot be accepted.

7) Man-in-the-middle attack. This protocol can perform a man-in-the-middle attack in defense, the attacker cannot obtain valid information by eavesdropping the messages EA, nB2, EB, nA2, eA and eB. Because the eavesdropped messages are all encrypted information, if the attacker replaces the new message, the devices will not be able to identify each other causing authentication failure. Furthermore, suppose the attacker wants to parse the encrypted information. In that case, it can be known from the above impersonation attack that the attacker cannot obtain the CRP pair (DA, SA) of the PUF, so the authentication between devices will fail.

4.2 Protocol Proof

This section uses BAN logic to prove the security of the shared key generated by PUF. BAN logic is a formal analysis method for authentication protocols, which can prompt some defects that are difficult to find by non-formal methods. The logic symbols commonly used in BAN logic are shown in Table 2. Table 3 shows the logic rules widely used in BAN logic related to this section.

Symbol	Meaning	Symbol	Meaning
P |≡ X	P believes that X is true	P |⇒ X	Entity P has jurisdiction over X
P |~ X	P used to send message X	#(X)	X is fresh
P ◁ X	Entity P receives message X	(X,Y)	X or Y is part of (X, Y)
$\{X\}_K$	Use key K to message X perform cryptographic operations	$P \overset{K}{\leftrightarrow} Q$	K is between P and Q shared key

Table 3 Logic rules widely used in BAN logic

Rules	Logical Expression
Rule 1: Message Meaning Rules	$\frac{P \mid \equiv P \overset{K}{\leftrightarrow} Q, P \triangleleft \{X\}_K}{P \mid \equiv Q \mid \sim X}$
Rule 2: The Freshness Rule	$\frac{P \mid \equiv \#(X)}{P \mid \equiv \#(X,Y)}$
Rule 3: Temporary Value Validation Rules	$\frac{P \mid \equiv \#(X), P \mid \equiv Q \mid \sim X}{P \mid \equiv Q \mid \equiv X}$
Rule 4: Trust Rules	$\frac{P \mid \equiv Q \mid \equiv (X,Y)}{P \mid \equiv Q \mid \equiv X}$

For the convenience of analysis, devices A and B are denoted as E1 and E2, and the server is designated as S. After idealizing the protocol, the message-sending rules are adjusted as follows:

N1: $E1 \rightarrow T$: $nA1$, $nA2$; N2: $E2 \rightarrow T$: $nB1$, $nB2$

N3: $T \rightarrow E1$: $\{dA, nA1\}A1$, $nB2$; N4: $T \rightarrow E2$: $\{dB, nB1\}nB1$, $nA2$ N5: $E1 \rightarrow E2$: $\{sA1, nB2\}nm$; N6: $E2 \rightarrow E1$: $\{sB1, nA2\}ne$

Protocol initialization assumes the following:

A1: $E1 \mid \Xi \#\{nA1, nA2\}$ A2: $E21 \Xi \#\{nB1, nB2\}$

nn nBj

A3: $E11 \Xi E1 \odot T$; $E11 \Xi E1 \rightarrow T$

nm nm

A4: $E21 \Xi E2 \odot T$; $E21 \Xi E2 \odot T$

nm nm

A5: $E11 \Xi E1 \odot E2$; $E21 \Xi E1 \odot E2$

The target formula is as follows:

G1: $E1 \Xi\Xi$ T $\Xi \{dA\}$; H3: $E2 \mid \Xi E1 \mid \Xi \{sA1\}$; G2: $E2 \mid \Xi T \mid \Xi \{dB\}$; H4: $E1$E $\Xi E2 \mid \Xi \{sB1\}$;

Protocol initialization assumes the following:

If the target formula is established, both the device and the server T negotiate and confirm the secret key with each other, and the private key is bound to the platform integrity report and the communication channel. The following logical reasoning can be made according to the rules in Table 3.

From rule 1 and A3, N3 we know:

Therefore, the target formula G1 can be proved: D1|≡S|≡ { cA }, device A and server S share key cA.

From rule 1 and A4, M4 we know:

$nA1$

$E1 \mid \Xi E1 \odot T$,1a$\{dA,nA1\}nA1$

$E1 \mid \Xi T \mid \sim \{dA,nA1\}$

From rules 2 and A2, we know:

$E1 \mid \Xi \#(nA1)$

$E1 \mid \Xi \#(dA,nA1)$

According to rule 3 and formula (1) and formula (2):

$E1 \mid \Xi \#(dA,nA1)$,$E1 \mid \Xi T \mid \sim \{dA,nA1\}$

$E1 \mid \Xi T \mid \Xi \{dA,nA1\}$

From rule 4 and formula (3), it can be seen that:

$E1 \mid \Xi T \mid \Xi \{dA,nA1\}$

$E1 \mid \Xi T \mid \Xi \{dA\}$

Therefore, it can be proved that the target formula H1: E1|≡T|≡ { dA }, equipment A shares secret key dA with server T.
From rule 1 and A4, N4 we know:

$nm1$
$E2|\Xi E2 \textcircled{1} T,2a\{dB,nB1\}nn1$
$E2|\Xi T|\sim\{dB,nB1\}$
From rule 2 and message A2, we can know:
$E2|\Xi\#(nB1)$
$E2|\Xi\#(dB,nB1)$

Similarly, according to rules 3 and 4, and formula (5) and formula (6), the target formula can be proved: H2: E2| ≡ T| ≡ { dB }.
From rule 1 and A5, N5 we know:

nm
$E2|\Xi E1\textcircled{1}E2,2a\{sA1,nB2\}nm$
$E2|\Xi E1|\sim\{sA1,nB2\}$
From rule 2 and message A2 we know
$E2|\Xi\#\{nB2\}$
$E2|\Xi E1|\Xi\{SA1,nB2\}$

From rule 3 and formula (7) and formula (8), it can be seen that:

$E2|\Xi\#\{sA1,nB2\},E2|\Xi E1|\sim\{sA1,nB2\}$
$E2|\Xi E1|\Xi\{sA1,nB2\}$

From rule 4 and formula (9), it can be seen that:

$E2|\Xi E1|\Xi\{sA1,nB2\}$
$E2|\Xi E1|\Xi\{sA1\}$

Therefore, the target formula G3 can be proved: E2|≡E1|≡{sA1}, device B and device A share key sA1.
From rule 1 and A5, N6 we know:

$nA2$
$E1|\Xi E1 \textcircled{1} E2,1a\{sB1,nA2\}nA2$
$E1|\Xi E2|\sim\{sB1,nA2\}$
From rule 2 and A1 we know:
$E1|\Xi\#\{nA2\}$
$E1|\Xi\#\{sB1,nA2\}$

Similarly, from rules 3 and 4, and formula (11) and formula (12), it can be proved that. Target formula: H4: E1| ≡ E2| ≡ { sB1 }.

V. PROTOCOL PERFORMANCE ANALYSES

This section analyzes and evaluates the authentication protocol in terms of security attributes, storage capacity, and communication costs. The authentication protocol program between the device and the server is written in Python. The network interaction is completed by abstracting the socket connected by the TCP client/server. It makes the server wait for a connection with the device on the specified IP address. Once the device establishes a relationship with the server, the protocol performs a mutual authentication session. The server and the machine run on Windows 10, using an Intel Core i7-9750 CPU with a frequency of 2.60 GHz, Equipped with 8 GB RAM, simulating the proposed authentication scheme.
Regarding security attributes, it is compared with other protocols. In the protocol [17-21] mechanism, the attacker can obtain the CRP pair of PUF through eavesdropping, counterfeiting and physical attack. Therefore, it is impossible to defend against modeling attacks. The protocol [18] can protect against PUF attacks through the d-time locking mechanism. Still, the information in channel transmission is not encrypted, which leads to security threats such as eavesdropping, resynchronization and replay attacks in device authentication. Protocol [22-23] the device stores the old and new identities. The attacker obtains the current identity information by accessing the memory to trace the authentication information of the previous or next round, so the protocol is not irretrievable. However, this protocol uses the shared key generated by PUF. It uses the encryption of the MASK algorithm and Hashes function to ensure the privacy and non-traceability of the device.

Figure 2 and Figure 3 list the comparison with other protocols regarding device storage and communication overhead. Referring to the paper by Literature [11], the pseudo-random identity PIDiD is 128 bits, the word length of the CRP pair (Di, Si) is 128 bits, and the byte length of the key is 96 bits. This protocol only stores 128-bit random numbers (no1ld, no1ld), which is far lower than the storage capacity of other protocols. Furthermore, the protocol only transmits information (nA1, nA2, EA, nB2, eA, eB) and the communication overhead is 640 bits. Compared with other protocols [3, 5, 9-11, 18-19], the communication cost of the proposed protocol is lower than that of different schemes (as shown in figure 3), and it is suitable for lightweight devices—Security authentication scenarios

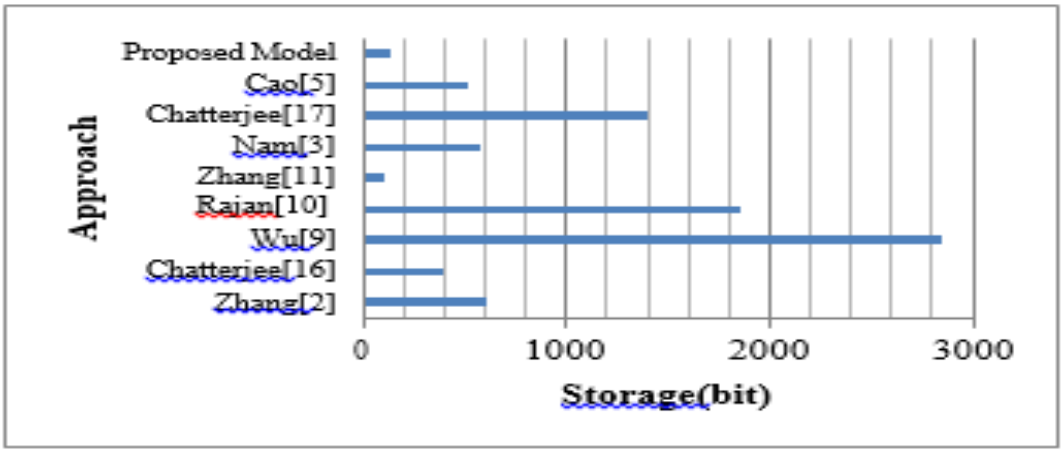

Fig.2: Performance comparison of device storage

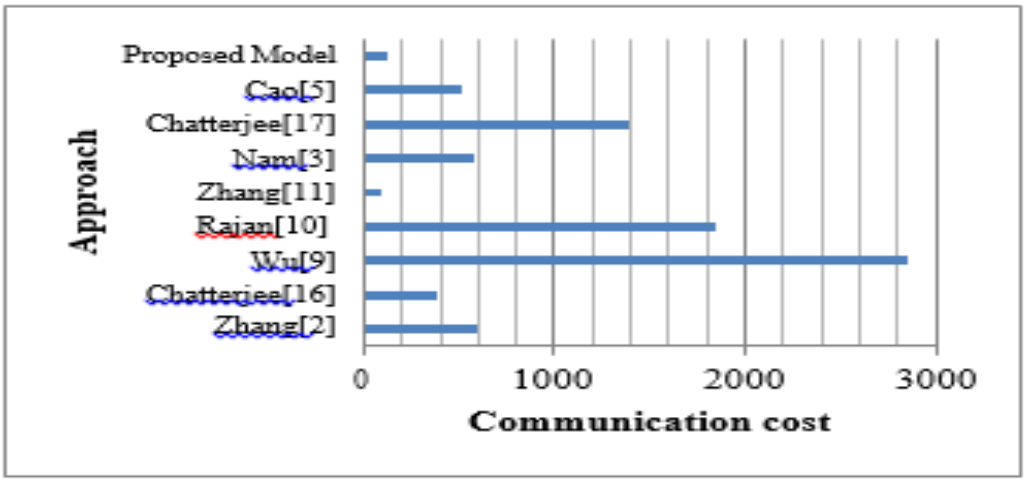

Fig.3: Communication cost in the proposed protocol

VI. CONCLUSION

The massive data generated by the IoTs brings information transmission security threats to resource-constrained terminal devices. At the same time, hardware devices usually face security issues such as chip cloning, device forgery, and key storage. Therefore, the traditional network protocol is not suitable for the security authentication of lightweight IoT devices. This paper proposes a lightweight anonymous key-sharing authentication protocol for IoT devices. This mechanism uses the characteristics of PUF anti-tampering and anti-cloning to generate shared keys on the hardware side combining security primitives such as obfuscation algorithm, MASK algorithm, and Hash function to ensure security attributes such as anonymity, untraceability, non- repudiation, and forward/backward secrecy of information transmission. Through formal verification tools, ProVerif, BAN logic, and informal, the security analysis and verification of the protocol prove the security, reliability and anti-channel attack ability of the protocol operation. Compared with other existing protocols, the proposed protocol has low computing cost, small communication overhead and storage capacity, and high security, suitable for secure communication transmission of lightweight IoT devices.

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A study of the Impact of Business Intelligence and Analytics on the modern world economy

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***Abstract*—A study on the impact of business intelligence and analytics on the modern world economy found that the widespread adoption of these technologies has led to significant improvements in business performance and decision-making. Companies that have implemented BI and analytics systems have seen increased efficiency and productivity, as well as improved customer service and satisfaction. Additionally, the study found that BI and analytics have had a positive impact on the overall economy, with increased competitiveness and innovation among businesses. The study concludes that the continued growth and development of BI and analytics will play a crucial role in shaping the future of the global economy.**

Keywords—Analytics, Business Intelligence(BI), Data, Data Analysis, Decision making, Economy.

I. INTRODUCTION

The modern economy is heavily dependent on datadriven decision-making, and the use of business intelligence (BI) and analytics has become essential for organizations of all sizes. BI and analytics tools allow organizations to collect, process, and analyze large amounts of data, providing valuable insights into their operations and the market. This study aims to investigate the impact of BI and analytics on the modern world economy. The study will focus on how the adoption of BI and analytics technologies has affected the performance of organizations and the overall economy. The study will also examine the future potential of BI and analytics in shaping the global economy. The study will be conducted by analyzing data from various sources such as published studies, articles, reports, and interviews with field experts. The findings of this study will provide valuable insights for organizations and policymakers on how to effectively leverage BI and analytics to drive economic growth and competitiveness.

II. BUSINESS INTELLIGENCE(BI)

Business intelligence (BI) refers to the tools, technologies, and processes that organizations use to collect, analyze, and present data to make informed decisions. BI typically includes a combination of reporting, data visualization, and analytics tools, as well as a data warehouse or other data storage system, to support the gathering and manipulation of data from various sources [1]. The goal of BI is to help organizations make data-driven decisions that improve performance and achieve strategic goals.

III. IMPACT OF BUSINESS INTELLIGENCE ON THE ECONOMY

Business intelligence (BI) can have a significant impact on the economy by helping organizations make better decisions, improve efficiency, and increase profitability [2]. Here are a few ways BI can impact the economy:

- Improved decision-making: By providing organizations with real-time data and analytics, BI can help them make more informed decisions that lead to better outcomes and increased competitiveness.

- Increased efficiency: BI can help organizations streamline their operations by identifying areas where they can reduce costs, improve processes, and increase productivity.

- Greater innovation: By providing organizations with access to large amounts of data, BI can help them identify new opportunities for growth and innovation that would have been difficult to uncover otherwise.

- Enhanced customer service: BI can help organizations understand their customers better, which can lead to improved customer satisfaction and loyalty.

- Increased profitability: By enabling organizations to make better decisions, improve efficiency, and innovate, BI can lead to increased profits and growth.

Overall, the use of Business Intelligence in an economy can lead to better decision-making, increased efficiency and productivity, greater innovation, improved customer service, and increased profitability for organizations, which can ultimately lead to economic growth.

IV. USECASE

One example of a use case for business intelligence (BI) in a business is sales performance analysis. A company might use BI tools to collect and analyze data on their sales, such as the number of products sold, revenue generated, and customer demographics. This information can then be used to identify trends, such as which products are selling well and in which regions, as well as which sales strategies are most effective.

Here's how BI can be used in this scenario:

- Data collection: The company's sales data is collected from various sources, such as its CRM system, financial system, and website analytics.

- Data warehousing: The collected data is then stored in a data warehouse for easy access and analysis.

- Data analysis: The company can use BI tools such as reporting and data visualization to analyze the sales data. They can create reports, charts, and dashboards to track sales performance over time, compare sales by region or product, and identify which sales strategies are most effective.

- Decision-making: The insights gained from the data analysis can be used to inform decisions on sales strategy, product development, and marketing efforts. For example, the company might decide to focus more on the products and regions that have shown the most growth or implement new sales strategies that have been successful in other regions.

- Continuous monitoring: The company can continue to monitor their sales data on an ongoing basis, using BI tools to track progress and make adjustments as needed.

- By using BI to analyze sales data, the company can gain a better understanding of its sales performance, identify areas for improvement, and make more informed decisions that can lead to increased sales and revenue.

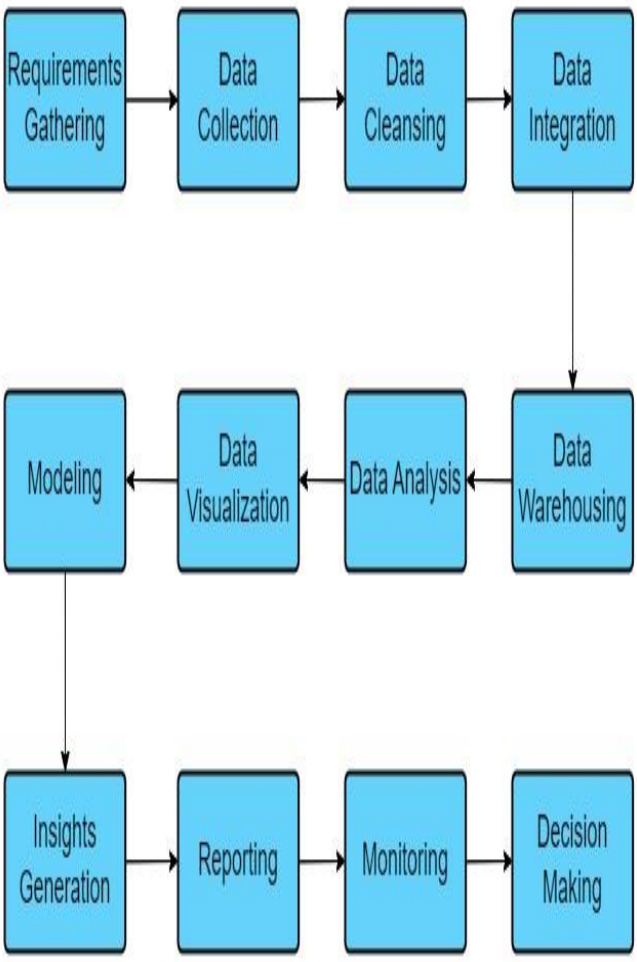

Figure 1: Business Analysis

V. ANALYTICS

Analytics refers to the process of examining data in order to gain insights, identify patterns, and make predictions [3]. Analytics can be applied to various types of data, such as financial, customer, or operational data, and it can be used for a wide range of purposes, such as improving business performance, detecting fraud, or identifying new business opportunities.

There are several types of analytics, including:

- Descriptive analytics: This type of analytics focuses on summarizing data and identifying patterns that have already occurred.
- Diagnostic analytics: This type of analytics focuses on identifying the cause of a particular problem or issue.
- Predictive analytics: This type of analytics uses historical data and statistical models to predict future outcomes or trends.
- Prescriptive analytics: This type of analytics uses data, models, and algorithms to recommend actions or decisions that can be taken to optimize a particular outcome.

Analytics can be performed using a variety of tools, including spreadsheet software, statistical software, and specialized analytics platforms. It often involves the use of data visualization techniques to help make the insights gained from the data more easily understood and actionable.

VI. IMPACT OF ANALYTICS ON THE ECONOMY

Analytics can have a significant impact on the economy by helping organizations make better decisions, improve efficiency, and increase profitability. Here are a few ways analytics can impact the economy [4]

- Improved decision-making: By providing organizations with insights and predictions based on data analysis, analytics can help them make more informed decisions that lead to better outcomes and increased competitiveness.
- Increased efficiency: Analytics can help organizations streamline their operations by identifying areas where they can reduce costs, improve processes, and increase productivity.
- Greater innovation: By providing organizations with access to large amounts of data, analytics can help them identify new opportunities for growth and innovation that would have been difficult to uncover otherwise.
- Enhanced customer service: Analytics can help organizations understand their customers better, which can lead to improved customer satisfaction and loyalty.
- Increased profitability: By enabling organizations to make better decisions, improve efficiency, and innovate, analytics can lead to increased profits and growth.
- Predictive maintenance: In manufacturing and other industries, analytics can be used to predict failures and schedule maintenance, thus reducing downtime and increasing productivity.

Overall, the use of analytics in an economy can lead to better decision-making, increased efficiency and productivity, greater innovation, improved customer service, and increased profitability for organizations, which can ultimately lead to economic growth.

Table 1 USE CASE IN DOMAIN

Table Head		
	DOMAIN	***Use Case***

1	Retail	Customer behavior analysis, Sales trend analysis, Inventory management
2	Healthcare	Patient data analysis, Clinical decision support, Healthcare fraud detection

Table Head

	DOMAIN	***Use Case***
3	Banking	Risk management, Customer segmentation, Loan approval process optimization
4	Manufacturing	Supply chain analysis, Quality control, Predictive maintenance
5	Education	Student performance analysis, Course curriculum optimization, Student retention analysis

VII. USE OF BI & ANALYTICS IN THE MODERN ECONOMY

One real-world example of the use of business intelligence and analytics in the economy is how Walmart, the largest retail company in the world, uses BI and analytics to optimize its operations and improve its bottom line. Walmart has a vast network of stores and a large amount of data on its customers and sales. The company uses BI and analytics tools to analyze this data in order to identify patterns and trends. For example, they use data on customer demographics and purchasing habits to optimize their product offerings and pricing strategies. They also use data on inventory and supply chain operations to improve efficiency and reduce waste. This allows them to make better-informed business decisions and stay ahead of their competition. Overall, the use of BI and analytics has been a key factor in Walmart's success as a company and its ability to compete in the global economy [5].

Here are some of the varied applications of BI:

- Sales and Marketing Analysis: Utilizing BI to analyze customer data, such as demographics and purchasing behavior, to improve sales and marketing strategies.
- Financial Analysis: Utilizing BI to analyze financial data, such as revenue and expenses, to identify trends and make informed financial decisions.
- Supply Chain Analysis: Utilizing BI to analyze data related to suppliers, inventory, and logistics to improve supply chain efficiency and reduce costs.
- Risk Management: Utilizing BI to analyze data related to potential risks, such as fraud or natural disasters, to identify potential threats and develop risk management strategies.
- Human Resources Analysis: Utilizing BI to analyze data related to employee performance, turnover, and benefits to improve human resources management.
- Customer Relationship Management (CRM): Utilizing BI to analyze customer data, such as purchase history and communication preferences, to improve customer relations and retention.
- Operational Analysis: Utilizing BI to analyze data related to operations, such as production and logistics, to improve efficiency and reduce costs.
- Fraud Detection and Prevention: Utilizing BI to analyze data related to financial transactions and identify patterns that may indicate fraud.

- Performance Management: Utilizing BI to analyze data related to organizational performance, such as revenue and employee productivity, to identify areas for improvement and set performance targets.
- Predictive Maintenance: Utilizing BI to analyze data related to equipment and machinery to predict when maintenance is needed and prevent equipment failure.

VIII. ADVANCEMENTS IN BI Recent advancements in Business Intelligence (BI) include the use of machine learning and artificial intelligence to improve data analysis, the integration of big data and real-time data streams, and the use of natural language processing to make BI systems more user-friendly and accessible to a wider range of users. Additionally, the increased use of cloud-based BI platforms has made it easier for organizations to access and share data and collaborate on analysis. Furthermore, the increasing use of mobile devices has also led to the development of mobile BI applications, which allow users to access and analyze data on the go.

Another advancement in BI is the use of augmented analytics, which uses machine learning algorithms to automate data preparation, data discovery, and insight generation. This allows users to quickly and easily gain insights from their data without the need for specialized skills or knowledge. Additionally, the use of data visualization tools, such as dashboards and interactive reports, has made it easier for users to understand and communicate their findings.

BI is also becoming more integrated with other technologies, such as the Internet of Things (IoT) and blockchain, to provide new insights and opportunities for businesses. IoT devices can generate large amounts of data that can be analyzed to gain insights into operations and customer behavior.

Similarly, blockchain technology can be used to secure and validate data, making it useful for supply chain management and other use cases. Finally, advancements in natural language processing (NLP) and natural language generation (NLG) have enabled the development of conversational BI systems, which allow users to interact with the system using natural language commands and receive insights in plain language. Overall, these advancements in BI are helping organizations to make better data-driven decisions, increase efficiency, and gain a competitive advantage.

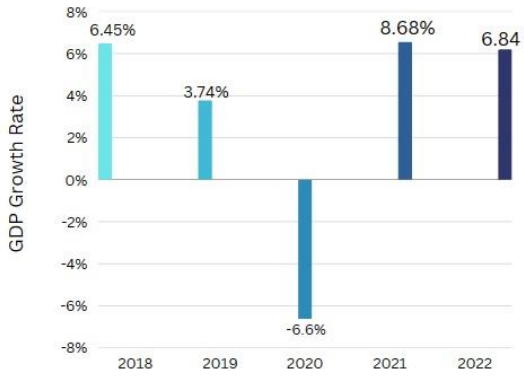

Figure 2: The Bar Graph Explain the past 5 year Economy growth of India from the financial year 2018 to 2019

The Gross Domestic Product (GDP) of India is an important economic indicator that measures the total value of goods and services produced in the country in a given year. It is a measure of the country's economic output and growth. In recent years, India's GDP has been growing at a relatively steady pace, with fluctuations depending on various economic and political factors. For example, in 2020, due to the COVID-19 pandemic, the country's GDP saw a significant contraction and dipped by 7.7% YoY, however, in 2021, it rebounded and grew by 11.0% YoY due to various stimulus measures and vaccine rollouts. It is important to note that the GDP growth rate can be influenced by various factors such as government policies, economic reforms, investment, consumer spending, exports, inflation, and more. In conclusion, the yearly growth of India's GDP has been fluctuating but has shown a positive trend over the years, with an average growth rate of around 7% in the last decade.

IX. CONCLUSION

The effective use of Business Intelligence and Analytics can change the world's perspective towards business and has a huge impact on the modern world economy leading to growth in business through the decision-making process. Also, the technology can be used by very big firms as well as small businesses and can derive business-related decisions to manage their activities. The business can be expanded in the areas of greater interest in the products.

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Benefits and Issues of Health Monitoring System Based on the IoT

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Abstract: **A world wherever everything is online and act to alternative things and folks to boost peoples lives like self driving drones and sensors for observation your health is conjointly referred to as the web of things (IoT). IoT devices are very useful in Hospitals. In most of the time using the IoT for Healthcare we replace part of the visit to the physician with an online consultation moreover some medical test can be performed remotely either, right at the patients home. In this paper author focus on Review of issue and benefits of HMS (Human Monitoring System) based on IoT smart devices can track health conditions IoT applications for health care can send a emergency signal if the patient has an asthma attack, heart failure or another medical issue.**

Keywords: **IoT, Sensor, folks, Human Monitoring System, driving drones.**

I. INTRODUCTION

At present Internet has became a part of our daily life. Internet connected devices are becoming more available, it will be harder to imagine that the internet we use today to reach people, find information and assist us in our daily live with innovative services will not be extended toward creating value out of such increased availability of connected objects[1][2]. Internet of Things(IoT) is such when the internet and networks are mashed up. According to infra structure, IoT is the combination of embedded electronics, sensors, software and connectivity and sometimes it is called internet of everything.Heterogeneity of interconnected objects are responsible for exchanging data those are interconnected between pcs, human to human, human to things, things to things[17].

The data will be accessed exploitation the power given from the magnitude of web from anyplace, any time. therefore health information will be remotely accessed with the assistance of IoT. during this sense we've developed a model for aggregation health information from patients as human to things and also the health units accessed the information to supervise the patient's state any time remotely. virtually individuals of all ages square measure exploitation mobile devices like sensible phones and tablets for exploitation numerous applications owing to being advanced mobile technologies. As health is one in all the most important problems within the sensible world therefore remote observation in everything is turning into standard. convenience of web it's currently turning into easier to use mobile technologies for medical applications.

A user can simply connect a health monitor via a mobile device to develop his or her own personal health[3]. There is currently strong need of advance in the field of health information[4].

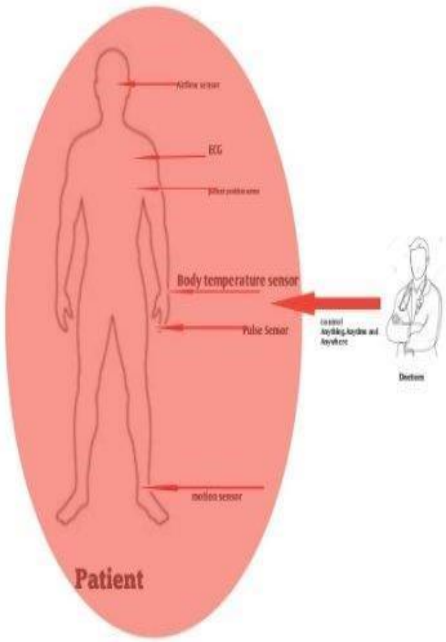

Fig: Human Monitoring System based on IoT Devices

II. SYSTEM EXPLANATION

Basically a hospital management consists of some teams of specialists like doctors, nurses, higher authorities etc. In a busy day the total units have to be compelled to be terribly careful concerning the health condition concerning their patients. however it's abundant robust to take the acceptable action once the patient are several in number. And additionally the value for the medical purpose is high for the large machines like cardiogram machine. every machine will measure every kind of knowledge solely. It takes additionally Brobdingnagian area. The management units store the health knowledge in written. But they can simply use cloud for unlimited storage with low cost. they'll talk to specialist anytime from anyplace they want. Hospital management can't offer patient's health information to their guardians uncomparable. they supply solely visiting hours to the guardians. victimisation this technique they'll easily monitor additional patients and provides correct treatments to the patients. The guardians may get the health data instantly.

A.Phidgets Interface kit

Phidgets Interface kit receives analog input which can measure the continuous quantities like as temperature, humidity, position, pressure, etc. This kit allows extensive variety of sensors which can be connected directly with this kit using cable included with the sensor[16].

1)Accelerometer : The Phidget Accelerometer is a ac- celerometer that measures 3 gravitational(29.4m/s2) change per axis having three axis(x,y,z). This sensor can measures both dynamic acceleration named vibration and static acceleration named gravity or tilt[16]

2) Touch Sensor: A binary result such as Touch Detected or No Touch Detected is the output of the Phidgets touch sensor. Touch is detected when patient is regularly using the sensors or patient is in touch of sensors[16].

3) Light Sensor: Precision light sensor measures human perceptible light level in lux; its measurement range is from
1 lux to 1000 lux of the living environment of the patient. Firing activities are measured by this sensor[16].

4) 4) 4) 4) Humidity and Temperature Sensor: Humidity sensor measures relative humidity from 10% to 95% with a typical error of 2%RH at 55% RH on the contrary temperature sensor measures ambient temperature in the range of -30oC to +80oC with a typical error of 0.75oC in the 0oC to 80oC range. The temperature sensor component is rated at -40oC to +100oC[16].

B. E-Health Sensor Shield kit

The e-Health Sensor Shield approves Arduino and Raspberry Pi users for causation of biometric and medical applications which is used for measuring health condition through using different sensors. All this information can be used to monitor in real time the condition of a patient or to get sensorial data in order to be subsequently analyzed for medical diagnosis. All this biometric information which is gathered by this kit; can be sent through wireless using any of the 6 connectivity options available Wi-Fi, 3G, GPRS, Bluetooth, 802.15.4 and Zigbee[6] depending on the application. This E- Health Sensor Shield kit also ables to make interface with Arduino and Raspberry board for making communication with personal computer[6].

1.E-Health ECG Sensor:

The electrocardiogram is such a diagnostic tool that regularly measures the electricaland muscular functions of the heart. Normally an ECG machine uses 12 electrodes, but this sensor only 3 electrodes for generating patients ECG signal because, this 3 electrode create a triangle around the heart and can receive the information form heart position V1 to V5[6]. Besides this ECG sensor is self-configurable. A user can measure a patients ECG data at any interval he likes. But minimum data interval is one micro-second when this sensor is programmed to make interface with Arduino UNO. But, as comparing with normal sinus rhythm rate[18].

2) E-Health Body Temperature Sensor: Body temperature sensor measures the temperature level of a patient. When a person get sick his body temperature do not remain constant as natural. The reason is that various diseases are accompanied by when characteristic changes in body temperature. Similarly, body temperature allows to monitor of the motion of certain diseases, and a physician can easily evaluate the efficiency of a treatment[6].

C. Arduino UNO: Arduino UNO is a microcontroller which is based on ATmega328. To support as a microcontroller it contains everything it needed. Such that it has 6 analog inputs, 14 digital input/output pins, a 16 MHz ceramic resonator, single USB connection, a power jack and a reset button. Simply the

microcontroller can be connected to a computer with a USB cable or an AC-to-DC adapter or battery to get started[15].

III. ISSUES/ CHALLENGES AND BENEFITS

 The five main benefits of IoT in patient health monitoring system:

1 .Health Monitoring :

Smart devices will track health conditions. IoT applications for aid will send and emergency signal if the patient has a respiratory disease, failure, or another medical issue.

For example, Apple has integrated AN IoT technology in aid to Fall Detection System in Apple Watch. It detects if the user falls And shows an alert. The person has to faucet 'I'm OK' for one minute. In another case, Apple Watch calls emergency services. They conjointly send a message to emergency contacts.

2 .Better Patient expertise:

IoT in hospitals improves the tending system, offers patients an easier thanks to get involved with doctors. It results in up patient expertise and gaining client loyalty. Thus, the ton in tending trade helped the U.S. (Mt. Sinai Medical Center) cut back the waiting time for five hundredth of their emergency patients victimisation AutoBed computer code.

The hospital has around 100 beds, however admits a minimum of 1000 of patients. the first task of AutoBed is matching obtainable beds with new patients. This way, IoT devices in tending assist the hospital within the economical accomplishment of the set goals.

3. Drug Management:

One of the Internet of Things health care edges is best drug management. IoT technology permits dominant the number of taken drugs. Doctors will monitor the dose and track effectiveness of treatment.

Also, the Internet of Things permits causing reminders to patients once they should to take their medication. In some cases, it's doable to inform the friend once the patient hasn't taken drugs on time.

4. Healthcare Automation:

loT devices will facilitate automatize body, manual, and routine tasks. Internet of Things medical applications

will analyze a major quantity of data and make totally different metrics to visualize any changes within the patients' health conditions. Automatic processes of collection knowledge will scale back the amount of errors in creating designation

5. Preventive healthcare:

A lot of individuals die from chronic diseases like heart condition, diabetes, and more. victimisation the analytic capabilities of ton, it's potential to supply patients with a lot of customized sorts of treatment and care.

Smart, Connected or wearable ton devices for health care will monitor condition of older or patients with chronic diseases. Having all that information, doctors are going to be able to provides a higher treatment and see the primary symptoms of the sickness.We've looked solely through the foremost common advantages of the web of Things technology. consistent with them, the role of ton in health care is to boost patients' well-being through trendy technologies likewise as boost physicians' work the loT-equipped medical devices.

 Some issue or challenges of IoT in Health Monitoring System:

1.Data security:-

The main downside of IoT for attention is poor security. information privacy is critical for the medical trade since case history is counselling. Malefactors could try and get access to the company's package and expose sensitive information. However, the good medical package development seller will effectively shield your future loTequipped app from any harmful actions of the third parties.To avoid such problems, it's a necessity to specialise in information security after you create use of heap in attention. Certainly, such a necessity can cause extra prices.

There also are such papers as GDPR and CCPA that shield personal data of patients on heap connected attention applications.

2. Integration of Protocols:

IOMT connects loads of various IoT health devices. to form a versatile scheme, attention needs exploitation the practicality of the many devices with varied protocols. However, there's no single answer concerning communication protocols and standards.

As a result, the combination of IoT within the attention trade is kind of slow and restricted.

Creating medical software system, you must make certain that your app is HIPAA and HITECH compliant. These protocols contain loads of rules and rules connected to process patients' personal data, and so as to facilitate such a compliance, you'll be able to apply to at least one of the attention IoT corporations having the in- depth experience in such Associate in Nursing integration and serving to you with success touch upon the aforesaid issue.

3. Data overload:

An IoT care device collects and processes many more of data. As a result, doctors will face information overload and accuracy problems. the big quantity of data on the internet of Things caring applications will result in difficulties in decision-making throughout treatment.

CONCLUSION

With the development of technology it may be expected that the provision of internet is everyplace. The goal of this system is to mechanically gather information from patients and store the gathered information into cloud for permanent use that may help health professionals to remotely health observance. The hospital management may be ready to monitor additional patients at a time. The system will facilitate guardians of the patients to know the health data. this technique is additionally transportable. So it may be expect that it'll facilitate the health units and guardian of the patients permanently caring and minimizing risk taking required immediate action. In future new health sensors may be additional and analysing the data to produce a satisfactory result supported the measured data to produce live opinion regarding patients state. There may be a telephony or SMS service may be enclosed to tell guardians and health units regarding patient's essential condition.This technique is very useful in day by day.

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A Future of Computer Assisted Education

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Abstract— **The cause of this evaluation paper is to discover and study boundlessly about computer-assisted schooling, and its impact on college students and their educational success. laptop-assisted mastering offers lecturers with diverse coaching statistics and multimedia platforms for easy gaining knowledge of of college students. It translates the innovation of computer-assisted education and its fulfillment in today's generation. computer-aided schooling indicates the integrated approach of the laptop and its gadgets. although, it does no longer imply on-line gaining knowledge of will subsequently replace traditional education and teachers, instead instructors the usage of computer-primarily based platforms, and their applications to teaching, like smart training, motion pictures, and web tutoring with stepped forward resources and reduced trainer workloads. by which, students can arrive, grasp, and have interaction themselves at their very own pace in a co-relational environment. furthermore, within the state of affairs of a deadly disease like this, we all are deciding on laptop-assisted education. consequently, with out pc- facilitated training these days, it'd were merely impossible for us to observe, and obtain schooling. the sector has widely opened and regular the brand new era of pc-assisted schooling. This paper is completed to differentiate the success of pc-assisted schooling.**

Keywords— Computer Assisted Education , Computer Facilitated Education , Multimedia platforms

1. Introduction

Training is a vital problem in a single's lifestyles. A correct and smart education is vital for all human beings. it's the technique of reaching accurate information, values, abilties, and useful habits. One of the fundamental important advantages of schooling is that it improves private lives and helps society to run effortlessly. it is the key to trade our non-public increase in an especially giant thank you to the fulfillment and own several opportunities in lifestyles. moreover, an knowledgeable man or woman encompasses a larger chance to range the planet collectively with his facts and ideas rather of accomplice diploma uneducated guy in society. education is the backbone of society. The government has completed and is functioning in empowering training and its regions in numerous little villages in our us of a. earlier, schooling utterly depended on books and magazines, however with the dynamic world; the training system is additionally bit via bit changed. therefore, we tend to vicinity unit currently transferring to computer systems, virtual, and virtual systems for gaining the utmost information, competencies, and statistics. computers have expanded human potentials, practically in every possible area. computers and multimedia generation has drastically reached a stage of refinement that allows lecturers to layout and create applications themselves that permit students to evolve the packages to their man or woman getting to know needs. also, computer systems make certain greater accuracy and make student's lives simpler and extra comfy.

And computer systems play a huge role inside the lives of students in the cutting-edge world. it's far the final results of many consecutive inventions by using several scientists. we can get an idea of how huge of a position this is if we have a look at some things in the contemporary world that we rely on, and primarily take as a right. generation lets in college students to help every other and paintings together for a higher expertise of the cloth. In that sense, they will every so often feature because the (supervised) instructors — and learning through guidance is idea to be noticeably powerful for mastering a topic and fixing problems. laptop-assisted training is one of the main precious gifts of state-of-the-art digital generation. With best one click on, we are in a position to have a compilation of statistics. It refers to gaining schooling thru electronic devices and digital merchandise. Now that we've got got an online learning system no person desires to keep in mind books and schools completely to attain schooling and expertise. There exists no discipline of education in which the technology isn't used, be it medical, civil, or any type of discipline. For example, computer systems assisted education is additionally used for the scientific and scientific field for higher information via visualization of the human physique, which will regularly lead to a better diagnosing pattern and makes health care quicker and more green. you'll gain any affordable understanding of any quiet subject from the utilization of digital devices and intermediate systems. digital learning is changing study room teachings within the majority of the schools, students, and institutes. smart training, video

lessons, on line-offline videos, web classrooms, and lots of extra services are available because of computer systems. laptop-assisted schooling is a simple way of gaining knowledge of and greedy the content material. We are in a position to make appealing and appealing displays to make clear subjects. With laptop-assisted studying, we will analyze every time and also multiple instances. we are able to view the videos, the recorded tutored consultation's infinite instances, and anywhere. laptop education has now not best simplified the system of training but also introduced value thereto. Due to pc-aided schooling, the method of getting to know has end up interesting.

2. What is computer assisted education?

computer-assisted training is frequently mentioned as a systematic use of computers, digital merchandise, multimedia structures, and package deal programs as a relevant function to show ideas or capabilities for the first rate improvement of the pupils. by means of victimization the materials that region unit maintain on in DVDs, cellular phones, and alternative net-primarily based resources, the schooling understanding becomes additional enticing and dynamic, that offers the students quality methods to exhibit their listening and mastering skills. it is accomplice in Nursing integrative generation that describes an academic putting anywhere a computer virus is hired to help the user in gaining knowledge of a precise problem. It refers to companion in Nursing's overall included method of educational approaches. Any use of computer systems to help or support the training or coaching of a personal. At any purpose, computer resource gaining knowledge of gives faster or slower routes through the material for oldsters of assorted aptitudes to healthy their pace and will preserve a revolutionary report for the running shoes. computer-assisted mastering is an associate in nursing most economical manner of speedy data inside the teaching subject. pc-assisted gaining knowledge of is one in every of many terms accustomed express absolutely exclusive packages of computers. therefore, other phrases include pc-aided (or assisted) practise (CAI), pc-primarily based learning (CBL), and pc-managed instruction (CMI).

There are many distinct techniques of laptop-assisted education as an example:

- smart lessons
- Recorded films
- power factor displays
- Zoom instructions
- online publications
- net meetings
- Blogs
- Wikipedia
- Social networking websites
- virtual games
- studying apps like byju's, unacadamy, and so forth.

In a pandemic situation like this maximum of the schools and schools who prefer online platforms. consequently, several pc applications like- Zoom, Microsoft companies, Google meet, and so on place unit helping the faculties, and universities within the tutorial sector. They enabled a platform anyplace teachers will produce a digital room to show, anyplace all of the scholars WHO board completely unique locations will attend the category. They offer numerous options like- screen sharing, whiteboard, hand raising, extra for a much better and charming version of coaching

Pros of computer assisted Education

- It caters to the personal needs of an man or woman.
- college students can select the language and can continually participate in active interactions.
- college students can see their daily development so that they could examine their paintings.
- college students discover it very thrilling and tasty.
- college students can discover complicated topics ruin down into small components.

Cons of computer assisted Education

- From time to time it is able to be expensive for college kids.

- Every so often teachers can discover it is difficult to enforce.

- Occasionally sports of it don't constantly healthy the desires of the trainer.

- Students can every so often habituate to isolation and may face trouble in social interplay.

In the quit, it's up to the faculty to decide whether or not computer Assisted getting to know is useful and right for his or her lessons or now not. as long as the professionals and cons are assessed pretty, the use of computers assisted getting to know inside the lecture room can be a superb manner to take benefit of new technology and build up the language gaining knowledge of studies many of the students.

3. Analysis

It has been analyzed there are numerous approaches of computer-assisted training. by that students will understand and hold close any subject matter at their very own pace, may additionally valuate themselves for their non-public growth and competencies. And it doesn't mean or result at paintings lecturers; it implies teachers exploitation computers and technologies for teaching the pupils. additionally, computers and their applications are wide hospitable in all regions of schooling from science to medicine, arts, and to plenty of diverse fields. The training quarter has been beneath a thriving advancement and is shining with upgrading technology. scholars perceive the significance of non-stop schooling. lecturers will produce virtual school rooms wherever at any time with severa alternatives like display screen sharing, massive area for notes and assignments, files, and posts; additionally numerous different alternatives for study and paintings. And many laptop packages like Zoom, Microsoft agencies, Google meet, and so on have enabled the achievement of pc-assisted education. The quantity of the education zone has raised and that they help academics and create gaining knowledge of interactive, bendy, and fascinating for college students.

4. Result and discussion

The principle goal of this observe become to investigate the effects of the computer-assisted mastering on the achievements and hassle solving competencies on the instructional sciences students. To this stop, This result leads that experiment institution's students with laptop-assisted learning techniques increase their problem solving stage, fulfillment and display a higher performance extra than the manage organization pupil. A good sized difference turned into located on the quit of the application on behalf of the test group between the instructional facts achievements of the manage group who had conventional preparation strategies and the experiment group who had laptop-assisted gaining knowledge of. This study confirmed that, computer-assisted mastering approach turned into more powerful on the students' academic facts achievements than the conventional education strategies.

5. Recommendation

- Children ought to pay constrained time with technology.

- It ought to be worn out green way.

- technology ought to be used until it serves its cause and now not harms.

- technology like this may be created to be had to rural areas

- Upgrading of technology have to be there.

- Simulation and virtualization.

- sensible computer-assisted mastering systems — partner intelligent laptop-assisted mastering machine this is at the some distance aspect the scope of this paper, can have numerous blessings in comparison to wellknown ones.
they're direct outcomes of AI ways.

- There ought to be a correctly disciplined technique of computer-assisted training
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6. Acknowledgement

I would like to expand gratitude to project guide **Prof. Vijay M. Rakhde** who guided by providing the valuable suggestion in numerous way on this project which gave us the inspiration to improve our self independency. Secondly I would like to express my gratitude toward the project mentor **Prof. Ashish B. Deharkar** who help in finalizing the work done within the limited time period, I would also like to express heartfelt thanks to Head Of Department **Lowlesh Yadav** who has given us a platform where we can work on developing the projects and demonstrate the practical applications.

7. Conclusion

The entire international is counting on the centers supplied with the aid of computers and their assisted packages to educate themselves and work. schooling is boundary-much less, wherein the computer aids in the method of overcoming the difficulties that come at the way. The use of pc-assisted getting to know enhances modern training and presents studying opportunities that can not be taught by using conventional techniques. It gives an interesting opportunity to support conventional strategies and to expand modern methods. In the future, we will see greater advanced software with virtual schooling that can speak and interact with students in a completely realistic way. however, for teachers, the task is no longer only to combine computer-assisted training into the curriculum but additionally to assess its impact on mastering inside the real international. in accordance to these outcomes, there are some hazards except the blessings that the observe unconcealed. For instance, the crew spirit among college students may additionally weaken due to man or woman works. This and similar hazards are waiting for researchers as a subject of every other study. although, in a pandemic scenario like this, simplest because of the centers of laptop- assisted technology, training is accomplishing large heaps. the belief is apparent that the pcassisted education program is the maximum used approach through institutional bodies nowadays to boom the potential of their college students.

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A Research On Digital Image Processing Technology And Application

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Abstract— **Computer virtual photo generation is a completely crucial department of the pc software discipline, and its software regions consist of measurement, pc-aided design, physics, three-d simulation and different industries. Moreover, with the development of pc hardware performance, photo processing algorithms have progressed the software of virtual photo processing generation. This article makes a speciality of the contemporary virtual photo processing generation and its software status..**

Key Words - ***Digital Image Processing Technology ,Application***

I. INTRODUCTION

Digital photograph processing generation is using laptop generation to cast off the image noise, decorate, segmentation, restoration and so on. The improvement of computer community generation has caused the development of virtual photo processing technology, the increasing stage of mathematics, and the consistent call for for digital photograph processing era from numerous industries in society, which has delivered new possibilities for digital image technology and supplied development. In the Nineteen Twenties, people used digital image processing generation for the primary time. They used cables to switch photos among the United Kingdom and the united states. but, the fine of pictures transmitted changed into not excellent. therefore, photograph satisfactory must be improved and optimized. It changed into now not until the Nineteen Seventies that virtual image processing generation had been updated. The examine of digital pics at this level additionally incorporated a pattern information gadget. As era is continuously up to date and applied to distinct fields, the requirements for virtual image processing generation are becoming higher and better, which additionally hurries up the development of virtual photo processing era.

With the boom of laptop processing power, humans use laptop processing gadgets to slowly shift from characters to photographs. According to statistics, today's records, particularly Internet records, transmits and shops greater than 80% of the records. Compared with the records of the man or woman type, the photograph records is an awful lot greater complex, so it's miles greater complex to manner the characters at the laptop than the photograph processing. Therefore, so one can make using photograph records more secure and greater handy, it's miles mainly essential to perform associated utility studies on photograph virtual media. Digital media photograph processing generation in particular

consists of denoising, encryption, compression, storage, and lots of different aspects. The motive of photograph denoising is to put off the noise of the herbal frequency withinside the photograph to obtain the traits of highlighting the that means of the photograph itself. Because of the photograph acquisition, processing, etc., they may harm the authentic sign of the photograph. Noise is an essential aspect that interferes with the readability of an photograph. This supply of noise is numerous and is in particular derived from the transmission manner and the quantization manner. According to the connection among noise and sign, noise may be divided into additive noise, multiplicative noise, and quantization noise. In photograph noise removal, normally used strategies consist of a median clear out out approach, an adaptive Wiener clear out out approach, an average clear out out, and a wavelet rework approach. For example, the photograph denoising approach achieved via way of means of the community averaging approach used withinside the literature is a median filtering approach that's appropriate for eliminating particle noise in an photograph acquired via way of means of scanning. The community averaging approach strongly suppresses the noise and additionally reasons the paradox because of the averaging. The diploma of ambiguity is proportional to the radius of the field. The Wiener clear out out adjusts the

output of the clear out out primarily based totally at the neighborhood variance of the photograph. The Wiener clear out out has the pleasant filtering impact on photographs with white noise. For example, withinside the literature this approach is used for photograph denoising, and desirable denoising consequences are acquired.

Median filtering is a normally used nonlinear smoothing clear out out this is very powerful in filtering out the salt and pepper noise of an photograph. The median clear out out can each put off noise and guard the rims of the photograph for a high-quality recovery. In the real operation manner, the statistical traits of the photograph aren't needed, which brings a whole lot of convenience. For example, the literature is a a success case of photograph denoising the usage of median filtering. Wavelet evaluation is to denoise the photograph via way of means of the usage of the wavelet's layering coefficient, so the photograph information may be nicely preserved, inclusive of the literature Image encryption is every other essential utility location of virtual photograph processing generation, in particular such as aspects: virtual watermarking and photograph encryption. Digital watermarking generation at once embeds a few identity records (this is, virtual watermark) into virtual carriers (such as multimedia, documents, software, etc.), however does now no longer have an effect on the use cost of the authentic service, and isn't without problems perceived or observed via way of means of a human notion system (inclusive of a visible or auditory system). Through the records hidden withinside the service, it's miles feasible to verify the content material creator, the purchaser, transmit the name of the game records, or decide

whether or not the service has been tampered with. Digital watermarking is an essential studies route of records hiding generation. For example, the literature is the end result of reading the photograph virtual watermarking approach. In phrases of virtual watermarking, a few researchers have attempted to apply wavelet approach to study. For example, AH Paquet and others used wavelet packet to perform virtual watermark non-public authentication in 2003, and efficaciously delivered wavelet principle into virtual watermark studies, which spread out a brand new concept for photograph- primarily based totally virtual watermarking generation. In order to obtain virtual photograph secrecy, in practice, the - dimensional photograph is commonly transformed into one-dimensional data, after which encrypted via way of means of a traditional encryption set of rules. Unlike regular textual content records, photographs and movies are temporal, spatial, visually perceptible, and lossy compression is likewise feasible. These functions make it feasible to layout greater green and stable encryption algorithms for photographs. For example, Z Wen and others use the important thing cost to generate real-cost chaotic sequences, after which use the photograph scrambling approach withinside the area to encrypt the photograph. The experimental consequences display that the generation is powerful and safe. YY Wang et al. proposed a brand new optical photograph encryption approach the usage of binary Fourier rework laptop generated hologram (CGH) and pixel scrambling generation. In this approach, the order of pixel scrambling and the encrypted photograph are used as keys for decrypting the authentic photograph. Zhang X Y et al. mixed the mathematical precept of -dimensional cell automata (CA) with photograph encryption generation and proposed a brand new photograph encryption set of rules. The photograph encryption set of rules is handy to implement, has desirable security, big key amount, desirable avalanche impact, excessive diploma of confusion, diffusion traits, easy operation, low computational complexity, and excessive speed.

2. Overview of Digital Image Processing Technology

Digital image processing, also called pc image processing, consults to the method of converting an image sign into a digital sign and processing it with a pc.This method includes image enhancement, blare reduction, segmentation, restoration, encoding, compression, and extraction of options.The method of digital image processing is displayed in figure 1.Image processing tech cannot be developed without the advancement of computers, the advancement of mathematics, and the development of application provisions . scientifically, and individuals utilized this tech to execute idealized processing of output images.afterwards years of advan cement, the common electronic image processing tech has the after characteristics: greater reproducibility: in comaprison with familiar analog image processing and digital image processing will not be because of storage, copying, or transmissio n in image processing.Causes the replace of image quality; The occupied frequency gang is wider: this is relative to the la nguage details, the image details is many orders of importance bigger than the frequency group of the languageDigital images could be processed from microscopes to astronomical telescopes.elevated adaptability: Electronic images could be utilized nearly as much as they have the ability to be expressed utilizing mathematical formulas and mathematical logic

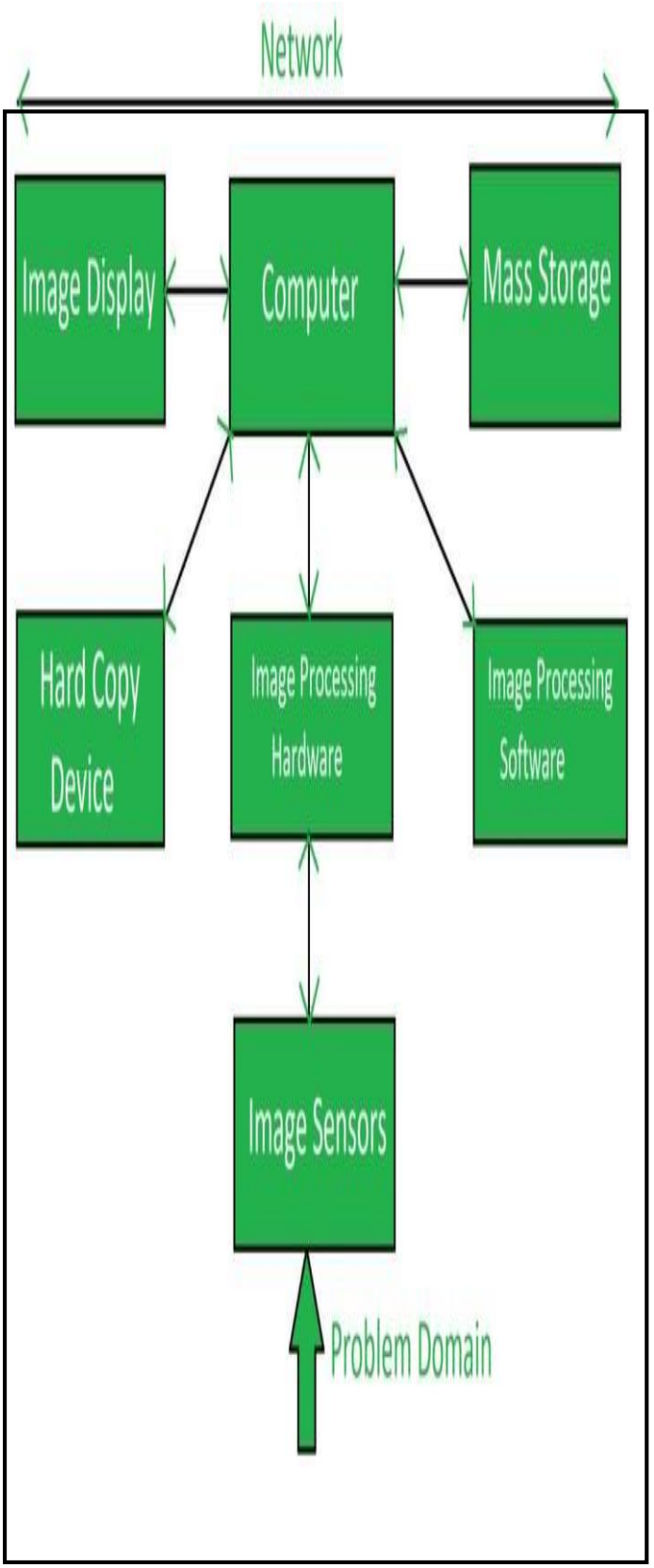

Fig :1 : Process Of Digital Image Processing

as viable. photo recovery is often a difficult and complicated inverse filteringmanner. in particular while the manner of causing picture degradation is extra complex anddifficult to predict, picture healing is more tough to best. irrespective of whether or not the photo ismore desirable or restored, all of the pixels of the complete image need to be calculated. The computationalcomplexity of the photograph pixel is likewise significant.

Photo Compression. some other crucial problem in image processing is the compression of photorecords. mainly after obtaining a big variety of static and dynamic snap shots, the finest difficultyencountered when moving them to the consumer terminal or storing the images for destiny use is thelarge quantity of facts of the snap shots. for instance, a frame of colour image has a facts amount ofabout 768 KB. If no picture compression processing is achieved, it's far tough to save alarge amount of photo data. on the equal time, this trouble also exists within the photograph transmissionsystem, a large number of photo information is tough to speedy transfer, or the transmission of photofirst-rate necessities are very high (inclusive of digital television transmission charge to 100Mb / s), those aredifficult transmission systems suffered. The compression of photo statistics is a crucial problem inthe storage and shipping of photos, or even inside the multimedia technologies referred to later.studies on photo compression coding protracted records. up to now, new technology andtechniques are nonetheless being explored. The image compression coding technique specially removes a massivequantity of data redundancy generated inside the photograph garage process. For better outcomes, excessivedefinition photograph compression coding techniques together with predictive coding, rework coding, andentropy coding can be used.

3. Development Of Digital Image Processing Technology

Since the united states of america started to gain a big quantity of moon photos thru satellite tv for pc and processed it using virtual technology due to the fact 1964, increasingly corresponding technologies have all started to be implemented to photo processing. digital photograph processing additionally occupies an impartial role as a science. The status of disciplines has began for use in clinical studies in various fields. another bounce-ahead development of image era regarded in 1972. The sign was the birth of CT medical generation. below the steering of this technology, an X-ray computed tomography tool was used. consistent with the projection of the human head, the computer processed the information. Reconstructing pass-sectional pics, this photo reconstruction approach changed into later prolonged to a whole-frame CT device and made contributions to human development throughout the instances. eventually, virtual image processing technology turned into utilized in greater fields and evolved into a new discipline of limitless potentialities. Ten years later, virtual photograph processing technology additionally evolved inside the deeper course. people commenced to construct digital human imaginative and prescient structures via computers. This era is referred to as photograph knowledge or laptop vision. many nations have invested a number of research electricity on this area and feature made profound research results. among them, the visual computing theory proposed on the cease of the Nineteen Seventies provided the guiding ideology for the later theoretical development of computer virtual photo generation, however theoretically As such, there are nevertheless many problems in practical operation. China started studies on pc era for the reason that founding of the humans's Republic of China. for the reason that reform and establishing up,

China's improvement in computer virtual photo processing generation has been very massive. Even in some theoretical research, it has caught up with the world's superior stage. With respect to the capability to collect imaging records, China efficaciously acquired a collection of sensors and launches of Earth observation satellites to acquire timely and effective records on wind, sea, sources, and environmental catastrophe reduction, and accomplished effective information. similarly, representatives of virtual image processing generation in a much wider variety of fields are construction, site visitors engineering and biomedical engineering. The application of digital image processing era in these elements can high-quality reflect the current improvement of the era. within the production enterprise, digital picture processing technology can convert the peak, density, and different information which can affect building high-quality and the built environment into the photo of the constructing or group of homes to be constructed, to be able to allow designers to plot more rationally; within the subject of engineering, digital image technology and voice, textual content and different elements constitute the simple content of contemporary multimedia. in the system of shifting images, encoding generation is used to compress the bit quantity of information. The contemporary development content of this era consists of transform coding, and so on. What can also play a function is wavelet remodel picture compression coding, department coding and so on. In biomedical engineering, ebook photograph era can objectively present the mechanism of human sports to researchers in the shape of images, which has an irreplaceable function within the future improvement of medication.

4. Application Of Digital Image Processing Technology

virtual photo processing technology has made super development in all walks of lifestyles. The software fields of digital photograph processing are shown in table 1. In far flung sensing and aerospace, many international locations have dispatched reconnaissance aircraft to take aerial snap shots of goal regions, and then used picture processing

strategies to research pictures. This stored manpower and physics, and may also reap other beneficial information from photographs. because the 1960s, america and different countries have launched useful resource far off sensing satellites. due to the very negative imaging conditions, the great of the picture itself isn't high, and virtual photo processing technology is required, together with scanning with a multi-band scanner. Imaging, image resolution is 30m and these pics are converted to virtual alerts and processed. digital image processing generation has been extensively utilized in various countries, including forest surveys,

catastrophe monitoring, resource exploration and also urban planning.

Field	Application
Physics and Chemistry	Spectrum Analysis
Biology and Medicine	Cell analysis; CT; X-ray analysis
Environment Protection	Research of atmosphere
Agriculture	Estimation of plants
Irrigation Works	Lake, river and dam
Weather	Cloud and weather report
Communication	Fax; TV; phone
Traffic	Robot; products
Economic	IC-card
Military	Missile guidance; training

Table: Application analysis table of digital image processing

The software of digital picture processing era to the aviation discipline can use JPL to better technique the pix lower back with the aid of the Moon and Mars. it is utilized in aircraft far flung sensing and satellite faraway sensing technology, specially thru reconnaissance plane to a certain area of the Earth. In aerial shooting, after the required photographs are processed via the picture, the virtual code can be saved inside the air, and then the satellite tv for pc can pass through the processing center whilst the satellite tv for pc passes over the vicinity with the receiving station. The photograph is analyzed in actual time, and judgment studying can be processed in this technique using a couple of virtual picture processing techniques. digital picture processing generation first came from the medical discipline. consequently, within the field of biomedical engineering, virtual image processing era has additionally performed a huge position.

In addition to the above-referred to CT, there are nevertheless some microscopic image processing technologies, specifically to discover purple blood cells, white blood cells, and chromosome analysis have played an crucial role in clinical diagnosis and remedy of X-ray photo enhancement, electrocardiogram analysis, and ultrasound photo processing strategies. digital photo processing is implemented to the scientific field and is mainly utilized in photograph processing technology along with clinical ultrasound imaging and X-ray angiography. virtual picture processing era plays a completely essential role inside the in addition diagnosis of diseases. The digital photo processing generation is carried out to the real clinical field.

The method is to apply the image overlay technology to perform the non-unfavourable check; the usage of image processing generation to investigate the wise fabric has performed a advantageous role in human exploration of the microscopic homes of the material. In conversation engineering, the primary improvement trend of contemporary communications is incorporated multimedia communications. this is, televisions, computer systems, and phones are mixed and transmitted on virtual communications networks. The maximum complex and difficult areas inside the transmission manner focus on snap shots. In processing, for instance, if the colour tv signal charge is greater than one hundred Mbit/s, the quantity of bits had to compress the facts needs to be transmitted. therefore, the key to the fulfillment of the technology is code compression. At present, new coding strategies that the us of a are vigorously developing, along with wavelet transform photograph compression coding and adaptive photograph network coding, etc. similarly, virtual photograph processing technology is often applied in communications engineering. The application of communique specially specializes in the layout of sound phrases and the analysis of photo facts. it's miles an natural combination of tv, telephone and pc. digital photograph technology is mainly vital on this method. it is code compression. The current coding techniques encompass remodel coding, adaptive community coding, and wavelet

rework photograph compression coding. In business and engineering, the principle packages are centered on the fine of parts in automatic system wiring, pressure evaluation of elastic-mechanical photos, and automated sorting of postal letters, and many others., as well as packages in smart robots.

In navy and public protection, the application of virtual picture processing technology specially specializes in precision steering of missiles, research images, and transmission and display of snap shots. inside the region of public safety, it is specifically used within the identification of human faces, fingerprint identification, and photo recovery. in addition to the utility areas described above, the virtual picture processing generation has additionally been extensively utilized in tv picture enhancing, costume layout, coiffure layout, and restoration of cultural materials.

digital picture processing generation can also be implemented to the military and public security fields, and has performed an lively function in these elements. The application in navy affairs is mainly implemented to the transmission of snap shots, the garage and display of images, and so on., and is maximum usually used within the application of automatic command structures. The software within the public safety field is applied to the general public safety personnel to research and interpret the images despatched back, and has played a terrific effect. The most essential in the public safety device is the reputation of faces and the repair of incomplete images. The biological area is also using digital photo processing era.

3. Acknowledgement

I would like to expand gratitude to project guide Prof. Vijay.M.Rakhde who guided by providing the valuable suggestion in numerous way on this project which gave us the inspiration to improve our self independency. Secondly I would like toexpress my gratitude toward the project mentor Prof. B.Deharkar who help in finalizing the work done within the limitedtime period, I would also like to express heartfelt thanks to Head Of Department Lovelesh Yadav who has given us a platform where we can work on developing the projects and demonstrate the practical applications.

4. Conclusion

To sum up, this paper first analyzes the studies status and most important software fields of virtual picture processing technology, after which research the improvement trend of virtual photo technology. At gift, digital image processing technology has been broadly utilized in life. as an instance, programs in networks, mobile phones, and many others., the development of virtual picture processing technology is carefully related to humans's lives. With the continuous improvement of technology, digital picture processing era will continue to be acquired. progress, these also want greater humans to examine

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Bidirectional Attention Mechanism-based Deep Learning Model for Text Classification under Natural Language processing

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Abstract— **Existing text classification models based on graph convolutional networks usually update node representations simply by fusing neighborhood information of different orders through adjacency matrices, resulting in an insufficient representation of node semantic information. In addition, models based on conventional attention mechanisms only Word vectors are forward- weighted representations, ignoring the impact of negative words on the final classification. This paper proposes a model based on a bidirectional attention mechanism and a gated graph convolutional network to solve the above problems. The model first uses the gated graph convolutional network selectively fuses the multi-order neighbourhood information of the nodes in the graph, retains the information of the previous order, and enriches the feature representation of the nodes. Secondly, the influence of different words on the classification results is learned through a two-way attention mechanism. While giving positive weights to terms that play a positive role in classification, negative consequences are given to words that have adverse effects of weakening their influence in vector representation, thereby improving the model's ability to discriminate nodes with different properties in documents. Finally, maximum pooling and average pooling are used to fuse the vector representation of the word, and the document representation is obtained for the final classification. Experiments are carried out on four benchmark data sets, and the results show that the method is significantly better than the baseline model.**

***Keyword- Natural Language processing, text classification, LSTM, Deep Learning, CNN, attention mechanism*.**

I. INTRODUCTION

Text classification has been widely used as the primary task and core technology of natural language processing, including spam detection, sentiment analysis, news classification, etc. Traditional text classification methods based on machine learning include Naive Bayesian [1] and Support Vector Methods. However, these methods require manual
feature extraction, which is labor-intensive and inefficient.

In recent years, with the continuous development of deep learning, convolutional neural networks (CNN) and recurrent neural networks (Recurrent Neural Networks, RNN) have been widely used in text classification. However, most of these models focus on capturing the local information of words. In continuous communication, discontinuous and distant words lack mutual information. Text classification models based on Graphical Convolutional Networks (GCN) [4] can handle tasks with rich structural relationships and solve the relationship between nodes to a certain extent. However, most previous GCN-based models update node representations by fusing neighbourhood information of different orders through an adjacency matrix, which cannot generate word representations well. And based on attention (Attention) [5], the model usually uses the sigmoid function to formulate a positive attention score distributed between 0 and 1 and cannot give negative weights to words that have an adverse effect while ignoring word pairs that have an adverse effect The impact of document representation.

Aiming at the above problems, this paper proposes a text classification method based on a gated graph convolutional network and a bi-directional attention mechanism. The technique first constructs each document as a document graph so that the model can achieve inductive learning. Secondly, the convolutional graph network is improved, using the gate mechanism to selectively fuse the multi-order neighbourhood information of the nodes in the graph, using the previous order information and the updated information to iterate, and the effect achieved is to enrich the node features and generate words. - Better hidden layer representation. Then use two-way attention to improve the traditional attention mechanism to a certain extent. Unlike the conventional attention mechanism, it uses tanh as the activation function to give positive weights to the words that play an active role in the classification. At the same time, negative consequences are assigned to terms that

have the effect of weakening their influence in the document representation so that the model can distinguish words that play different roles in the final classification. Then the assignment adds weighted features to the original part so that the model can enhance the features of words with positive influence and weaken the details of terms with negative impact to obtain a more differentiated feature representation and help the model classify better. Finally, word representations are fused into document representations using max and average pooling for final classification. Overall, the main contributions of this paper are as follows:

(1) Using the gating mechanism to improve the convolutional graph network, a gated chart convolutional network is proposed. The network selectively fuses the multi-order neighbourhood information of the nodes in the graph and retains the neighbourhood information of the previous layer—better-generated word node representations.

(2) The attention has been improved to a certain extent so that the model gives positive weights to the words that play a positive role in the classification and gives negative consequences to the terms that negatively weaken their influence in the document representation. In this way, the ability of the model to discriminate nodes with different properties in the document is improved.

(3) Many experiments have been carried out on four text benchmark datasets, and the results show that the model in this paper is significantly better than the baseline model, which verifies the model's effectiveness in this paper.

II. RELATED WORK

Existing text classification methods using deep learning have made significant progress.Literature. [6] proposed the TextCNN model to extract local and position-invariant features in documents. Literature. [7] used CNN to remove character-level feature representation and achieved good results. Literature. [8] used Bi-LSTM to capture long-distance semantic information in documents using a gating mechanism. Literature. [9] used an optimized multi-channel CNN to extract local features to compensate for the neglect of Bi-RU. Insufficient local features. Literature. [10] used Multi-timescale LSTM to capture context information of different time scales to model long documents. Since CNN and RNN prioritize local information and order information, although these models

can capture local Semantic and syntactic information in word sequences, but ignores the interactive communication of discontinuous and long-distance words. Therefore, attention mechanisms and convolutional graph networks are widely used in text classification to solve these problems and have achieved specific results.

The attention mechanism was first proposed in computer vision [11]. In natural language processing, the attention mechanism was first used in the machine translation task based on the decoder [12] and then extended to other tasks. Literature. [13] combined Attention with Bi-LSTM for relational classification tasks. Literature [14] proposed a hierarchical attention model, using attention structures at the word and sentence levels so that the model can give words and sentences differently. Literature. [15] used attention to calculate the weight value of each concept in the knowledge map, reducing the impact of irrelevant noise concepts on short text classification. However, these attention-based models usually only perform node vectors. Simple positive weighting to obtain document representation cannot well weaken the influence of negatively affecting words on document representation.

Graph convolutional networks have recently received more and more attention. Literature. [16] proposed a graph-based CNN model, which converts documents into graphs for the first time and uses them as the input of graph convolutional networks. Literature. [17] proposed Text-CN, which first uses documents and words as nodes in the chart, then uses sliding windows to generate edge relationships between words, builds a sizeable heterogeneous chart based on the corpus level, and finally uses graph convolution. The network classifies the document nodes. Literature. [18] constructed a document graph for each document, and the weights of the edges between words are randomly initialized and shared globally and are constantly updated during training; A word node uses the Message Passing Mechanism (Message Passing Mechanism MPM) [19], first aggregates the information of its neighbour nodes, and then updates the node representation. Literature. [20] use heterogeneous graphs and topic models to classify short texts. Based on GCN, although text classification models can solve the mutual information problem of non-continuous and long-distance words in documents to a certain extent, these models usually update node representations by simply fusing neighbourhood information of different orders through adjacency matrix and do not make full use of the knowledge of nodes. Multi-order neighbourhood information cannot update the word node representation well.

III. Model based on bidirectional attention and gated graph convolutional network

The model in this paper consists of four essential parts: graph construction layer, gated graph convolutional network layer, bidirectional attention pooling

layer and classification layer. The overall framework of the model based on bidirectional attention and gated chart convolutional network is as follows: It is shown in Figure 1. This section first gives the overall algorithm of the model and then introduces the four parts in detail.

The specific description of the model in this paper is shown in Algorithm 1.

Algorithm 1 Model based on bidirectional attention and gated graph convolutional network

Input: Document Text = (word 1, word 2, ⋯ , word 1)

output: document says h*g*

1. Preprocess text in a standard way, including tokenization and stopword removal
2. Based on the sliding window, the text is constructed as a graph, and the feature matrix X and the adjacency matrix A˜
3. fornodeingraph:
4. Vi ← Glove embedding /∗Represent words as vector form∗/
5. forlayertin{2,3,4, ⋯ , *T*}:
6. h˜t ← tanhf_0(A˜ht−1Wb)/∗Transfer the first-order neighbourhood information of the node to its own node∗/
7. $\alpha \leftarrow$ (Wc ht−1)/∗Get the selection matrix α with gating function, control the aggregation of node neighbourhood information∗/
8. ht ← ht−1 ⊙ α + h˜t ⊙ (1 − α)/∗Selectively fuse different order neighbourhood information∗/
9. ht′ ← tanhf_0(W ht + b)/∗Get deep node representation∗/

n s

10. score ← tanhf_0(Ws ht + bs)/∗Get bidirectional attention score∗/

–

11. h ← score ⊙ h

t ′ /∗ assign weight to node representation∗/

12.

–

hn ← h + h

t ′ /∗ is added to the original feature to enhance the node feature∗/

13. hg ← MaxPf_0(h1 ⋯ hn) + MeanPf_0(h1 ⋯ hn)/∗Use maximum pooling and average pooling to obtain document representation for classification∗/.

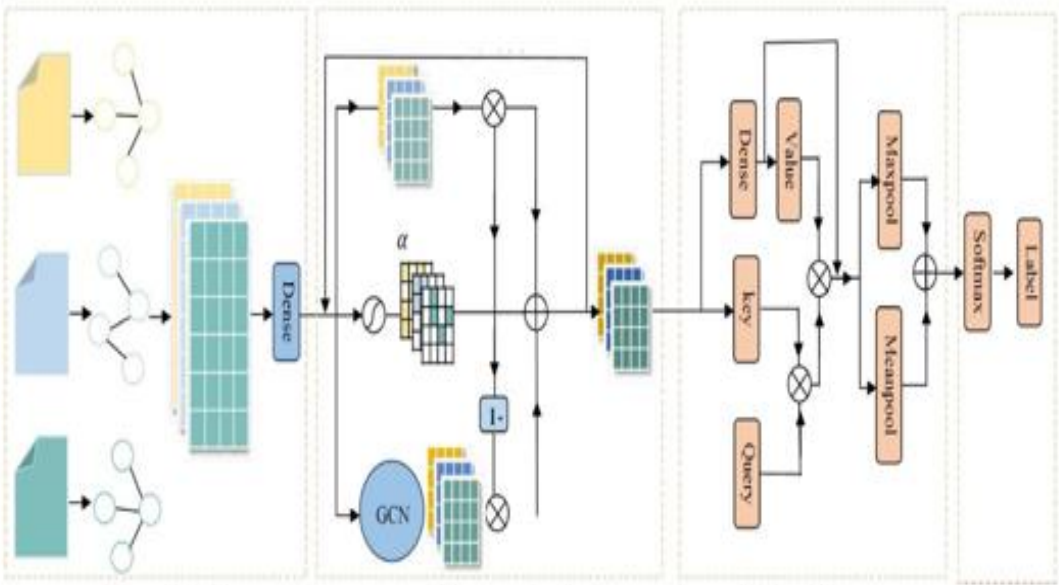


Figure 1. The overall structure of the convolutional network model based on bidirectional attention and gated graph

4.3 Experimental Environment And Result Analysis

The operating system is Linux, the memory is 64GB, the CPU is AMDEPYC7302, and the graphics card is 24GB NVIDIA GeForceRTX3090. The model in this paper is implemented using the Pytorch framework.

Table 3 lists this model's GPU memory and time overhead and other models on different datasets (memory and time consumption under the same environment configuration). The data in Table 3 shows that the model in this paper has apparent advantages in terms of memory usage and running time. The reasons are as follows: Text-GCN needs to use training and test documents to build a graph based on the corpus level, which will inevitably generate many edges and consume a certain amount of time. The video memory and time; Text-Level-GNN randomly initializes the weight of the border between words, which belongs to the model parameter. It needs to be updated iteratively during training, so it takes up a part of the time and video memory; the graph constructed in this paper belongs to the document level, and the weight of the edge is in the document construction graph. The time is determined, so it will not consume too much time and video memory.

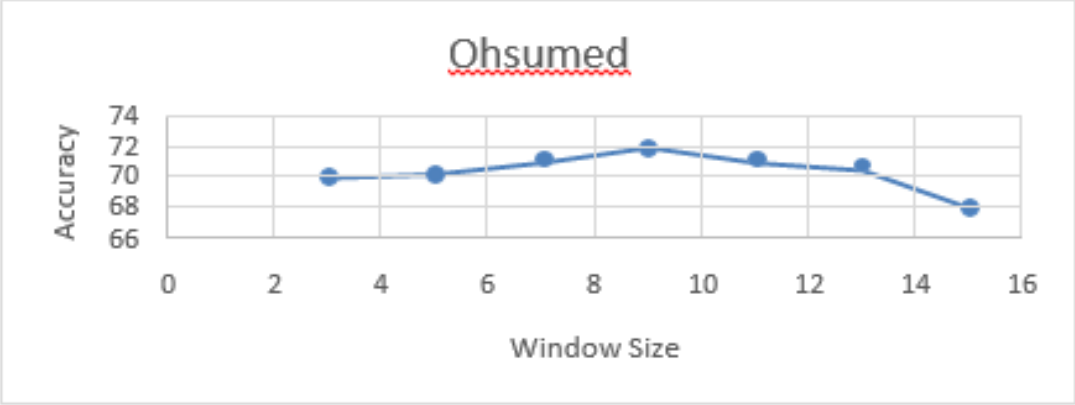
Table 3 GPU memory consumption and running time

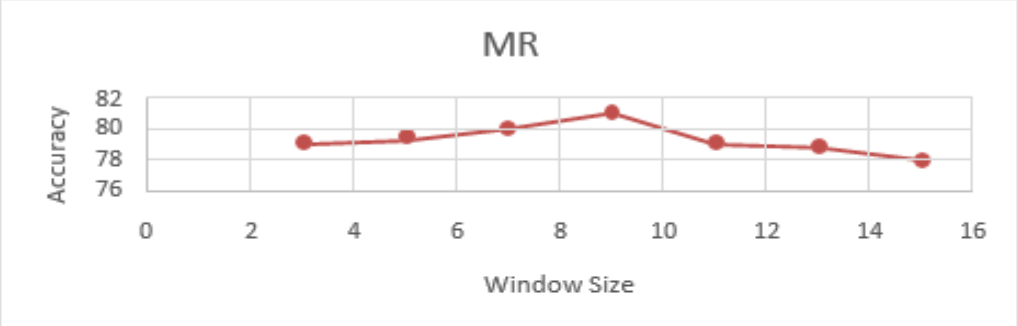
Dataset	Model	Memory/MB	Time/s
Ohsumed	TextLevelGNN	9725	495
	Text-GCN	7195	365
	OurModel	2235	248
R8	TextLevelGNN	8455	585
	Text-GCN	4635	155
	OurModel	1825	125
R52	TextLevelGNN	9175	635
	Text-GCN	5188	195
	OurModel	1865	156

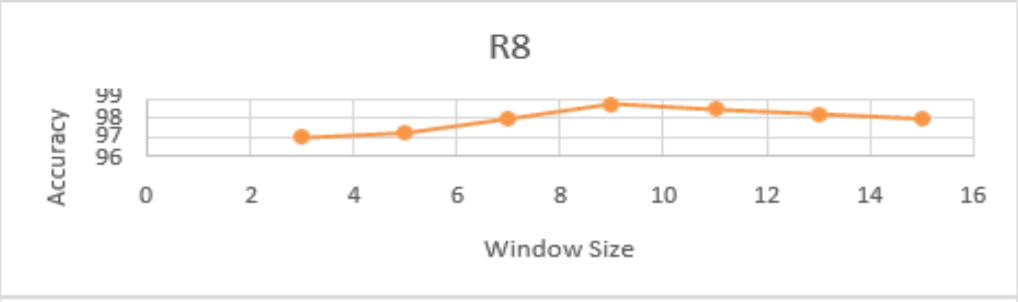
4.7 Parameter Analysis

Figure 5 shows the reflection of sliding window size on accuracy of different datasets. If the window is too large, edges will be added between nodes that are not closely related so that the updated node representation noise information is included in the classification, affecting the classification Effect.

Figure 6 shows the effect of the number of layers of the gated graph convolutional network on classification results on the R52 dataset. Through analysis, the reason may be that as the number of layers grows, the model retains part of the original word information and captures the information of foreign words. By selectively fusing information from two nodes, word representations with richer meaning information are generated. As the number of network layers further deepens, the representation of each node will tend to be the same. Still, due to the gate mechanism, the model retains part of the original word information, which alleviates the excessive problem and smooth the nodes in the graph to a certain extent, so the accuracy will first decrease and then level off.







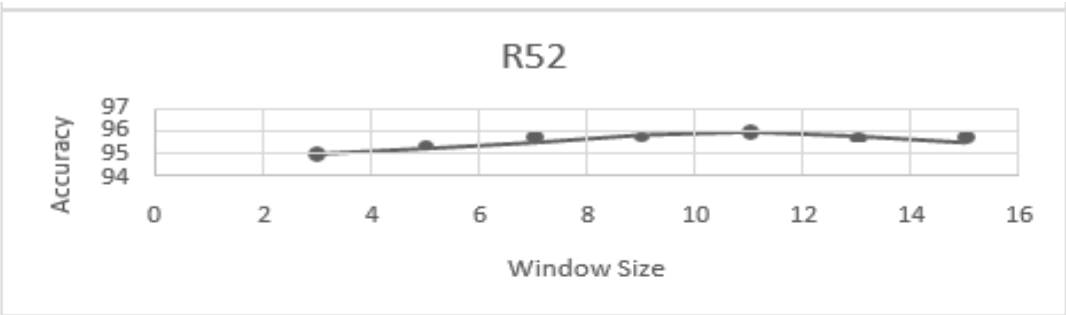


Figure 5. The effect of the sliding window size on the experimental results

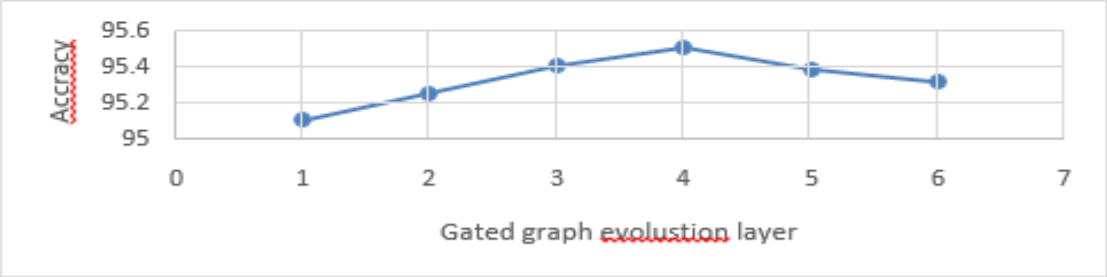


Figure 6. The effect of the number of gated graphs convolutional network layers on the experimental results

CONCLUSION

This paper suggests a text categorization model based on a gated graph convolutional network and a bidirectional attention mechanism. The technique first creates a document as a graph and then uses a gated graph convolutional network to identify multi-order neighbourhood data selectively. After you have feature representations with more noticeable distinctions for final classification, you can employ a two-way attention mechanism to give different weights to words of various types. Many tests on four benchmark datasets reveal that the method in this study is vastly superior to the standard. To improve the model's performance, future work will consider introducing external knowledge, such as some internal statistical characteristics of the corpus. This is

because the graph produced in this paper did not wholly utilize the statistical information of words in the text.

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Multi-scale memory residual network based Deep Learning model for Network traffic anomaly detection

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Abstract— **Models for detecting network traffic anomalies based on deep learning usually exhibit weak generalization, confined representative capacity, and low real-world adaption. In light of this, a multi-scale memory residual network-based model for identifying network traffic anomalies is proposed. The distribution analysis of the three-dimensional feature space illustrates the efficiency of the network traffic data preprocessing technique. The deep learning algorithm enhances the model's capacity to represent data by coupling multi-scale 1DCNN-LSTM networks. The realization of the residual network is shown using the residual network notion as a foundation. Deep feature extraction accelerates model convergence to detect network traffic anomalies accurately and effectively while preventing gradient disappearance, explosion, over fitting, and network damage. The experimental findings show how the multi-scale 1DCNN-LSTM network can improve the model's representational competence and generalization ability. Performance indicators for the model in this study are also superior to those for other deep learning models.**

Keyword- Deep Learning, Feature Extraction, Network Traffic Anomaly Detection, Network Degradation, One-Hot Encoding, CNN, LSTM;

I. INTRODUCTION

With the development of network technology and the expansion of network scale, network traffic is increasing exponentially, and network security threats and risks are becoming more and more prominent. Intrusion Detection System (IDS) [1] is a network security monitoring system. Network traffic is one of the main network states. When network intrusions occur, network traffic anomalies usually occur. Therefore, network traffic anomaly detection is the current network Research focus of Network Intrusion Detection System (NIDS).

However, the continuous change of network attack patterns has increased the difficulty of network traffic anomaly detection [2]. Based on the empowerment effect of artificial intelligence, cyberspace security is facing new risks, including network attacks becoming more and more intelligent, and large-scale attacks becoming more and more difficult. Network attacks are becoming more and more frequent, the concealment of network attacks is getting higher and higher, the game-fighting nature of network attacks is becoming stronger and stronger, and important data is becoming easier to steal, etc. [3]. Maintaining network security is a process of attack and defense games. Network traffic Anomaly detection, as a prerequisite for ensuring network security, has received more and more attention because it can identify unknown network attacks.

The representational capacity is constrained and the false alarm rate is high [4]. It is challenging for classical machine learning to accomplish the goal of analysis and prediction due to the increase in huge data on the network, the improvement of network capacity, the complexity of data, and the diversity of features [5]. Large-scale network traffic data can be processed successfully using the deep learning approach. Deep learning offers better representation performance when compared to conventional machine learning techniques, which can significantly increase the effectiveness and precision of network traffic anomaly identification. The identification of network traffic anomalies is a powerful tool for thwarting contemporary network attacks. The network traffic anomaly detection model is the main topic of this study, which also suggests a multi-scale memory residual network-based network traffic anomaly detection model.

1.2 MSMRNet based IDS Model

Since standard recurrent neural networks have an issue with gradient disappearance, the long-short-term memory neural network (LSTM) has been presented as a solution (RNN).Its basic unit is a structure containing multiple groups of neurons, called a cell (cell), as shown in Figure 1.

Combining the idea of residual network and long-term short-term memory network, this paper proposes a network traffic anomaly detection model based on MSMRNet,

There are non-numeric data such as protocol type and service type in the network traffic data, and the machine learning model cannot handle non- numeric data, so the network traffic data needs to be processed numerically. At the same time, the network traffic data is different, and the characteristic attributes There is a large difference in magnitude between [5], so it is necessary to carry out dimensionless processing on the network traffic

data. The initial network traffic data $X0 = \{x1, x2, \cdots, xn\}$, where $f = |X0|$ represents the characteristic dimension of the initial traffic data, and $n = |X|$ represents the characteristic dimension of the network traffic data after data preprocessing.

MSMRNet for deep feature extraction, that is, the initial input of MSMRNet $X1 = X$. MSMRNet is formed by stacking several multi-scale memory residual modules, and its l multi-scale memory residual the difference module takes Xl as input and generates output Xl+1, where the input Xl and output Xl+1 have the same dimension. The multi-dimensional output $Y0$ is one-

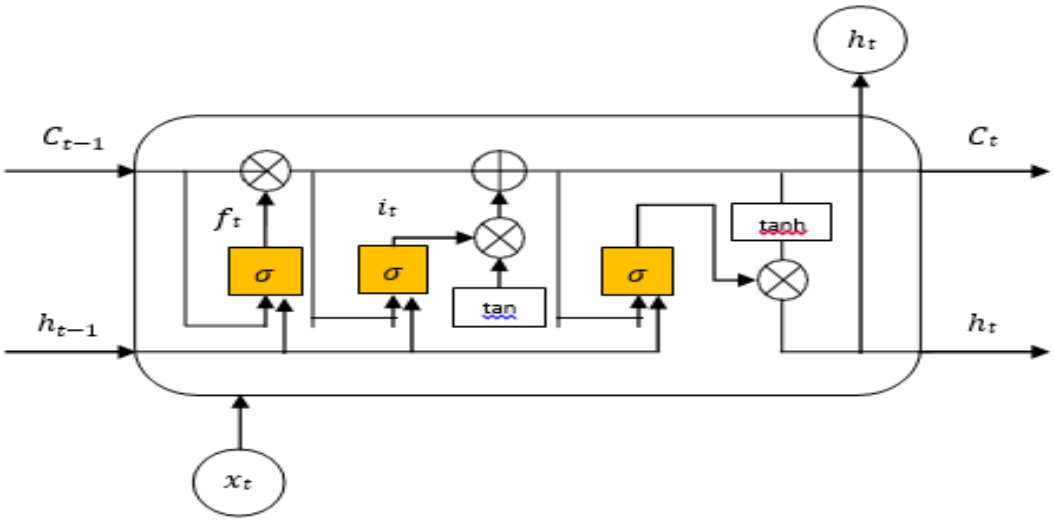

Figure 1 Long Short-Term Memory Network

dimensionalized by the Flatten layer to obtain the

Input the preprocessed network traffic data X to MSMRNet for deep feature extraction, that is, the initial input of MSMRNet $X1 = X$. MSMRNet is formed by stacking several multi-scale memory residual modules, and its l multi-scale memory residual the difference module takes Xl as input and generates output Xl+1, where the input Xl and output Xl+1 have the same dimension. The multi-dimensional output $Y0$ is one-dimensionalized by the Flatten layer to obtain the output $Z0$. The local features are comprehensively processed through the fully connected layer [21] Obtain the output Z. Use the softmax function as the classifier to realize the network traffic classification, and obtain the network traffic classification result Y. Each element in Y represents the probability of each network traffic category, and the maximum probability category is the classification result. The calculation formula as shown in formula (10), Wd and bd represent the weight matrix and bias item respectively.

$Y = softmax(Z) = softmax(WTZ0 + bd)$ … … (10)

The implementation method of the network traffic anomaly detection model based on MSMRNet is shown in Algorithm 1.

Input the preprocessed network traffic data X to one-hot encoding are shown in Figure 2 As shown in (a), it can be seen that the normal flow data points overlap with the abnormal flow data points in a large area. The PCA two-dimensional visualization results of the

output $Z0$. The local features are comprehensively processed through the fully connected layer [21] Obtain the output Z. Use the softmax function as the classifier to realize the network traffic classification, and obtain the network traffic classification result Y. Each element in Y represents the probability of each network traffic category, and the maximum probability category is the classification result. The calculation formula as shown in formula (10), Wd and bd represent the weight matrix and bias item respectively.

$Y = softmax(Z) = softmax(WTZ0 + bd)$ … … (10)

The implementation method of the network traffic anomaly detection model based on MSMRNet is shown in Algorithm 1.

1.3 Experiment

In order to obtain an effective data preprocessing method, this experiment uses the PCA two-dimensional visualization method to analyze the feature space distribution of the experimental data set after data preprocessing. The PCA two-dimensional visualization results of the experimental data set after

experimental data set after one-hot encoding and standardization processing are shown in Fig. 2(b), which can be It can be seen that the normal flow data points and the abnormal flow data points have been partially

separated, but there are still some overlapping areas. The PCA two-dimensional visualization results of the experimental data set after one-hot encoding and normalization processing are shown in Figure 2(c) , it can be seen that compared with the results after one-hot encoding and normalization, normal flow data points and abnormal flow data points have been effectively separated. Therefore, this experiment uses one-hot encoding and deal with.

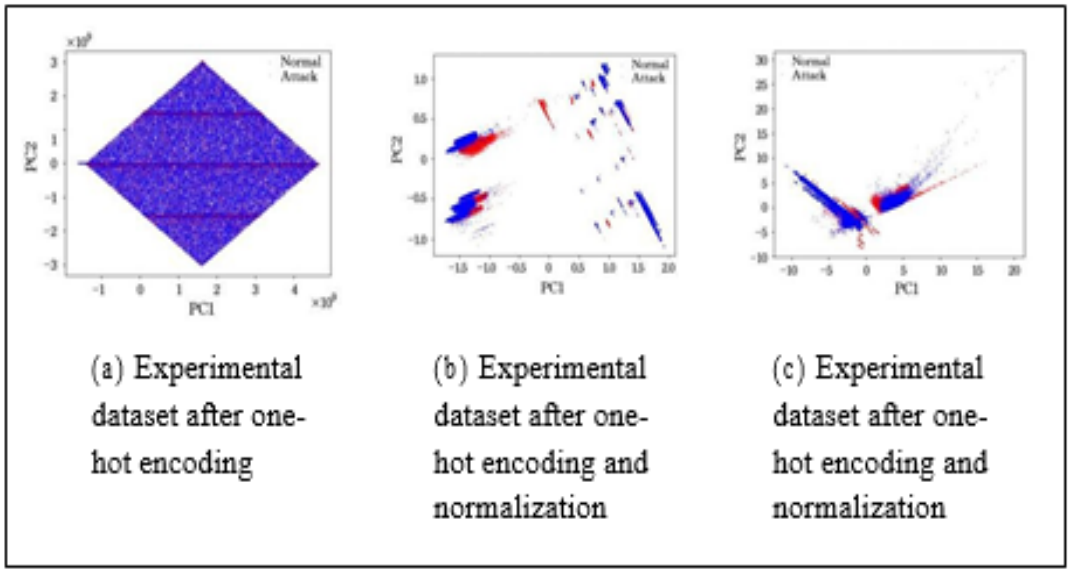

Figure 2 Visualization of Data Set after Preprocessing using PCA

1.4.4 Validity Verification Experiment

In order to verify the effectiveness of MSMRNet in solving the problem of network degradation, this paper constructs a multi-scale memory network (Multi-Scale Memory Network-work, MSMNet) of different depths and compares it with MSMRNet. The experimental model is as follows.

MSMNet-5: It is stacked by 5 multi-scale memory modules, including 20 training parameter layers, 10 non-training parameter layers and 1 fully connected layer.

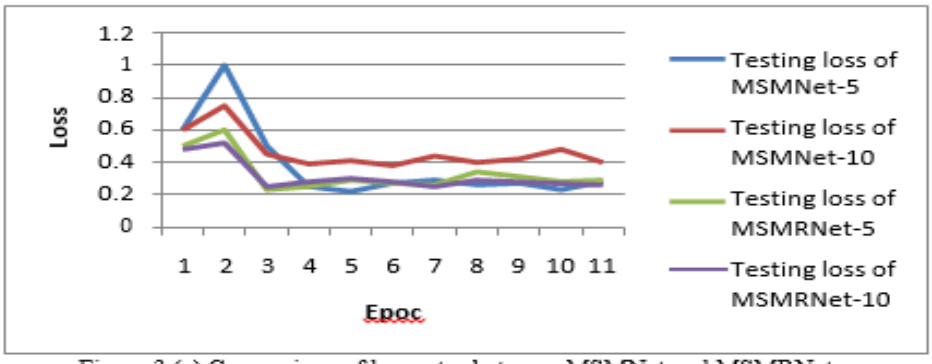

Figure 3 (a) Comparison of loss rates between MSMNet and MSMRNet

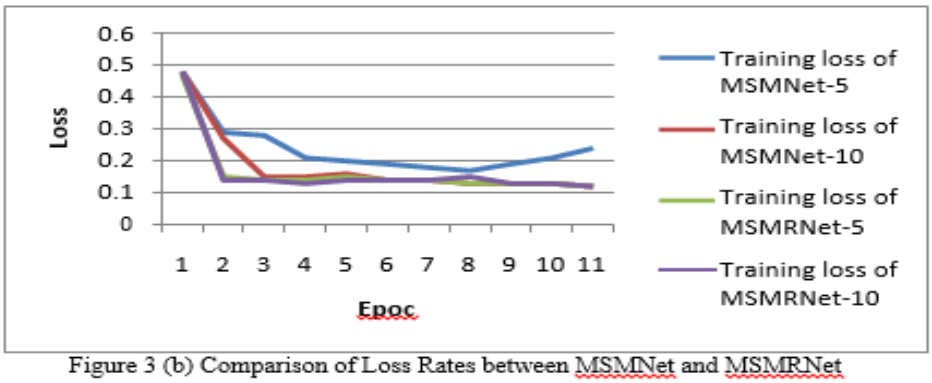

Figure 3 (b) Comparison of Loss Rates between MSMNet and MSMRNet

MSMRNet-5: It is stacked by 5 multi-scale memory residual modules, including 20 training parameter layers, 10 non-training parameter layers and 1 fully connected layer.

MSMNet-10: It is stacked by 10 multi-scale memory modules, including 40 training parameter layers, 20 non-training parameter layers and 1 fully connected layer.

MSMRNet-10: It is stacked by 10 multi-scale memory residual modules, including 40 training parameter layers, 20 non-training parameter layers and 1 fully connected layer.

Figure 3 (a) and (b) show the comparison of the loss rate between MSMNet and MSMRNet during training and testing.

1.4 Conclusion

This work proposed a network traffic anomaly detection model based on multi-scale memory residual network to address the issues of poor environmental adaptation, restricted representation ability, and weak generalization ability of the network traffic anomaly detection model based on deep learning. This essay is based on credible The effectiveness of the network traffic data preprocessing method is demonstrated by the analysis of the three-dimensional feature space distribution; the multi-scale one- dimensional convolution is combined with the long short-term memory network, and the model representation ability is enhanced through the deep learning algorithm; based on the idea of the residual network, the realization of in-depth feature extraction, while preventing gradient disappearance, gradient explosion, and over fitting. The results of data preprocessing visualization demonstrate that following one-hot encoding, the results of validity verification experiments and performance evaluation experiments show that adding identity mapping can accelerate model convergence, improve network traffic anomaly detection performance, and effectively solve the problem of network degradation; comparative experimental results show that normalization processing can effectively separate normal traffic and abnormal traffic data. Performance metrics have improved.

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Auto-encoder and Graph Neural Networks-based Hybrid Model for Link Prediction on Complex network

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Abstract – **: Among the many network data mining tasks, link prediction is crucial. Due to the in-depth development of graph neural network research, related models can learn essential features of the network more effectively and have achieved good prediction results in tasks such as link prediction. However, unlike the CNN model in deep learning, the existing graph neural network model only aggregates the first-order neighbor information of nodes and does not fully consider the topological structure characteristics between neighbor nodes. On this basis, a motif-based graph neural network link prediction model is proposed. The model adopts the self-encoder structure. In the encoding process, the adjacency matrix of the node is constructed through the motif, and then the motif neighborhood of the node is obtained. Next, the neighbor information is aggregated according to the neighborhood of each type of motif, and the node is obtained through nonlinear transformation. Finally, concatenate the representations of nodes under each type of motif. However, since different motif structures have other importance in the network, the attention network gives the attention weights expressing different motifs. The vector representation of nodes is provided by connecting the attention network. During decoding, the network is reconstructed by computing the similarity between nodes. Investigational results on several citation collaborator networks show that the proposed method surpasses most baseline algorithms on two metrics, effectively improving the accuracy of network link prediction.**

Keywords: Deep Learning, Link Prediction, Complex Network, Auto- encoder, CNN, GCN

I. INTRODUCTION

A network is an abstract representation of real-world objects and their interactions, where nodes stand for entities and links for the one-to-one or two- to-two relationships between them. These networks contain rich node attribute information, structural information and network evolution information. During the evolution of the network, some links may appear or disappear, and it is necessary to complete the missing data and make predictions about links that could be added or removed in the near or distant future. At the same time, as an important division in the field of data mining, link prediction has very important practical significance. For example, in biological network analysis [1-3], link prediction can mine and complete biological data. In scientific collaborators [4-6] and friend recommendations [7-10], link prediction can recommend relevant new friends and scientific collaborators. As a classic problem in the field of data mining, the link prediction problem has many related models and methods. Most of the current link prediction methods are based on the similarity assumption of node representations, that is, the more similar the representations of node pairs, the greater the possibility of generating links, so the problem boils down to finding high-quality node representations so that the representations of nodes retain The topological features of the original network, that is, the nodes connected by edges in the original network, are relatively similar in the representation of nodes.

Recent advances in graph-structured network embedding approaches and graph neural networks have helped the model become even better at representing network nodes[11-13].

This research offers a motif-based graph neural network link prediction model to enhance node representation capability while also accounting for computational economy..

1.2 PRELIMINARY KNOWLEDGE

1.2.1 Basic Definition

Let G = (V; E) represent a graph network, V represents a node set, E represents an edge set, if two nodes vi and vj are connected by an edge, then (vi, vj) ∈ E [14-17]. A recurring theme An instance of the sub-graph M of a graph G, where just a few of the network's nodes are present, is well-defined as follows:

Definition 1 (motif) [18] Let M be a connected sub-graph of graph G = (V; E), and satisfy any (vi, vj) ∈ EM ,(vi, vj) ∈ E, then M is called G , where EM represents the edge set of sub-graph M.

Different third-order motifs and fourth-order motifs are shown in Figure 1 (expressed as $M3$, $M4$, the first

subscript i of each motif Mij represents the number of nodes, and the second subscript j is the specified sorting), in the research cooperation network, the motif $M31$ represents that two authors have cooperated with one other author, but they have not cooperated with each other. Often this happens in collaborations between ordinary researchers and scientific celebrities. $M32$ represents the cooperation of researchers who are close to the same level, and the three authors have cooperated with each other.

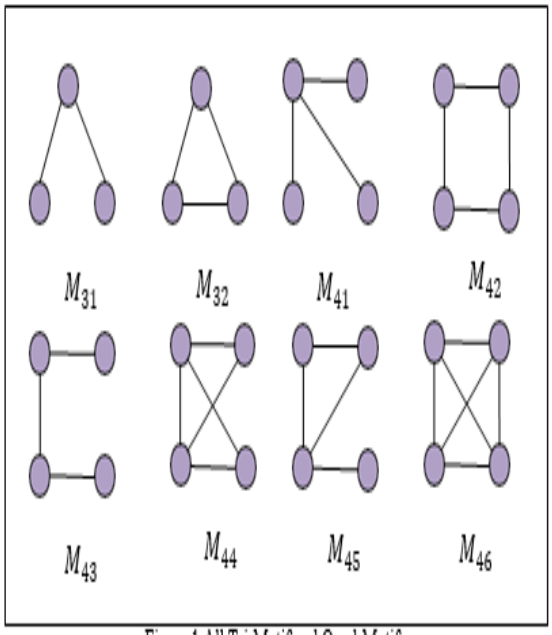

Figure 1 All Tri-Motif and Quad-Motifs

Indicates that two authors have collaborated with one other, but they have not collaborated with each other. Often this happens in collaborations between ordinary researchers and scientific celebrities. M32represents the cooperation of researchers who are close to the same level, and the three authors have cooperated with each other.

Definition 2 (Instances of Motifs) [18] Let Su = (VS, ES) be the containing node u instance of motif S, if Su is a subgraph of graph G, and there are VS ∈ V, ES ∈ E such that For any x, y ∈ VS, (x, y) ∈ ES there exists a bijection ψ: S → M such that (x, y) ∈ ES iff(ψS(x), ψS(y)) ∈ EM . Definition 3 (motif neighbors) for a specified motif type M, among the first-order neighbors of node vi, the nodes located in the same type of motif as vi are called the neighbors of node vi based on motif M.

The two motifs (v, v1, v2) and (v, v3, v4) in Figure 2 are two instances of motif M32, and v1, v2, v3, v4 are also motif neighbors of v. In different networks, there are different eigenmotifs belonging to the network, which occur much more frequently than that sub-graph in random graphs. In the calculation process, in order to excerpt the motif features of the network, it is necessary to search all the motifs that are isomorphic to different types of motifs from the network, and the calculation cost of this process is relatively high. In order to reduce the computational complexity, this paper only considers the third-order and fourth-order motifs. First, the software mfinder[19] is used to find out how many of each theme type are spread throughout the network, and the distribution of motifs in each network is given.

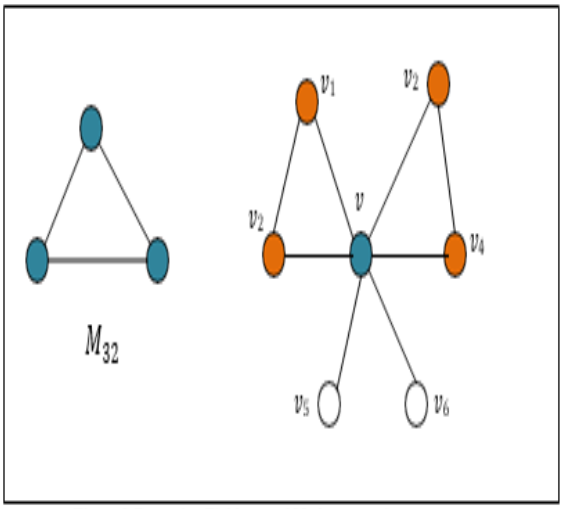

Figure 2 Receptive Field around Node v contains v_1, v_2, v_3, v_4

1.3 Link Prediction Model Based on Motif Graph Neural Network

This paper introduces a motif-based spatial convolution operation to extract features of nodes [18]. Given the motif M and the target node vi, the input node is a 1-dimensional vector, and the dimension of the mapped node is F = 1. Define the weight matrix $w0$ of node vi and the weight wj of its neighbor node vj , then the convolution at node v can be defined as the weighted sum of the neighbors of the motif M based on the motif M of node vi , namely:

$$h^M(v_i) = \sigma\left(x_i w_0 + \sum_{j=1}^{N} A^M_{ij} x_j w_j\right) \ldots\ldots\ldots (4)$$

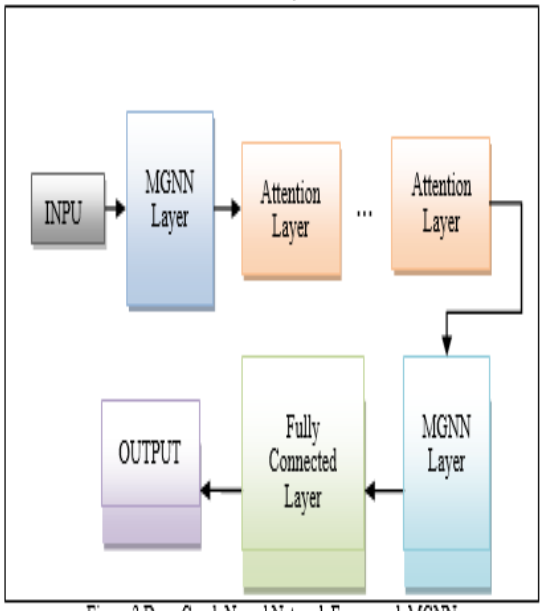

Figure 3 Deep Graph Neural Network Framework MGNN

Fig 3 Among them, xi, xj represent the attribute vectors of nodes vi, vj. hM (vi) represents the convolution output of node vi, σ(·) represents the activation function, such as ReLU(·) or Softmax(·), the weight sharing process is to give the same weight to the motif neighbors of node vi. Furthermore, the situation of the above formula can be extended to the general situation: the attribute matrix X of the node is a matrix of N × D dimensions, and the output dimension is F, then:

HM = σ(XWM + (DM)−1)AM XWM … … . (5)

Since the feature information of a single type of motif cannot fully represent a node in the process of representing each node, it is necessary to synthesize the information of multiple types of motifs. However, in the process of aggregation, different types of motifs have different importance to each node. In order to reflect the different influences of various motifs on node representation in the convolution process, this paper adds the attention mechanism of motifs [18].

$$h(vi) = \sum_{i=1}^{U} \alpha k,i\, hk(vi) \qquad (6)$$

α $= softmax(e$

$) = \exp(ek,i) \ldots\ldots\ldots (7)$

k,i

k,i

U

j =1

(ej,i)

In the formula, U is the number of motifs, αk,i = αk,i (hk(vi)) = W. hk(vi)

is a one-dimensional convolution about hk(vi), and the attention coefficient αk,i reflects the The importance of volume Mk to node vi, hk(vi) is the convolution output of node vi under Mk. In this paper, the motif graph neural network model is referred to as MGNN (motif-based graph neural network), and its network architecture is shown in Figure 3. After the aggregation of convolutions of different types of motifs, the attention network is connected in the activation layer. These two parts form a basic neural network unit, and then iterate layer by layer. Finally, after aggregating the convolutional output of various motifs in the convolutional layer, the final node's output is obtained through a fully connected network express.

1.4 Experiment and Results

This research offers a homogeneous network-based MGNN link prediction model, and demonstrates the efficiency of the method on different real network datasets. During training, some links (positive class edges) of the dataset have been eliminated, although all node properties remain unaltered. The justification and test sets are constructed with the detached edges and the equal number of randomly picked unconnected node pairs (negative class edges) (negative class edges).

The Cora dataset comprises a total of 2708 sample points, each sample point being a scientific publication, and individually document is signified by a 1433-dimensional word vector. After stemming and deleting stop words, only 3703 words are left. The PubMed dataset includes 19,717 research publications on diabetes from the PubMed database. There are 44,338 citation linkages in

the network. A word vector from the dataset's lexicon of 500 distinct terms, weighted by their frequency in the document's TF and IDF values, describes each publication[29-30]. Use the mfinder software to give the motif distribution of each network (as shown in Table 1). (as shown in Table 1). In order to further improve the computational efficiency, the motifs including 3 nodes and 4 nodes in the network are picked.

Data Set	M_{3_1}	M_{3_2}	M_{4_1}	M_{4_2}	M_{4_3}	M_{4_4}	M_{4_5}	M_{4_6}
Cora	76.70	3.30	15.10	80.40	0.10	4.10	0.20	0.10
CiteSeer	95.30	4.70	30.70	61.50	6.20	0.61	0.07	0.92
PubMed	98.25	1.75	46.10	49.10	0.60	3.90	0.28	0.02

1.4.1 Experiment Description and Summary

Table 2 displays the findings from the experiments. After combining the high-order structural information on the two data sets, the method in this paper can obtain a better representation of network nodes on most networks, and the link prediction results are improved by 1%~ compared with traditional methods. 4%. At the same time, the prediction result on the PubMed data set is slightly lower than that of VGAE. Due to the consideration of the motif construction data of the node, the number of motifs may not obey the normal distribution, so the experimental results of the auto-encoder will be lower than that of the variable in some cases the result corresponding to the self-encoder.

Method	Cora		CiteSeer		PubMed	
	AUC	AP	AUC	AP	AUC	AP
VGAE	91.4	92.6	90.8	92.0	96.4	96.5
LINE	76.0	75.5	73.1	75.2	72.2	72.0
MGNN(*)	91.9	92.1	90.7	91.6	67.2	76.2
VMGNN(*)	91.6	91.4	92.0	91.0	62.3	74.0
MGNN	92.1	91.4	93.3	93.7	92.4	91.8
VMGNN		93.5	94.6	95.1	95.9	94.4

1.4.2 Ablation Experiment

This section compares the method in this paper with VGAE and MGNN+MLP (fully connected network). VGAE combines the graph convolutional network GCN and autoencoder to achieve good results in link prediction tasks. MGNN+MLP is a fully connected network MLP linked after the MGNN network to illustrate the efficiency of the model MGNN+Attention in this article. The result is shown in Figure 4 (a) and (b).

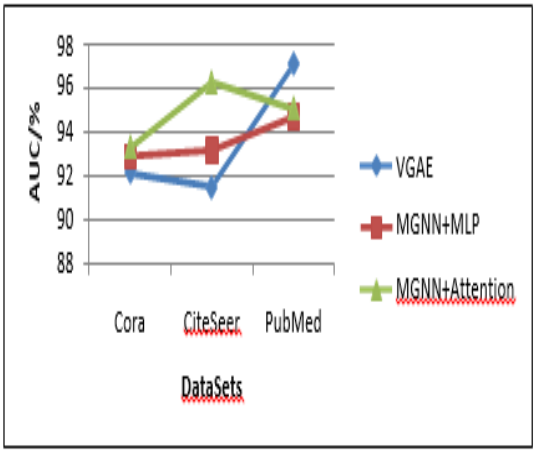

Figure 4 (a) Comparison Results

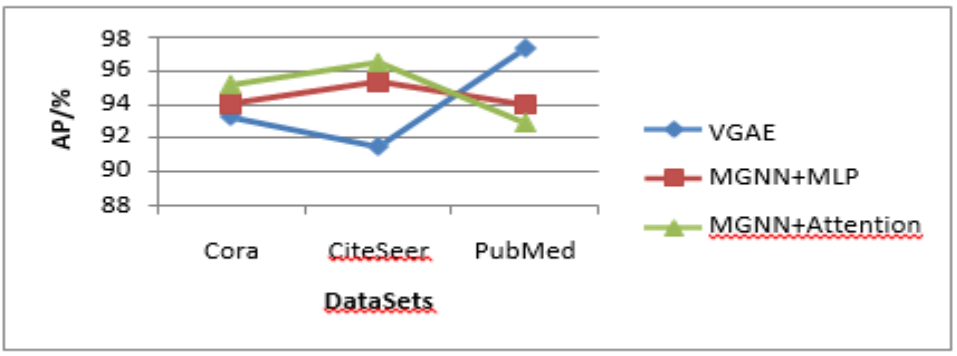

Figure 4 (b) Comparison Results

The experimental outcomes demonstrate that, in most situations, the model presented in this work outperforms the other two types of models, which further demonstrates that incorporating the motif structure into the model can effectively improve the predictive ability of the neural network. At the same time, the comparison between MGNN+MLP and MGNN+Attention also verified the effectiveness of the link attention network in the MGNN network, indicating that the importance of different motifs needs to be considered in the process of node representation.

1.4.3 Experimental Efficiency Comparison

This section gives a comparison of the running time of each model on the link prediction task on the network Cora and CiteSeer. Figure 5 gives a comparison chart of the operating efficiency of the six corresponding algorithms.

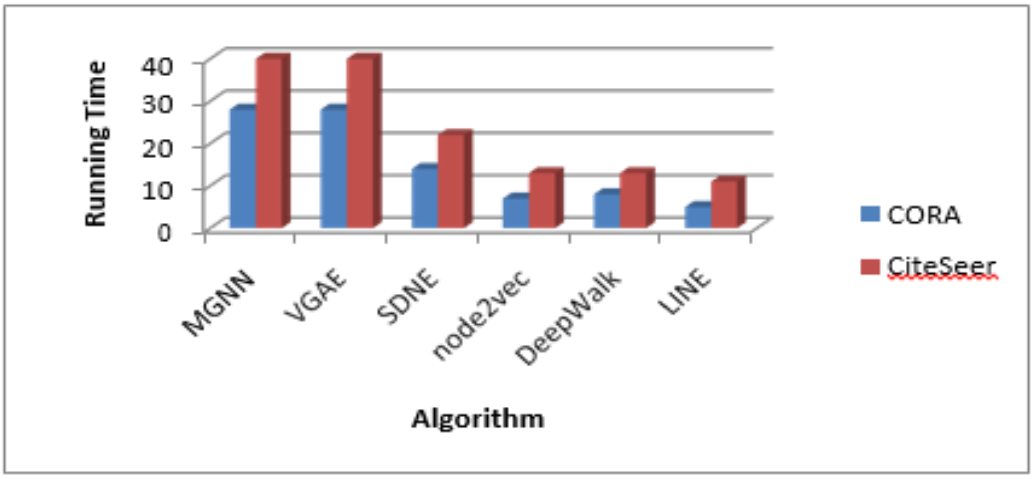

Figure 5 Comparison of Algorithm on Different Datasets

As shown in Figure 5, the shallow network model based on graph representation learning is more efficient, but it is difficult for such a model to learn the complex structural information of the nodes in the network. The method in this paper combines multi-layer neural network structure and high- order motif information. Although the computational cost is high, it has achieved a significant improvement in link prediction indicators compared with graph representation learning methods. At the same time, because the model adopts the auto-encoder framework, the running time is close to that of models such as graph auto-encoder (VGAE).

1.5 Conclusion

In this study, we offer a homogenous network-based model for predicting links in neural networks, using motifs from graphs as inspiration. Using a graph convolutional neural network, the network's high-order structure-motif information are combined, and each motif structure is given. The representation of the nodes is obtained, and the attention weights of various motifs for the nodes are further considered, and finally the network is reconstructed by using the representations of the nodes. The effectiveness of the algorithm is verified on link prediction tasks of several conventional citation datasets. Computational efficiency and accuracy need to be further improved in large-scale networks. When the model is being trained, MGNN uses the high-order motif information of the nodes, and the computational cost of the model increases to a certain extent.

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Leaf Life – A Study On Plant Disease Predictor

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Abstract— **: Identification of plant diseases is the first step in mitigating decreases in agricultural output productivity and quantity. Examining patterns on plants that are visible to the unaided eye is a common practice in studies on plant diseases. For agriculture to be sustainable, disease detection and plant health monitoring are crucial. Plant disease tracking manually is exceedingly difficult. It requires a lot of labour, expertise in plant diseases, and protracted processing durations. Hence, image processing is used to detect plant diseases. The steps involved in the disease detection process include image acquisition, image pre-processing, picture segmentation, feature extraction, and classification.**

I. INTRODUCTION

: The Plant Disease Predictor is a computer system designed to assist farmers, growers, and agricultural researchers in identifying plant diseases and predicting their potential spread. The purpose of the system is to help prevent the loss of crops due to disease and to assist in making informed decisions about disease management strategies.
The importance of predicting plant diseases is to help protect crops and reduce the impact of diseases on agricultural productivity and food security. Accurately predicting disease outbreaks allows farmers and growers to take proactive measures to prevent the spread of diseases, reduce losses, and protect their crops.
User Interface Design: Discuss the design of the user interface, including the layout, color scheme, typography, and overall visual style. Highlight the considerations and principles used to design the interface to ensure ease of use and user-friendliness.

1. Given that our target users are farmers, who may not have the latest smartphones or high-speed internet connections, it's essential to design a user interface that is lightweight and responsive, minimizing the use of graphics and images that could slow down the app's performance.
2. In designing the user interface for the Plant Disease Predictor app, we need

3. to prioritize ease of use and intuitive navigation, making it simple and straightforward for users to input data, view results, and get the information they need to identify and manage plant diseases.

4. A clear, consistent visual hierarchy is critical in designing the user interface, using typography, color, and layout to create a well-structured and visually appealing interface that guides the user's attention to the most critical elements on each screen.

5. We need to ensure that the user interface design of the app is accessible and user-friendly for all users, regardless of their level of technical expertise or physical abilities, using design principles like contrast, simplicity, and consistency to make the app usable for a wide range of people.

6. An intuitive interaction design is critical for the success of the app, enabling users to easily input and view information, and providing feedback that guides them through the process of identifying and managing plant diseases.
7. The user interface design should prioritize function over form, focusing on the essential features and functionalities that users need, and avoiding unnecessary bells and whistles that could slow down the app or distract users from their primary goals.
8. To ensure that the user interface is effective, we will conduct user testing and evaluation, using feedback from users to refine the design and improve its usability, accessibility, and overall effectiveness.
Here is the AI generated idea for ui/ux design for 'Plant Disease Predictor' app. This is close to what our end product will look like:

Figure 1 : Fronted End Design (a)

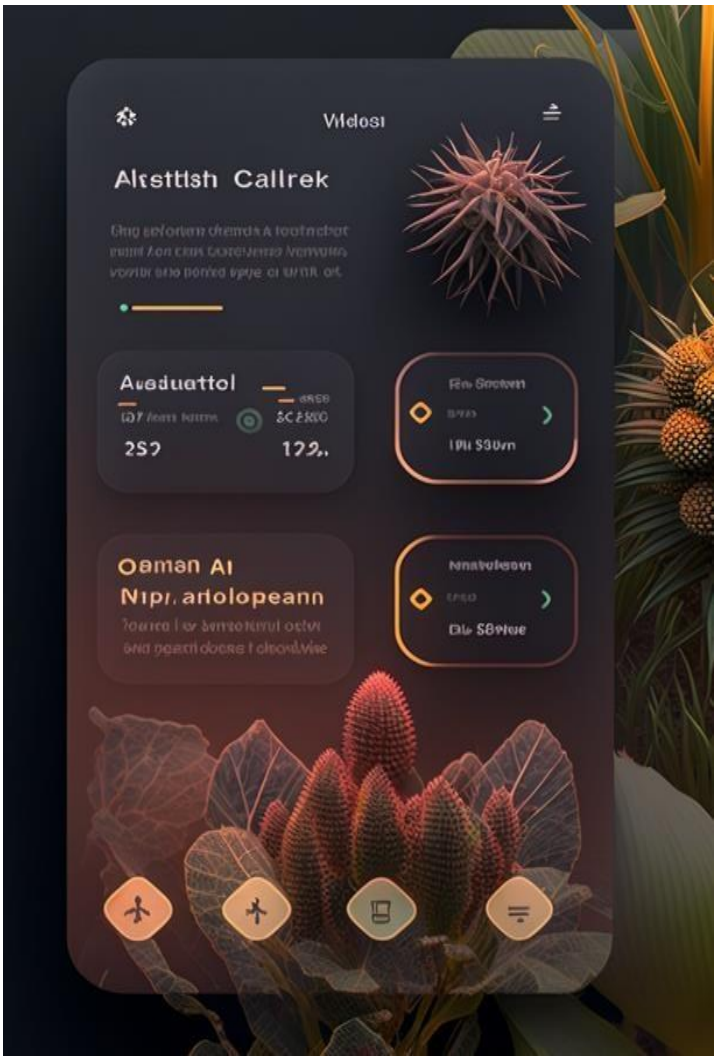


Figure 2 : Fronted End Design (b)

Overview of our Design:The front-end part of the Plant Disease Predictor system typically consists of a user-friendly interface that allows users to input information about the symptoms of a disease, the type of plant affected, and other relevant information. The system then analyzes this information and provides a list of potential diseases, along with information about the symptoms, causes, and management strategies.

Functionalities of the front-end part of the system include image recognition and upload, symptom analysis, disease prediction, and management recommendations. The system may also provide information about disease prevention and control measures, including the use of resistant varieties, crop rotation, and fungicide applications. By providing quick and accurate information about plant diseases, the Plant Disease Predictor can help farmers and growers make informed decisions about disease management and protect their crops from the impact of diseases.

I. Interaction Design: Describe how the app allows the user to interact with the system, including the navigation, input and output components, and the feedback mechanisms provided to guide the user.

II. Information Architecture: Explain how the front-end organizes the information and functionalities of the app, including the use of hierarchy, grouping, and labeling to create a clear and intuitive structure.

III. Accessibility and Usability: Discuss how the front-end design ensures accessibility and usability for a wide range of users, including those with disabilities, limited technical skills, and different cultural backgrounds.

IV. Design Evaluation: Describe the methods used to evaluate the design of the front-end, including user testing, heuristic evaluation, and expert review. Present the results of the evaluation and discuss the improvements made based on the feedback received.

V. Accessibility and Usability: Discuss how the front-end design ensures accessibility and usability for a wide range of users, including those with disabilities, limited technical skills, and different cultural backgrounds.

VI. Design Evaluation: Describe the methods used to evaluate the design of the front-end, including user testing, heuristic evaluation, and expert review. Present the results of the evaluation and discuss the
improvements made based on the feedback received.

Model Building using Deep Learning

Deep learning is a subset of machine learning, which is essentially a neural network with three or more layers. These neural networks attempt to simulate the behavior of the human brain—albeit far from matching its ability—allowing it to “learn” from large amounts of data.Presented a technique of deep learning for detection of disease in plants that could cause damage in crops and agriculture resulting in loss of crop yield. The current deep learning methods expansion found their plant disease detection application, thereby contributing the robust tool having higher results on accuracy.It is the most promising one for fine grained classification of disease similarity as this scheme evades the labor- intensive feature extraction and the segmentation.

Following is the flowchart representing basic methodology for model building.

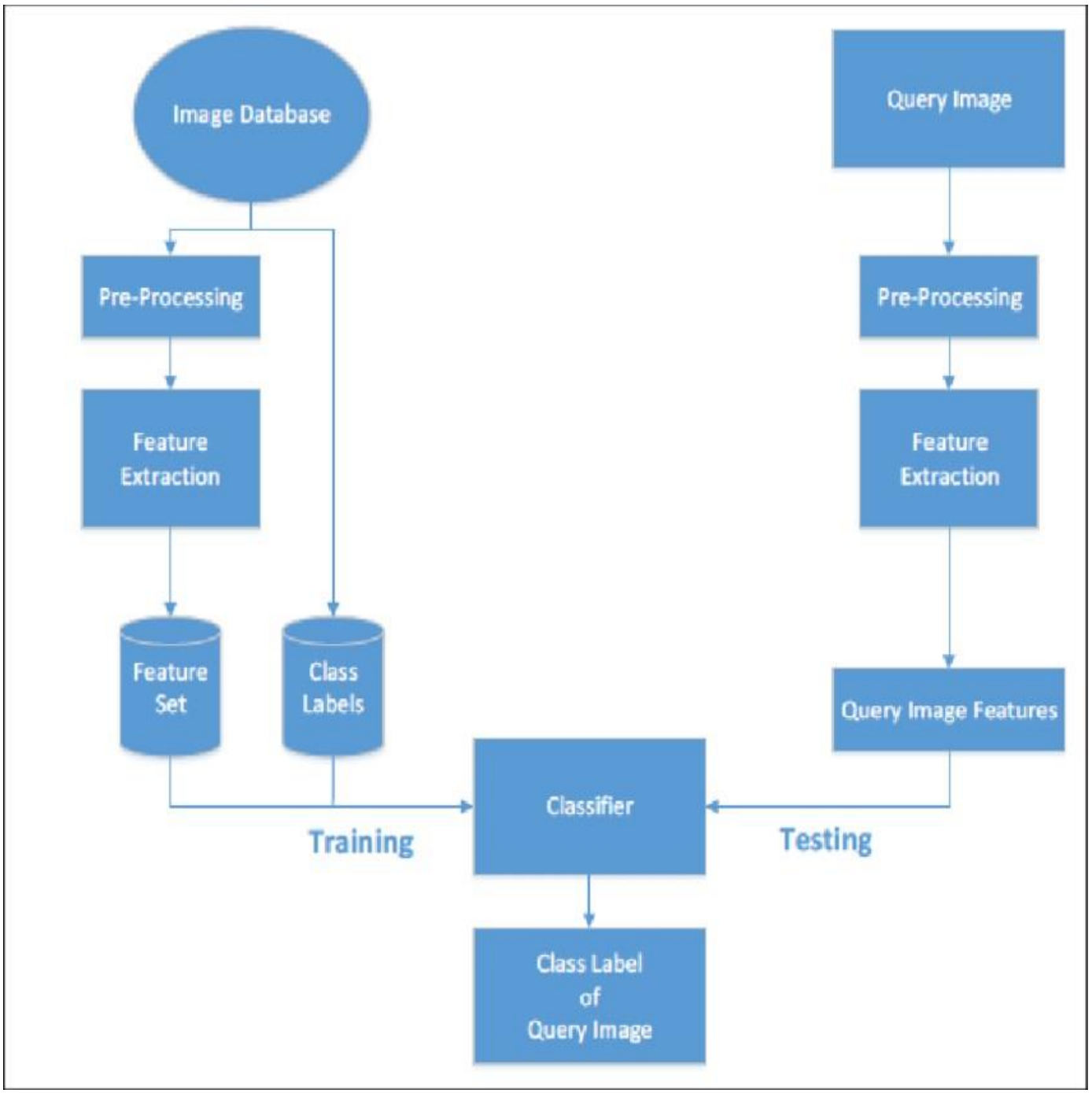


Figure 3 : Basic Methodology for model building

Data Collection

The image dataset was collected from Kaggle using the following link- https://www.kaggle.com/datasets/saroz014/pla nt-disease The dataset is of 2 GB containing images of plant leaves belonging to 38 different categories. It consists of 2 folders-train and test with 38 directories in each. It altogether consists of 54,305 images of which 43456 are used for training and 10849 are used for validation. It is collaborated by Saroj Raj Sharma on Kaggle.

PREPROCESSING

The model is built in Google collab in which the zip file of the dataset is imported. After importing two batches of tensor image data are generated for training and testing with real time data-augmentation with ImageDataGenerator() and flow_from_ directory().After preprocessing a 3D array of image dataset and 2D array of label dataset is generated.

The visualization of some images after preprocessing is as follows:

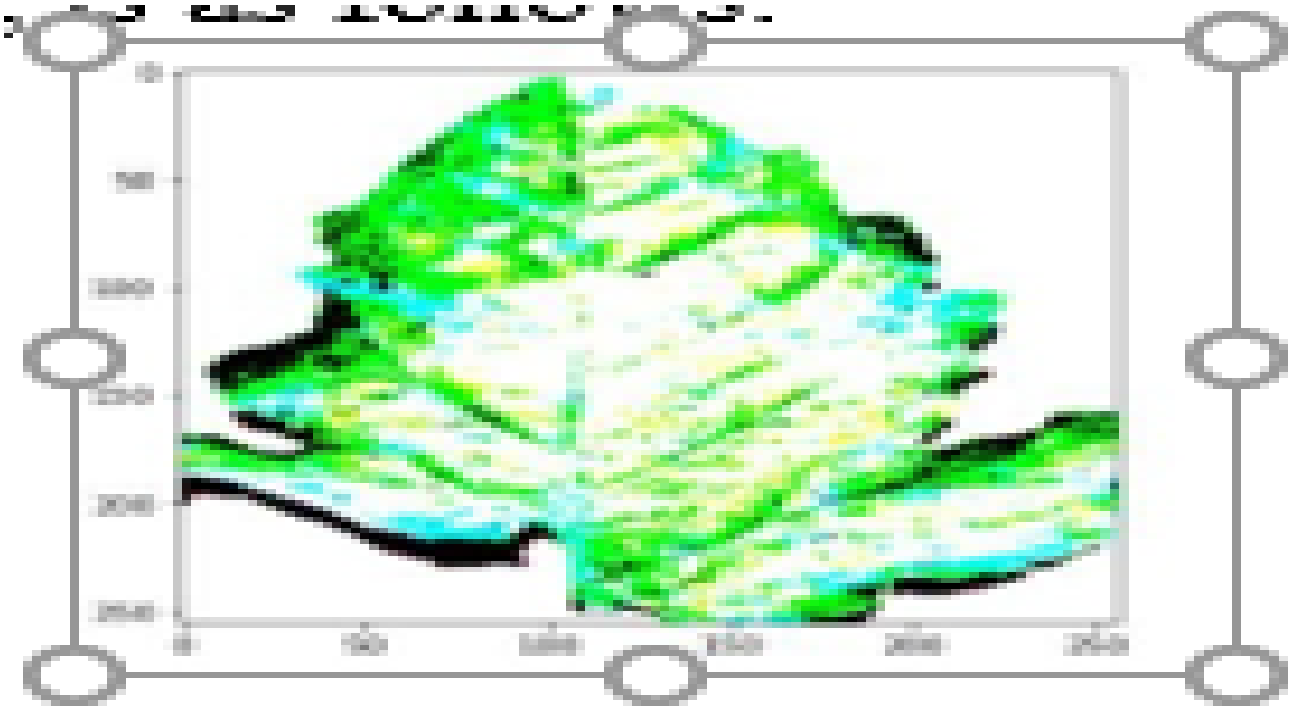
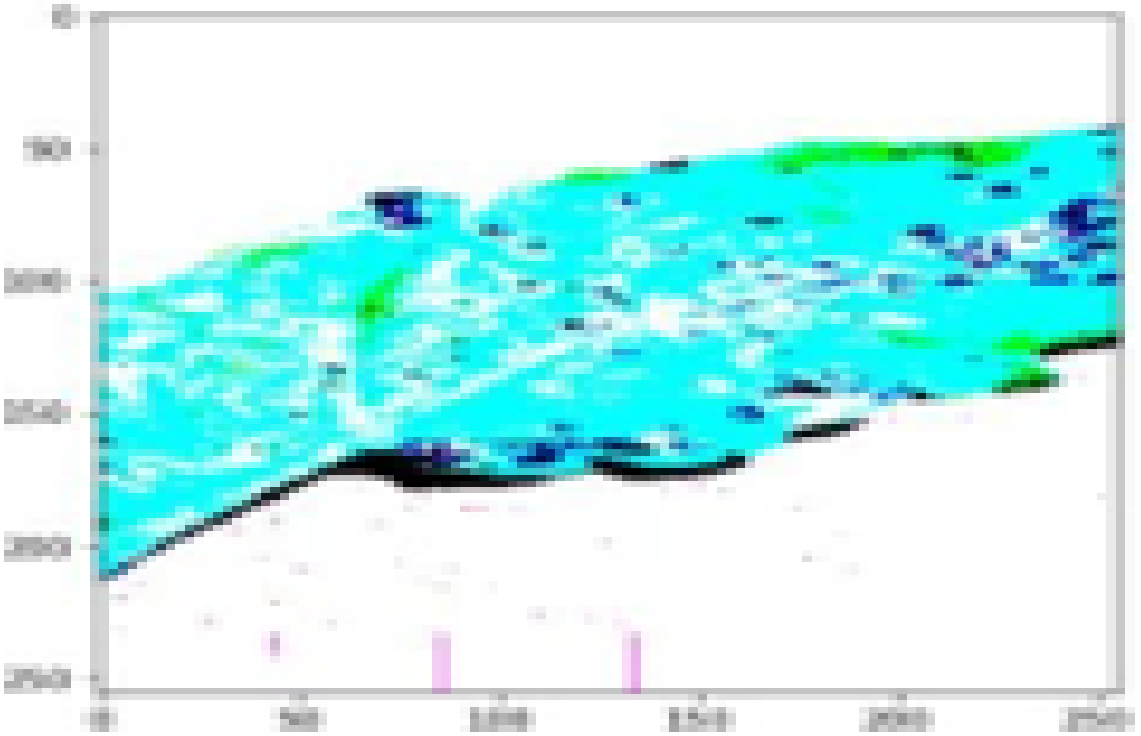


Figure 4 : Visualizations of Leaves



Model Building

For model building a prebuilt model for image classification 'VGG-19' is used. VGG is known as the "visual geometry group" and was introduced by the oxford university which made this type of deep CNN model for the "Image Net Large scale recognition of visual challenge" (ILSVRC) held in 2014. This structure comprises of best function up to date on comparing the other deep neural networks. Though several kinds of parameters exist, this structure only focuses on the padding convolution layer, fully connected layer, and max pool having the outcome of softmax layer. The model is thus not built from scratch. Following is the summary of the model in which it's top layer is replaced by a Dense layer of 38 units with the activation function 'softmax'.

The optimizer which is used for compiling the model is 'adam' with loss-function 'categorical_crossentropy'. ModelCheckpoint callback is used in conjunction with training using model. fit() to save a model or weights (in a checkpoint file) model.h5 for best model only in terms of validation accuracy. Early Stopping technique is used for deep neural network so that model can stop training when validation accuracy no longer begin to yield improves on a validation set .

Result 1 : Summary Of the Diagnosis

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None, 256, 256, 3)]	0
block1_conv1 (Conv2D)	(None, 256, 256, 64)	1792
block1_conv2 (Conv2D)	(None, 256, 256, 64)	36928
block1_pool (MaxPooling2D)	(None, 128, 128, 64)	0
block2_conv1 (Conv2D)	(None, 128, 128, 128)	73856
block2_conv2 (Conv2D)	(None, 128, 128, 128)	147584
block2_pool (MaxPooling2D)	(None, 64, 64, 128)	0
block3_conv1 (Conv2D)	(None, 64, 64, 256)	295168
block3_conv2 (Conv2D)	(None, 64, 64, 256)	590080
block3_conv3 (Conv2D)	(None, 64, 64, 256)	590080
block3_conv4 (Conv2D)	(None, 64, 64, 256)	590080
block3_pool (MaxPooling2D)	(None, 32, 32, 256)	0
block4_conv1 (Conv2D)	(None, 32, 32, 512)	1180160
block4_conv2 (Conv2D)	(None, 32, 32, 512)	2359808

block5_conv3 (Conv2D)	(None, 16, 16, 512)	2359808
block5_conv4 (Conv2D)	(None, 16, 16, 512)	2359808
block5_pool (MaxPooling2D)	(None, 8, 8, 512)	0
flatten (Flatten)	(None, 32768)	0
dense (Dense)	(None, 38)	1245222

Total params: 21,269,606
Trainable params: 1,245,222
Non-trainable params: 20,024,384

Evaluation

Training and testing data is passed through the model.The model is build for 50 epochs.The model trained and improved uptill the accuracy is reached upto 82.74% .So the accuracy of our Plant disease predictor is 82.74%.

The model is saved as best_model.h5 using ModelCheckpoint().For Prediction following images are passed into the model after preprocessing

Observation:

Prediction

loss=5.653777599334717
Accuracy is 82.74495601654053

Lable-Apple healthy

Lable-Peach__Bacterial__spot

These images were passed to a function that converts them into an array and then preprocesses thembefore Following were the results which were obtained from the predictor-For 1st image

```
1/1 [==============================] - 0s 17ms/step
Apple___healthy
```

Result 2 : Apple Leaf Image

For 2nd image

```
1/1 [==============================] - 0s 19ms/step
Peach___Bacterial_spot
```

Result 3 : Peach Leaf Image

Conclusion : Food security is seriously threatened by crop diseases, yet due to a lack of the essential infrastructure in many places throughout the world, it is still difficult to identify them quickly. Smartphone-assisted disease detection is now achievable thanks to growing smartphone adoption worldwide and recent developments in computer vision made possible by deep learning. The trained model's accuracy on a held-out test set is 82.74%, passing them for prediction.
A directory containing the label-names as values having their label-index as keys was maintainedwhich was used by the function to map the generated output with the appropriate name.

proving the viability of this method. Overall, a clearroad for smartphone-assisted crop disease diagnosis on a gigantic worldwide scale is presented by the method of training deep learning models on progressively larger and publicly available image datasets.

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https://www.researchgate.net/publication/344155605_Plant_Disease_Detection_using_CNN

https://link.springer.com/chapter/10.1007/978-981-15-4474-3_11

Maximum Convergence Accuracy forHybrid Indoor Positioning System

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Abstract-**For tracking people or object's Location in the indoor environments, a network device is suggested known as IPS.. This technology mainly used because of supervising the health, position, guidance in different sectors like Universities, museums, airports, hospitals and warehouses the main advantages of IPS with distinct feature like reduction of material and energy cost over time that has huge impact compared to other technology which are more costly.**

Among various technology like (UWB) Wireless Fidelity (Wi-Fi) Bluetooth Low Energy (BLE). (Wi-Fi)Technology is an outstanding approach for indoor navigation and positioning due to already available Wi-Fi Infrastructure Wireless IPS has categorized into two approaches :geometrical –calculation based and Scene – Analysis based former relies on measurement of geometrical parameter of Distance and angles by physical characteristics of Signal. RSS is the performance parameter used for achieving robustness and accuracy which is most concerned factor for current scenario

Most Recent Research has solved the problem of inconsistency on Received Signal Strength (RSS) using fingerprint method. But the RSSI that received may contain some noise. This paper mainly proposed a method to estimate or tracking the real position of dynamic user. With RSSI value as input to be processed and the result of it will be a location (x, y) value, then repeat the process to create an estimate coordinate map of route taken. Our proposed method is based on fingerprinting with weighted sum of four nearest reference access point to estimate the position of dynamic user then using Extended Kalman Filter as a tracking algorithm. In this paper we try new ways to collect the data of RSS by dynamically collecting the data in many routes to see whether the proposed algorithm could estimate the position better. We achieve an average mean of error around 2cm using Weighted Sum using Kalman Filter tested on dynamic data.

Key words: Indoor Positioning System, Dynamic User Localization, Fingerprinting Method, Weighted Sum Model, Extended Kalman Filter

1. INTRODUCTION

Location detection has been popular implemented in outdoor environments by the introduction of GPS technology. GPS has made many changes on our daily activities; the usefulness to navigate to other places has been a very important factor of the success of GPS. Different from outdoor positioning, GPS technology can't be used for indoor positioning. GPS technology had limited access to indoor positioning because of many factors such as lack of line of sight and in indoor the signal of the GPS will be attenuated as they cross through walls [4].Building structure and in other case the indoor positioning system would behave differently. Also, in Indoor positioning there is many obstacle that need to be included as an obstruction. This cause the GPS could not applied into IPS

Various indoor positioning technologies has been proposed based on the literature review such as Infrared, Ultrasound, WLAN/Wi-Fi, BLE and RFID to estimate the position of user in indoor position environment. Among them, Wi-Fi and BLE used similar bandwidth of 2.4 GHz radio wave frequency but based on [14,12] BLE has more advantage than Wi-Fi because of lower material cost and high availability of BLE because of shorter channel width and 3 dedicated advertisement channel also supported by most modern smartphones which made BLE more advantageous than Wi-Fi technology.

BLE is introduced as a new form of wireless communication that is designed for short range communication [05-12]. BLE act as a replacement for cable to transmit the data into another device. Most of the time BLE stays in sleep mode constantly except when connection is initiated [14]. In the previous research most of the experiments on other literature are based on static user, where positions of users are estimated while users are immobile. The dynamic user with fingerprinting algorithm and implement tracking element on the position by Kalman Filter to see the difference.

In the Fingerprinting method we can get the object's location based on the signal strength that are channeled from the BLE, it consists of 2 main phase that are Offline and Online phase. Offline phase used to store the experimental condition of radio wave on a grid based possible location with signal strength received from each transmitter as the reading value, meanwhile online step is the phase where positioning be done where measurement of signal strength from each transmitter will be used to match the condition stored from previous step

Fingerprinting in indoor positioning systems was also known as scene analysis method which was used to measure the condition of radio frequency signal on the test field. The measurement of radio frequency was taken not only to determine position on the online phase but also to avoid wrong measurement because of obstacle material, human cause, etc. Much research has been focused on removing the noise caused by other factors, but there are no exact methods to remove it.

There are two main proposed methods in this paper to solve our problem. First one, this paper intended to implement a tracking algorithm based on RSSI value of Bluetooth but with the extended version because of the non-linearity of RSS measurement. We proposed this tracking algorithm because of the change from static user data collection to dynamic user data collection. Also, we proposed this filtering algorithm because in [13] we see an improved accuracy around 93% by using various filtering algorithm. The proposed method

expected to improve the current accuracy by tracking the estimated position based on measured noise covariance, process noise covariance, and Kalman gain. We proposed to capture the data dynamically by walking in a route that we had created with some constraint and see whether the algorithm proposed could measure the distance or not.

2. RELATED WORKS

Indoor Positioning System using BLE technology has been experimented on many known techniques from Wi-Fi technology [7,8] like trilateration is a method of position estimation using the distance between mobile target and the receiver with the received RSSI as the measuring unit. The position of an object can be measured with a minimum of 3 estimated distances which is why this method was called trilateration. The disadvantages of this method is the simplicity of the measurement only based on the placement of BLE or Wi-Fi access point location and current RSS information which can change depending on environmental change also due to multiple interference on other radio signal that will cause the distance estimated contain some noises.

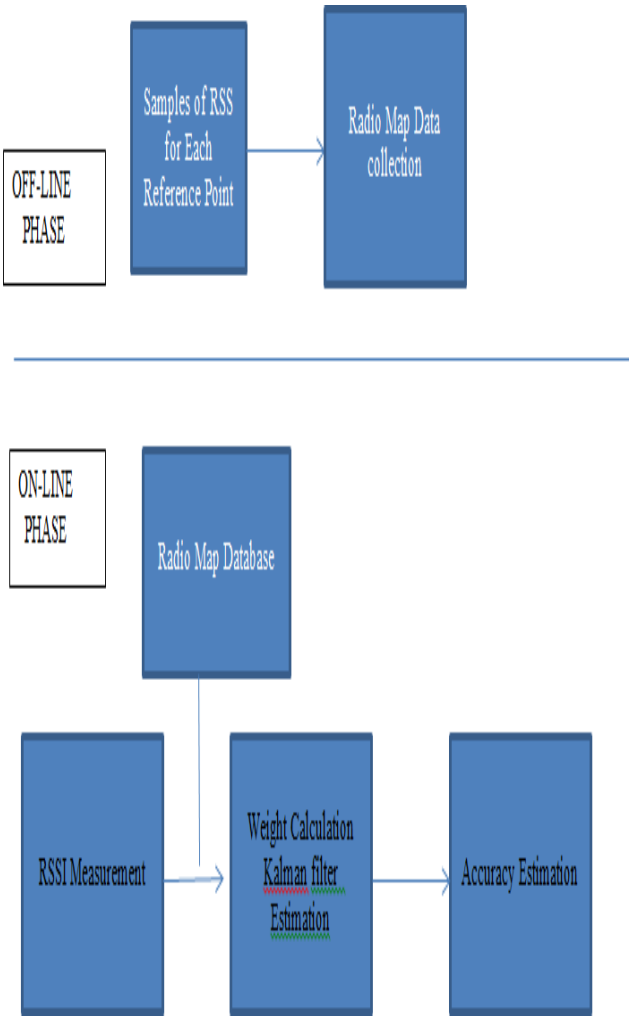


Figure 1: Outlines for online and offline Phase of with RSSI values for IPS using Hybrid Wi-fi system

Figure 2: Screenshot for Moving Blue dot denoted as outline room location with RSSI value at each Wi-Fi denoted as Red spot at each Edge Corner

1. PROPOSED METHODS

1.1 Scene Analysis Based

In this paper we proposed an Indoor Positioning System by using BLE with fingerprinting approach exploits available infrastructure to evaluate the user's location with different RSSI observed at the "radio map" is the setup imposed at different Aps and estimates its position by positioning algorithm method. There are two main phases of fingerprinting method proposed in this paper shown in Figure 1 Outlines for online and offline Phase of with RSSI values for IPS using Hybrid Wi-fi system ,offline phase is designed for learning the RSS at each reference point (Figure 2). This method simply creates Radio Map Database by gathering on each of the reference points and started receiving RSS from all BLE beacon then send the representative data to database. One row of data on the radio map database consisting 2d coordinate value (x, y) where the Reference point (gathered point) are and each BLE beacon RSS received. Then Euclidean distance is regularly applied to calculate

minimum distance between Aps the The main task of this phase is to collect fingerprint data to build a model [5].

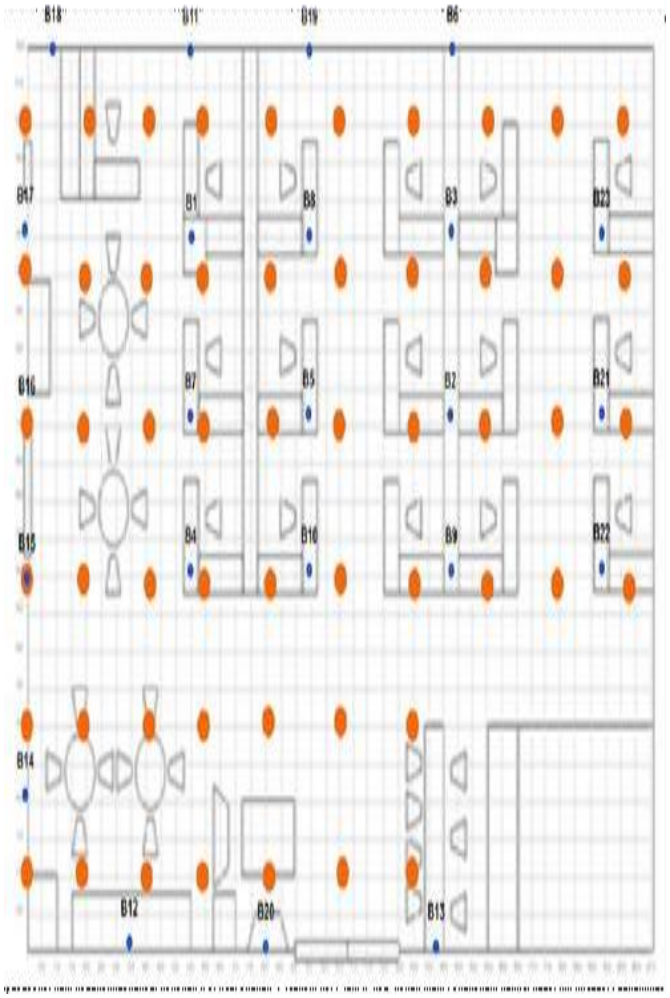


Figure 3: Phase of Location of XYZ Campus room

The deterministic positioning algorithm is based on the measured signal strength on radio map creation phase to match the real-time measured signal strength to determine the position of receiver While deterministic positioning algorithm is based on signal that matches the corresponding fingerprint data to determine receiver position, probabilistic positioning algorithm approaches this by calculating the probability distribution of radio wave signal strength during a certain time and stored in fingerprint database to be used on online phase also during the online phase of positioning, the more static a user are on the position, the more accurate the result of position estimation will be which is why probabilistic positioning algorithms cannot be used to determine the position on a dynamic device.

2.1 Kalman Filter

The potential technique for Wi-fi and Bluetooth signal in practical environment with updating current location is essential to meet user requirement the state transition function is as shown

$$Xk = FXk\text{-}1 + Gdk + vk \quad (1$$

)With measurement Z that is :

$$Zk = HXk + Wk \quad (2)$$

Where F,G indicates identity matrices ; vk, wk is the process and measurement noise at the time step k, respectively. These parameter are required to be independent and have cumulative distribution function .

$$Vk = N(0, Q) \quad (3)$$

$$Wk = N(0, R) \quad (4)$$

Where Q, R is the process noise variance and measurement noise covariance matrix, respectively.

The Kalman Filter is the solution for linear problem with assumption of Gaussian noises .The algorithm consists of two phases ;prediction and observation phase [9]. Estimation of wifi location error can be given as (5),(6) receiver and TDOA is the measurement taken by examining the difference of time between each radio signal interval. The most accurate usage of TOA/TDOA has been proposed by [10] where radio wave propagation was modeled as probabilistic model and determination of position will be based on time-delay estimation algorithms and this method has proven to solve the fading effect of radio wave propagation.

To solve the problem of multipath radio wave phenomenon and more accurate measurement on positions, fingerprinting technique was developed. Fingerprinting on IPS uses Wi-Fi Access Point ID or BLE ID and RSSI where an experimental site with transmitter scattered then divides the space into small grids and collects the RSSI value on each grid to be saved into a database is called a radio map [1, 11]. From here, there are

two approaches that have been known so far to determine the position of receiver deterministic positioning

$$R = [0\ 2] \quad (5)$$

algorithm and probabilistic positioning algorithm.
The test field is built on the 6th floor of the XYZ campus as a specimen and the device used for Bluetooth receiver

$$Q = [0.1 \quad 0\ ] \quad (6)\ 0 \quad 0.1$$

In the application for moving object a movement is

changes unpredictably. Therefore the Kalman Filter will be updated based on step detection. Regularly in two phase ,the prediction phase relies on estimation of Wi-fi results.

4 EXPERIMENTAL DESIGN

4.1 Experimental Setup

researcher [7, 8, 10] has proposed a new idea to include other parameters that can be taken as measurement such as Time of Arrival (TOA) and Time Difference of Arrival (TDOA). TOA is the time measured for a radio wave from

Figure 3: BLE beacons

Test field used in this experimental design is an office room with size 10 m x 12 m shown at Figure 5. Reference point are placed with 2 meters gap each shown in Figure 4

First, we configured Wi-Fi module as Access point Bluetooth beacon from HC-05 shown in Figure 3 with transmit power of 20 dBm and transmit interval of 100 milliseconds. Then the RSSI value will be deployed in this research as shown in Figure 2 represented by the blue dots as beacon deployed where on the site will be placed at 5m apart each other height from the floor

Due to the simplicity on basic idea of trilateration, many

transmitter to reach

is a smartphone device with specifications of "one plus 6T" shown on Table 2.

and total reference point are used in the radio map. On each reference point 100 samples were taken by smartphone device specified on Table 1 to log the RSS received while standing on the point around 3 minutes for the entire sample of a point to be taken .along with user id and password for authentication success status.

Figure 2 Log in with Authenticated user-id

The test field is built on the 6th floor of the xyz location campus as a specimen and the device used for Bluetooth receiver is a smartphone device with specifications of "one plus 6T" shown on Table 2.

RSSI VALUEIN DB	WIFI-1	WIFI-2	WIFI-3	WIFI-4	δ(DB)
RSSI 1	**-30**	**-56**	**-48**	-100	10.2
RSSI 2	**-28**	**-58**	**-48**	-100	4.1
RSSI 3	**-27**	**-60**	**-47**	-100	3.6
RSSI 4	**-29**	**-59**	**-48**	-100	15.6
RSSI 5	**-21**	**-63**	**-48**	-99	23.8
RSSI 6	**-25**	**-55**	**-47**	-100	31.3

RSSI 7	**-21**	**-59**	**-48**	-98	35.3
RSSI 8	**-22**	**-60**	**-46**	-98	7.2

Table 1 Sampling Point from Wi-fi Module

4.1 Experimental Evaluation

Our framework uses two metrics for assessment are; Exactness :use the RMS of the determined location and position

Error i= $\sqrt{(x - \hat{x})2 + (y - \hat{y})2}$ ·· (7)

Where (x,y) represents for the true physical position and $(\hat{x},\hat{y})$represents the estimated position.

4.3.1 Test Point 1: Evaluation of RSSI value for Scene based Approach

The screenshot illustrates our room used for training points of the project in 10mx12m room with 4 Wi-Fi modules with samples of data Spatially with estimation of error using Kalman Filter to reduce the fluctuation of the signal strength model baed on strongest access points.

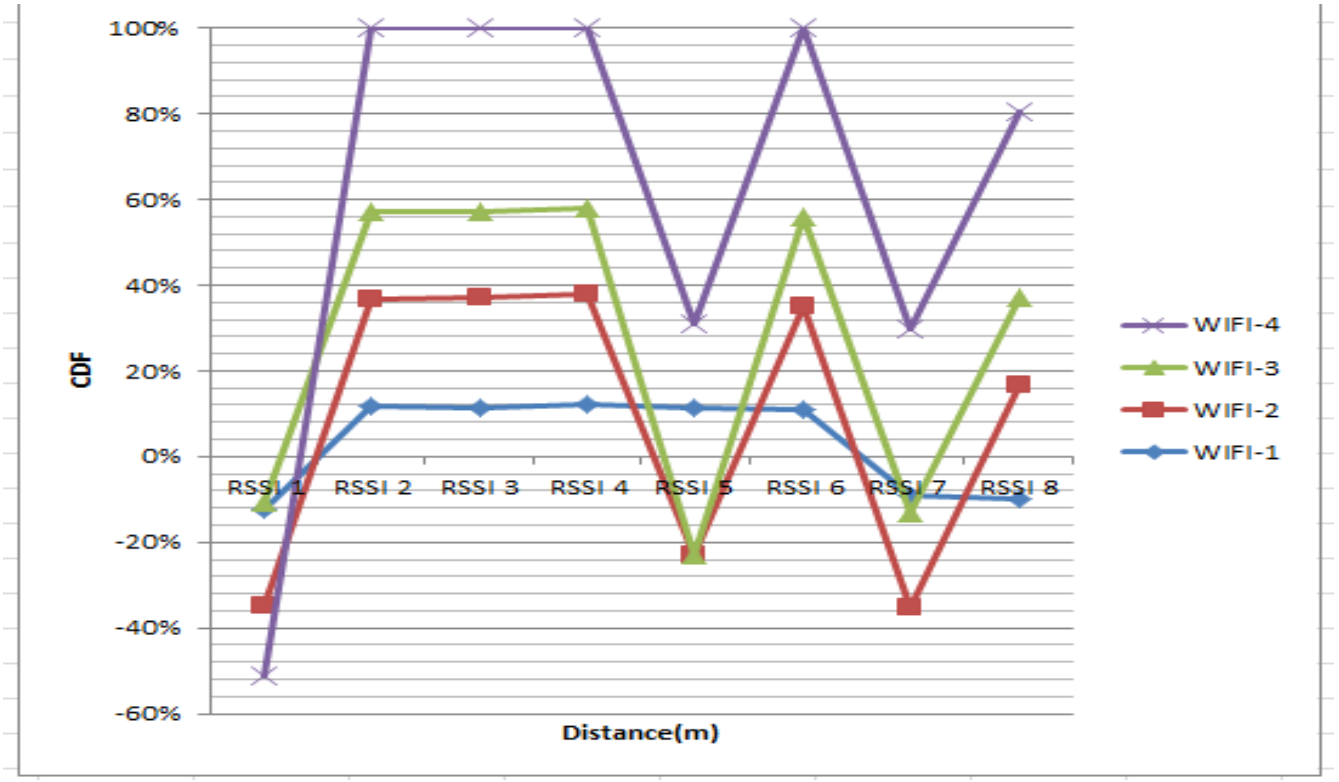
Figure 3: Screenshot of Estimation for accuracy level of different access point along with RSSI value

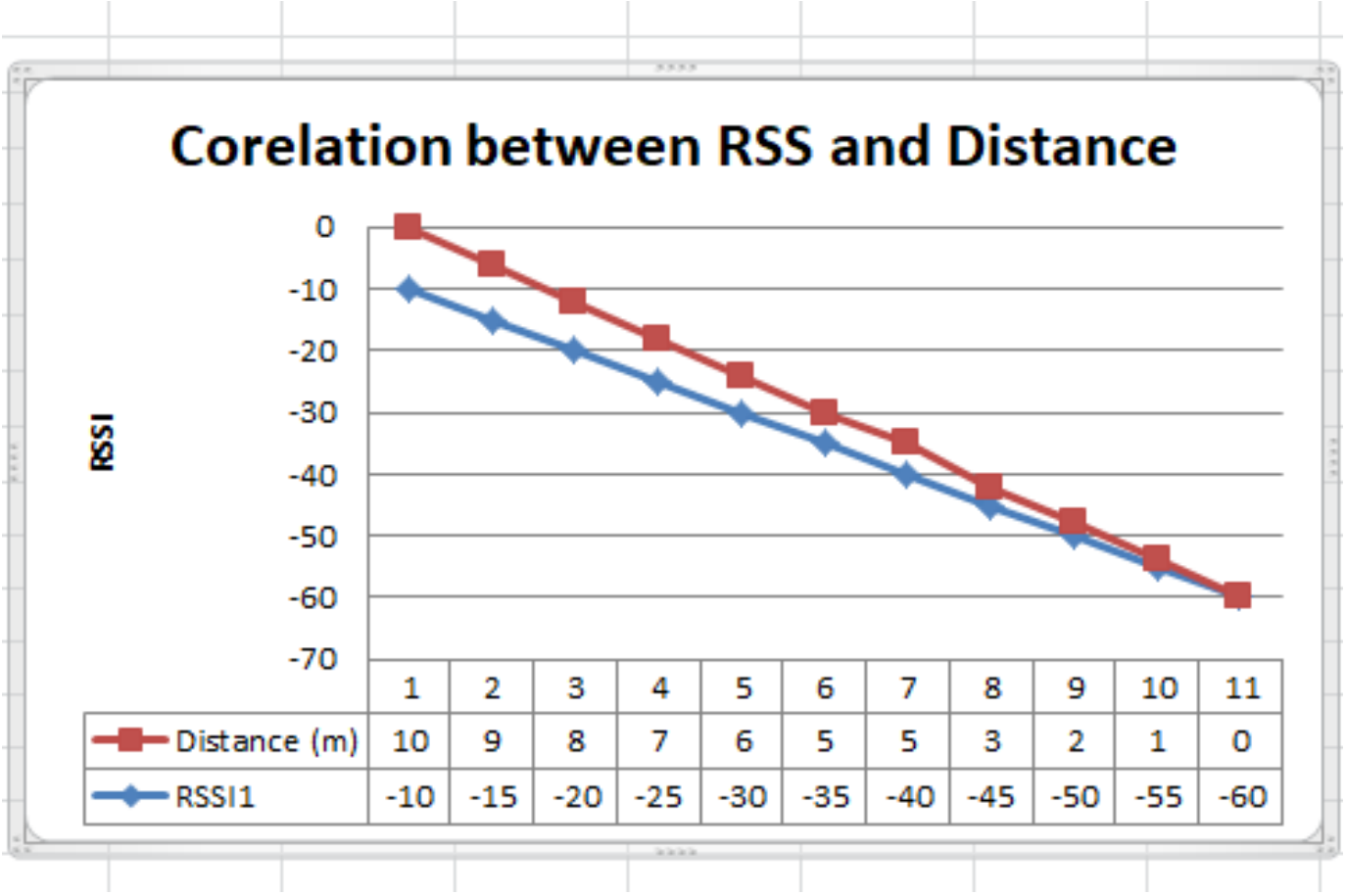
4.3.1 Test Point 2: Evaluation of Hybrid Method depicting correlation between RSS and Distance

As per the tabular form of the received signal strength we can determine the estimation of error and the accuracy factor showing the correlation between the accuracy and RSS values.The Wi-Fi fingerprinting average positioning exactness of the hybrid framework can be 45% to 74% respectively

Aver = $1/n \sum n \ \ error\ i$ (8)

Where n is the number of the test point of Wi-fi nodes
Precision : It is defined as consistency of the system in order to determine the robustness of the position techniques with CDF (Cumulative Distribution Function of the distance)is applied .





CONCLUSION

In this paper we provided a review of the state-of-art in hybrid indoor positioning system based on Wi-Fi and Bluetooth with estimation of different access points for acquiring accuracy. The test results shown that introduces effective and consistent improvised provision for estimation of accuracy a a level of half meter .Major importance is relying in flexibility adaptivity for scalability in future development can be integrated with other approaches of IPS. Future work will be critical analysis for the performance estimation in various investigations in RSSI observation from Aps in different time.

6. ACKNOWLEDGEMENTS

With acknowledge for the support of time and facilities from Dr.Vinit Dongre Dean of Electronics & Telecommunication Dept TECT from Mumbai University for valuable the project guidance for the proposed project.

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LensPatrol: Detecting Anomalous Event

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Abstract. **The advent of technology and subsequent waves of technological modernization have had a massive impact on society today. Along with the development, there has been an increase in activities that can only be categorized as abnormalities or anomalies. Due to these anomalies, security has received the greatest importance in recent times. Setting up CCTVs to constantly monitor people and how they interact is a very common practice in most organizations. It is nearly impossible for the authorities to continuously review these surveillance films to determine whether the occurrences are suspicious or not because it takes continual attention from their staff. This is the issue being addressed here. The Proposed System uses the CCTV feed to detect abnormalities like Weapons, Theft, Fire, Masks, etc., and upon detection, the respective authorities can be notified immediately. The surveillance footage is further analyzed to identify the busiest counter, person count, and queue analysis which is then summarized in a report for the management. Detection algorithms like CNN,**
ConvLSTM, Resnet, YoloV3, and YoloV5 have been trained and YoloV5 showed a mean Average Precision (mAP) of 53.6 with a loss of 0.012.

Keywords. **Video Analytics, Event Detection, Deep learning, Object Detection, Anomaly Detection**

1. INTRODUCTION

The Banking Industry has seen modifications in banking rules and their exchanges due to rapid advancements in technology. Banks are looking for intelligent solutions to monitor their premises, and detect and raise an alarm for any suspicious activities. These solutions need to be highly accurate so that the system can rely on them even after working hours. The core value or principle on which any bank works is trust. They strive to achieve customers' trust in their bank and their employees. And this can only be done by providing them with a sense of security. For this reason, they employ a workforce to constantly monitor their premises either physically or via CCTV or a combination of both. Although watching multiple areas via several CCTV feeds is quite efficient, there is a possibility that certain mishaps may go unnoticed by the human eye or it might be too late before they get noticed by the security personnel. This causes a delay in taking swift action against criminal activities which may cause a loss of life or property. To prevent this, an intelligent CCTV proctoring system titled "Lenspatrol" is developed. This Proposed System has considered possible nefarious activities that can happen on the bank's premises and developed detection models for the same. LensPatrol can broadly be classified into three modules, i.e., security, analysis, and predictive modules. The proposed system uses the YOLOv5 algorithm and OpenCV library for detection and identification purposes and generates an accurate analysis report for the banks.

2. LITERATURE SURVEY

An enormous amount of research carried out in the last decade has led to several new technologies, applications, and even algorithms to detect abnormal events. Some of these papers have been reviewed to get a better understanding of this field of study and aid in the implementation of LensPatrol.

MM. Salehin et al. [1] present a system to summarize videos by extracting the most valuable videos from a long, continuous video stream.. The proposed method contains the following steps- (i) Foreground object extraction, (ii) Motion information estimation, (iii) Visual saliency difference calculation, and (iv) Key frame selection through SVM. The above-proposed method performs better than the state-of-the-art methods, according to comprehensive experiments. Another system by S. Saravanan [2] focuses on putting in place a smart camera that watches operations in banks and can spot any kind of unusual conduct, allowing robbers to be traced using movement and time-based facial recognition. V.Singh et al. [3] present a method for identifying deviations from the norm in actual CCTV footage. It might not be possible to identify anomalies in these recordings using only the standard data. As a result, both normal and irregular movies are taken into account to handle the intricacy of these genuine anomalies, which maximises the model's accuracy. S. Gupta et al. [4] proposes a new framework for video summarization – perceptual video summarization where choosing the right frames for the synopsis requires summarization that is in line with the characteristics of human understanding.

The paper by C. Kumar et al. [5] focuses on the early detection of fire accidents. Fires are identified in picture or video sequences using a classification

model that incorporates deep learning with transfer learning. The ResNet-50-SVM pair was chosen as the implementation model out of many deep learning and classification models since it provided the best measurement figures (Accuracy, Precision, and Recall values for this arrangement were 97.8%, 97.46%, and 97.66% respectively).

For the weapon detection module, works like S.Narejo et al. [6] through IP cameras study, the cutting-edge YOLO V3 object detection model was adopted and trained over the available dataset for firearms identification. The goal of this project was to create an integrated framework for reconnaissance security that gradually distinguishes the weapons and, if the identification is positively true, it will caution/brief the guards to control the predicament by coming at the place of the incident.

It has been observed from experimental results of [6], in comparison to other approaches like AlexNet + SVM, Faster RCNN, and CNN VGG - 16, which produced accuracies of 95%, 95.4%, and 93.1% correspondingly for various kinds of data, YOLOv3 produces the highest accurate results (98.89%) for the amassed picture dataset.

The work by H.Jain et al. [7] presents an automatic gun (or) weapon detection system using a convolution neural network (CNN) based SSD and Faster RCNN algorithms. It is discovered that the SSD method provides faster performance with 0.736 s/frame compared to Faster RCNN's 1.606 s/frame. Faster RCNN provides superior accuracy, with a score of 84.6%, whereas SSD provides a score of 73.8%. Both SSD and Faster RCNN algorithms are simulated for prelabeled and self-created image datasets for weapon (gun) detection. Works like M.T.Bhatti et al. [8] adopt the deep learning methodology, particularly Convolutional Neural Networks. The outcomes of using deep neural networks for object identification were assessed in terms of accuracy, speed, and the common F1 score measure. Modern deep learning-based YOLOv3, FasterRCNN-InceptionResnetv2, SSDMobileNetv1, and YOLOv4 models were trained and put to the test. The research by S. Boudoir et al. [9] questions the focus on only the analysis of trajectories for anomaly detection. Instead, it presents a method for the detection and localization of abnormal events in scenes, based only on a

training dataset of normal situations.

The most lucrative targets for fraudsters are banks, insurance companies, and other financial institutions. In the financial year 2022, the Reserve Bank of India (RBI) reported bank frauds amounting to 604 billion Indian rupees. Fraud Detection plays an important role in minimizing these losses as proposed by D.Sarma et al. [10]. Video and surveillance feeds can be analyzed for several aspects such as weapons, fire, ATM Fraud, and snatching that constitute abnormalities in banks and other public places. Roy et al. [11], by training a sizable UAM that includes qualities from all activities, suggest a method for using the similarities between snatch steals and regular actions. This led to the creation of a framework whose learning is independent of labelled snatch steal cases, which are notoriously hard to gather due to their rarity and limited quantity.

1.1 Existing Systems and their drawbacks

Existing surveillance systems are generally single-feed classification-type systems that do not perform analysis to gain insights from the captured activities. Also, various IOT-based analytics and detection systems use external hardware like sensors attached to the machine which increases the cost of the system. When it comes to monitoring, public spaces like banks that have CCTV and computerised systems need a staff and regular attention to determine whether the recorded behaviours are unusual or suspicious. This is often hard or even impossible for a human being to accurately classify. Many of these systems are single-domain detection systems that are used to track a specific kind of anomaly like Theft or Fire, Long Queues, etc.

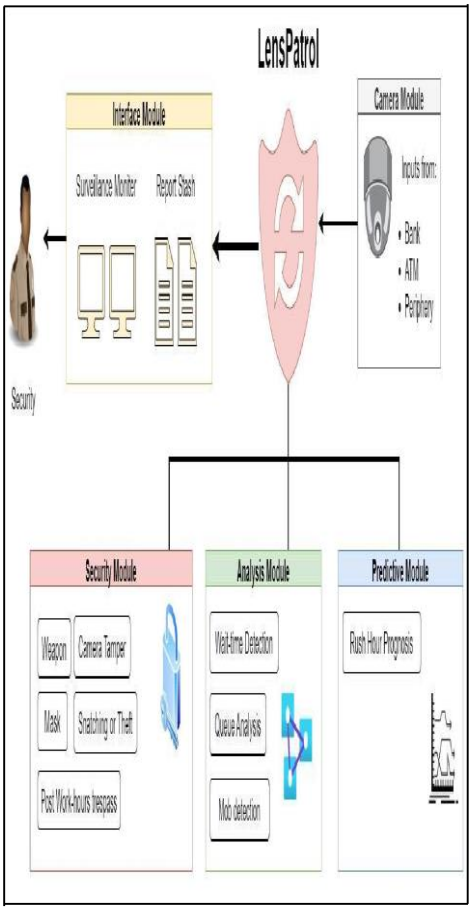
3. METHODOLOGY

The suggested application basically is a bank surveillance and analytics system. This proposed system can broadly be divided into three modules viz., Security Module, Analysis Module, and Prediction Module. *A. Security Module:*

In this, the proposed system is going to identify four events through the closed-circuit television (CCTV) system. The four events are as follows:

- Snatching
- Weapon
- Robber Mask
- Fire
- Camera Tampering
- Post- work hour detection

To train a model that can identify the above-mentioned events, the proposed system needed a large dataset. Since this sensitive dataset was not available anywhere easily, youtube videos were downloaded regarding that event. Around 120 videos were downloaded and converted into frames. Amongst the collected frames, many were blurry and of poor quality; hence, such frames could not be used for training purposes. After this various Deep Learning models were trained on the dataset and evaluated based on their accuracy. CNN, Resnet, Vgg16, LSTM, ConvLstm, YOLOv3, YOLOv4, and YOLOv5 were trained and results were checked for each model. YOLO gave better results than other models so YOLO was chosen for training the dataset. For the training of YOLO, various steps were followed like downloading a labelling software named Labellmg to map image frames to their classes. In this, around 26k images were annotated to their respective classes. After mapping all the images to their respective classes, they were trained for 4-5 hrs and results were computed on some test videos.



(Figure 2 - Modular)

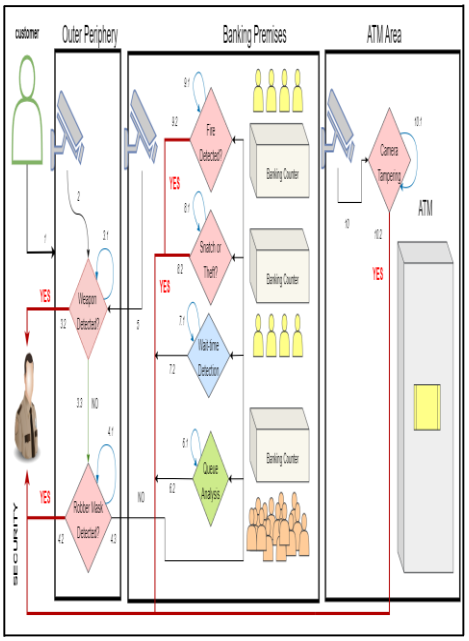
B. Analysis Module:

The whole motive for this module is to utilize the entire footage captured by CCTV cameras and analyze it to provide infographics to the bank. Analysis was conducted through CCTV for the following:

- Count number of people
- After working hours intruder detection
- Dwell time detection
- Person tracking
- Mob detection
- Camera Tampering

Persons were detected using the OpenCV library and then assigned a unique Id to every person in the person and also kept the count of people in the frame and the overall count. After that using that unique Id dwell time was also calculated for each person in the frame. Also, a program was created for camera tampering in OpenCV, in which if the screen gets darker or blurry then it triggers an alert. This analysis might help the bank to improve its security and reduce the manual work done by people by automating this concept. *C. Prediction Module:*

The data collected by the analysis module can be then analyzed and inferences can be drawn from it. Its aim is to provide accurate predictions for the busiest counter at a particular time of the day and also perform rush hour prognosis. LSTM model can be used to generate an accurate prediction of the time-series type data collected in the analysis module. This module's maximum potential will be unleashed when LensPatrol gets integrated with an actual bank. Only then real-time data can be used by the model to get precise predictions.



(Figure 3 - Block Diagram)

For the purpose of this system, the entire premises is divided into three areas, hereby referred as sectors, with each sector having separate camera modules:

1) Outer Perimeter

The customer visits the premises through the outer periphery, where initially, the camera continuously screens for any weapon present on the individuals, along with sustained lookout for individuals seen wearing robber masks. If one or both modules reports back positive identification on their respective fields, the security personnel are alerted and a report for the event is generated and stored in the database.

2) Banking Premises

Once the individual enters the actual banking area, they are persistently monitored by the cameras for the aforementioned criteria. Besides these, the camera modules also carry an incessant stake-out for the rest of the activities like a snatching or theft event, attempts at tampering the cameras at any point of time and detecting whether it's a trespasser present post working hours. Actions taken on a positive hit on any event are similar to that of the previous sector. Furthermore, the cameras also scrutinize the entire populace present to analyse the crowd and its wait-time at the counters, as well as carrying out a prognosis of the number of people standing in queues across the various counters. Reports are generated for analytics purposes, which include infographic depiction of the collected data.

3) ATM Area

Every bank is usually accompanied by its very own ATM adjacent to the main banking premises. The camera module in this sector stays alert for any kind of camera tampering attempts, accompanied by the rest of the security measures like firearms or robber masks.

4. PROPOSED ALGORITHMS

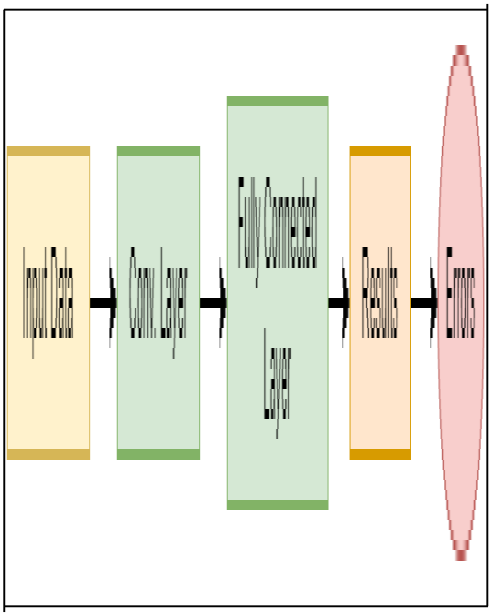
- CNN:

A neural network type called a convolutional neural network, or CNN or ConvNet, is particularly adept at processing input with a grid-like architecture, like an image. The training process of a neural network generally involves two steps:

1. Forward Propagation: Input Data is received, processed, and output is generated.
2. Backward Propagation: Error is calculated and network parameters are updated.

Convolutional Networks can be broken down into two parts:

1. The Convolution layers: Responsible for extracting features from input data
2. Fully Connected (Dense) layers: Responsible for generating the output using data from the convolution layer.



(Figure 4 - CNN Architecture)

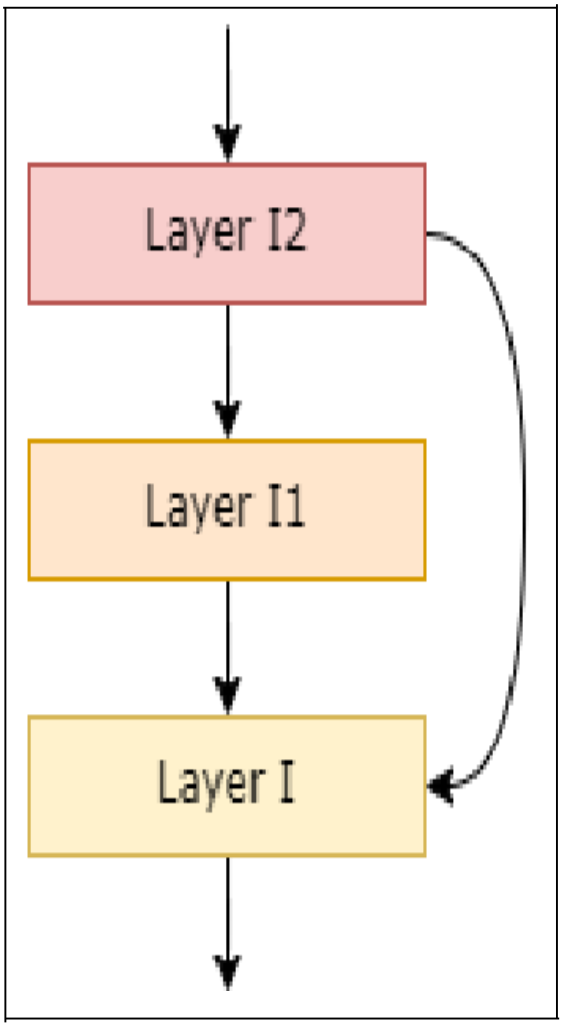
- ConvLSTM:

ConvLSTM is a kind of recurrent neural network used for spatiotemporal prediction that incorporates convolutional structures in both the input-to-state and state-to-state transitions.

The ideal method for working with photos is a CNN (Convolutional Neural Network) architecture. Convolutional layers, which the image passes through to extract significant information, are used. The output is joined to a fully-connected Dense network after going through a few convolutional layers sequentially. ConvLSTM, a recurrent layer similar to LSTM with the sole exception that internal matrix multiplications are swapped out for convolutional operations, can be applied in the situation of sequential images. As a result, rather than being a 1D vector containing features, the ConvLSTM cell keeps the input dimension of the data that flows through it (2D or 3D).

- Resnet:

It is a CNN architecture model. ResNet, short for Residual Networks, is a classic neural network used as a backbone for many computer vision tasks.

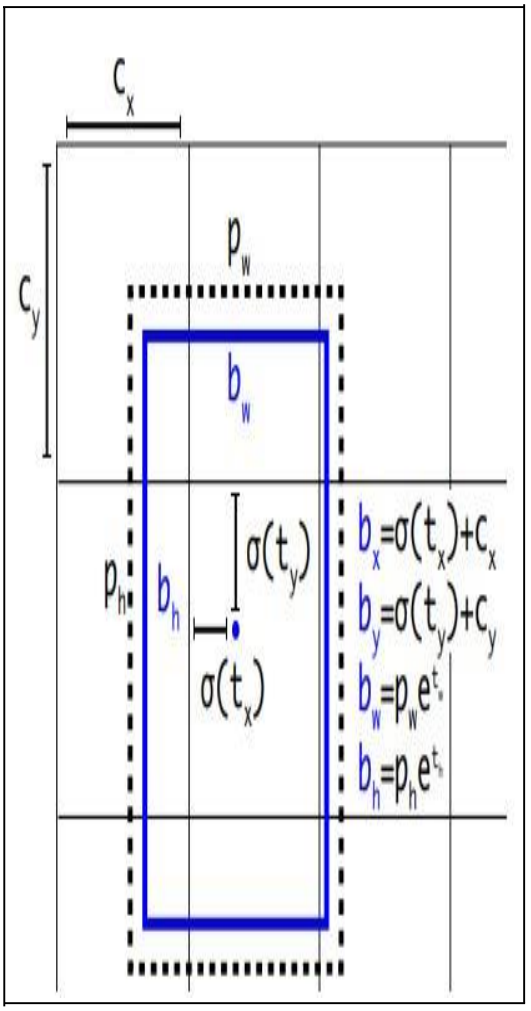


(Figure 5 - Canonical Form of Resnet. Layer L-1 is skipped from L-2 to L)

- YOLOv3:

A real-time object detection system called YOLOv3 (You Only Look Once, Version 3) recognises particular things in films, live feeds, or still photos. To find an item, the YOLO machine learning system leverages features that a deep convolutional neural network has learned.

The approach in prior detection systems was to repurpose the classifiers for detection. The model was applied to an image at multiple locations and scales and the regions of the image which produced high scores were considered as detections. Yolov3, however, applies a single neural network to the entire image. The image is then divided into areas and bounding boxes by this network, and probabilities are forecast for each region. The bounding boxes are weighted using the predicted probabilities.

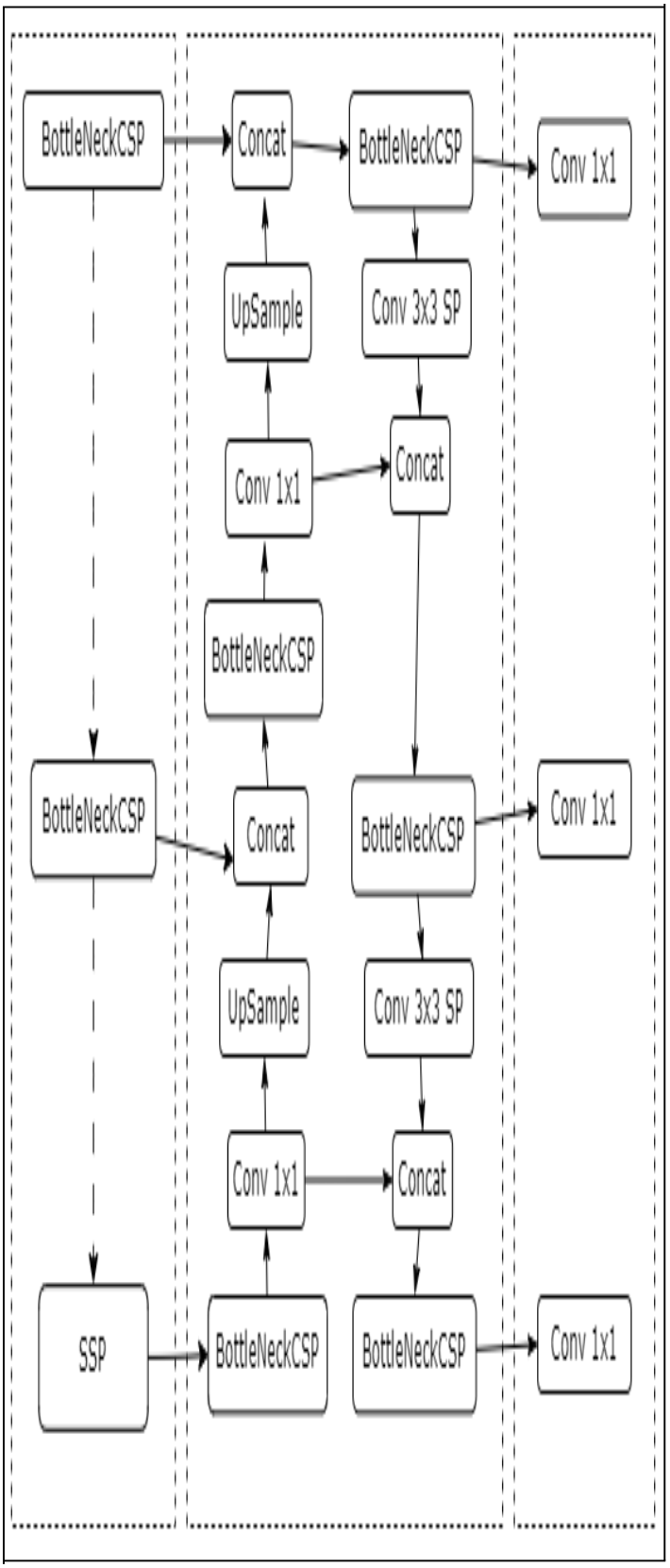


(Figure 6 - Bounding Boxes with dimension priors and location prediction - from paper [12]) The advantage of YOLO over other classifier systems can be listed as follows:

1. Predictions are based on global context as it looks at the entire image at testing time.
2. Makes the predictions using single network evaluation, unlike CNN-based systems.
3. Faster, lightweight, and improved training and testing performance.

- YOLOv5:

The YOLOv5 collection of object identification frameworks and models, which was developed by Ultralytics as part of their open-source R&D AI techniques, incorporates best practices that have been developed through thousands of hours of study and development.. It was released in 2021 with newly added features like support for panoptic segmentation and object tracking further improving the model's performance.



(Figure 7 - YOLOv5 Architecture)

Model	***Accuracy / mAP***	***Loss***
CNN	96.32%	0.112
ResNet	90.65%	0.20
YOLOv3	82.91%	0.60
YOLOv5	53.6 (mAP)	0.012

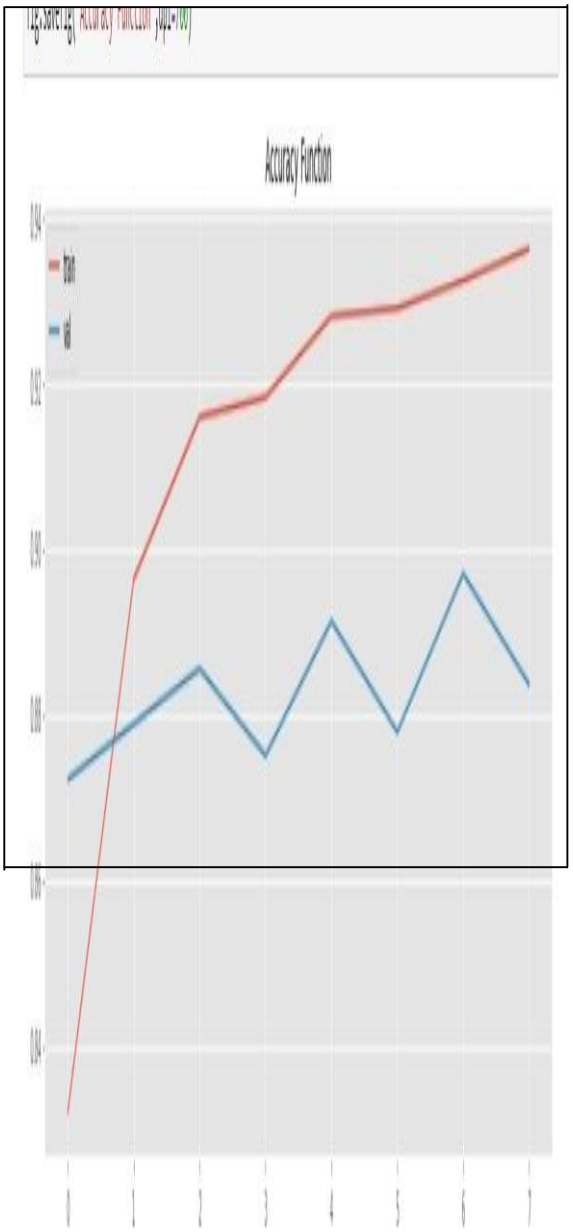
5. RESULTS AND DISCUSSION

By adjusting various parameters and modifying the dataset, four models were trained. The goal was to detect and classify frames into 4 categories, Snatch, Weapon, Fire, and Mask. Following were the validation results for each model:

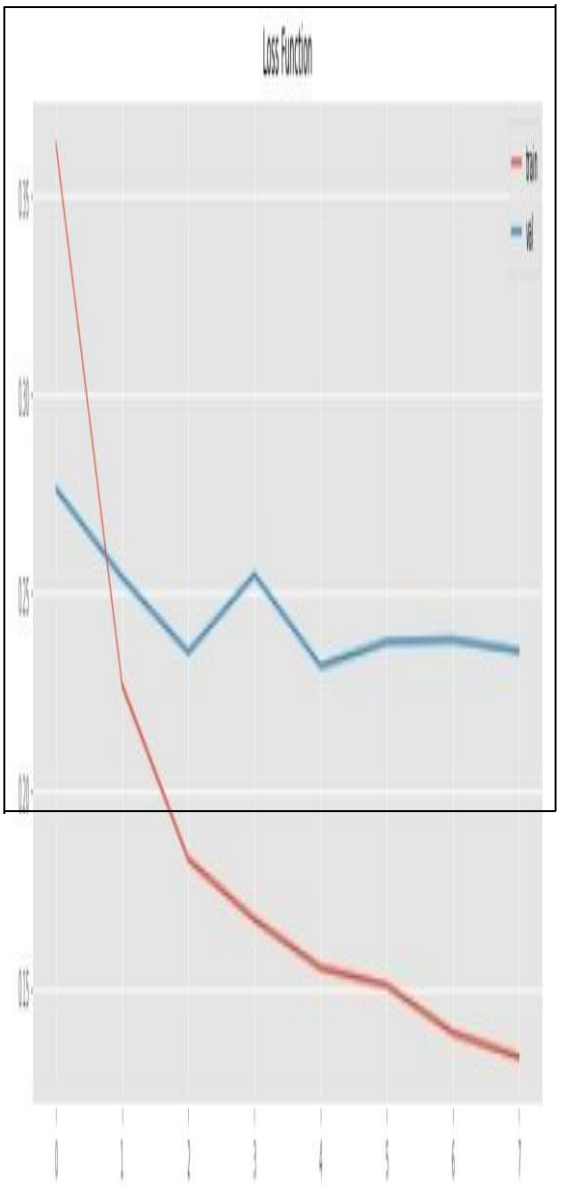
TABLE I. RESULTS OBTAINED FROM THE TRAINED ALGORITHMS

Though the accuracy shown by the CNN algorithm is the highest, it is overfitted to the data on which it is trained and hence performs poorly on new data.

For ResNet the accuracy and loss functions showed the following trend:



(Figure 8 - Accuracy Plot for ResNet)



(Figure 9 - Loss Plot for ResNet)

From Figure 8 and Figure 9, in the case of ResNet, the training loss decreases over several iterations and accuracy increases. The validation accuracy fluctuates a lot and validation loss sees a sudden spike but then approximately becomes constant.

In comparison to CNN and ResNet, YOLOv3 gave more accurate results, with lesser false positives on videos independent of the training dataset. A training loss of 0.36 was observed in the case of YOLOv3.

YOLOv5 performed far better as compared to the other 3 models. A very low training loss of 0.1 was observed in the case of YOLOv5. As it was able to detect faster and provide more accurate results,

All four classes were integrated into one model in YOLOv5.

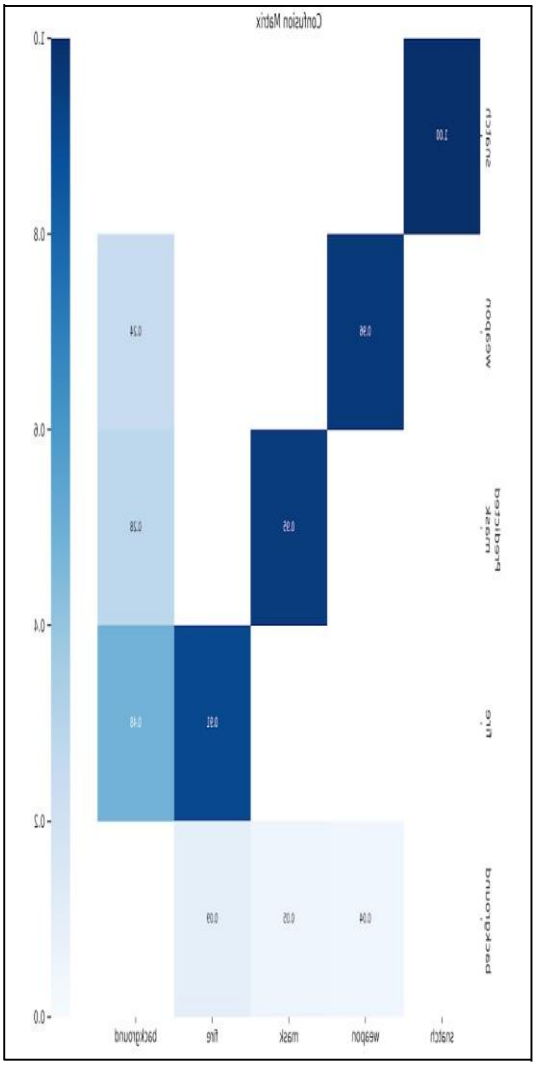


Figure 10) Confusion Matrix for YOLOv5

6. Conclusion And Further Work

An effective and robust event detection, and analysis system has been proposed and implemented. Various suspicious events like Snatch/Theft, Fire, Weapons, and Camera Tampering are detected using LensPatrol, and respective authorities are immediately informed in case of mishaps. Also, the CCTV footage that is being captured when such nefarious activities are not happening can be analyzed to understand various aspects of the banking process. Algorithms like YOLO and ResNet have been used to perform the classification of detected events and train models to predict outliers accurately. The future work focuses on adding more components to the analysis module which would help financial institutions to improve their day-to-day banking operations and provide infographics to them for better analysis and convenience.

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Internet of Things (IOT): Future Application and research

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Abstract—**With the Internet of Things (IoT) gradually it evolves as the subsequent phase of the evolution of Internet, it becomes crucial for recognizing the various potential domains and also for application of the Internet of things, and the challenges of the research that are associated with these applications. Ranging from smart cities, to health care, agriculture, logistics and retail, to even smart living and smart environments Inter of things is expected to infiltrate into virtually all aspects of daily life. Even though the current Internet of things it enables the technologies which have greatly improved in the present years, there are still many more problems which require attention. Since the Internet of things concept ensues from heterogeneous technologies, many research challenges are therefor bound to arise. The fact that Internet of things is so expansive that affects practically all areas of our lives, makes it a significant research topic for studies in various related fields as information technology and computer science. Thus, Internet of things is paving the way for new dimensions of research that should be carried out. This paper presents the recent development of IoT technologies and future applications and challenges.**

Keywords—**Internet of Things; applications; smart:cities , environment , agriculture, living ,challenges** .

1. INTRODUCTION

The IOT can be described as the network of communication which connects to the individual information whereas the internet of things is interconnected system distinctively address able physical items with various degree of processing and actuation capabilities that share the capability to communicate through the Internet as their joint platform . the main objective of the Internet of Things is to make possible for objects which is been connected with other objects, individuals, at any time and also anywhere using any network or service. The Internet of Things (is gradually being regard as the subsequent phase in the Internet evolution. Internet of things will make possible for ordinary devices be linked to the internet in order for achieve minimum goals. Currently, an estimated number of only 0.6% devices that can be part of Internet of things has been connected so far . However, by the year of 2023, it is likely to say that over 90 billion devices will having internet connection an internet connection.

As the internet continues to evolve in the system and environment, it has become more than a simple network of computers, but also network of various devices, while Internet of thing serves as a network of various “connected” devices a network of networks as shown in Fig. 1. Nowadays we can see that, devices like smart phones, vehicles, industrial systems, cameras, toys, buildings, home appliances, others can all share information over the Internet. Regardless of sizes and functions, these devices can

accomplish smart reorganizations, tracing, positioning, and process control. In the earlier years, there has been an important of Internet capable devices. Even its most significant commercial effect has been observed in the consumer electronics field, . particularly the revolution of smartphones and the interest in wearable devices (watches , bluetooth etc.), connecting people has become merely a fragment of a bigger movement towards the association of the digital worlds. With all this, the Internet of Things (IoT) is expected to continue expanding, which it can run. This is the evident from ambiguity in the expression of

"Things" which makes difficult to outline the ever-growing limits of the Internet of things. While in commercial success it continues to materialize, the Internet of things constantly it offers a virtually limitless supply of opportunities, not only just in businesses but also in researches

2. Potential Domains for IOT

Potential applications of IOT are not only numerous they are also quite diverse as they permeate into virtually all aspects of daily life of individuals, society. The applications of Internet of things cover broad areas which include manufacturing and also industrial sector, health sector, agriculture, smart cities, security and emergencies among with many others.

A. Smart Cities

The Internet of things plays a role in improving the smartness of cities and also enhancing general infrastructure. As some of the Internet of things application areas in creating smart cities which include intelligent transportation , smart building, traffic, waste management , smart light, smart parking, urban maps,That may include different

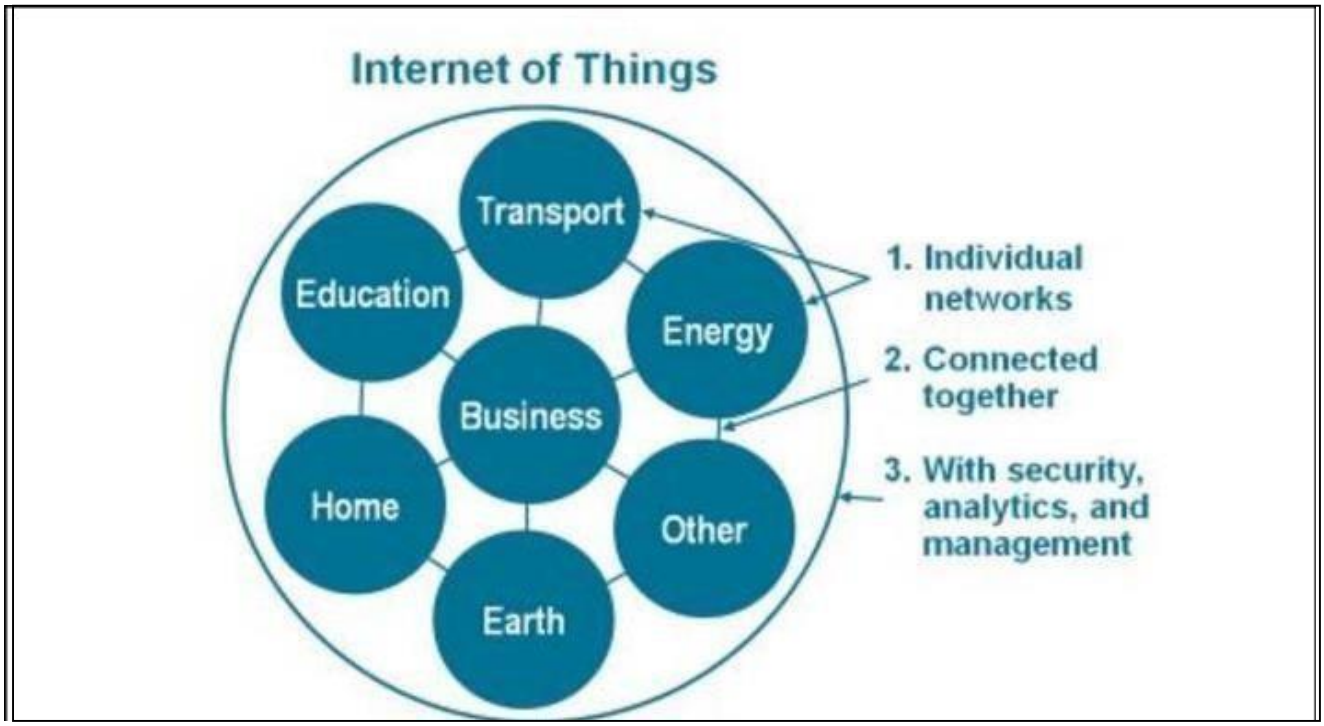

Fig :1 IOT can viewed as network of networks

functionalities as; monitoring parking spaces within the city, monitoring vibrations and material conditions of bridges and buildings, putting in place sound devices monotering in sensitive parts of cities, as well as monitoring the levels of vehicles. Artificial Intelligence enabled internet of things can be utilized to monitor, control and reduce traffic congestions in Smart Cities . Moreover, Internet of things allows the installation of intelligent and adaptive street lighting and detection waste and also the waste containers by keeping tabs of trash collection . Intelligent highways can provide warning messages and information which are important, such as access to diversions depending on the climate conditions and it may be unexpected occurrences like traffic jams and accidents. Application of Internet of things to achieve smart cities would require using radio frequency identification , sensors. Some of them which are already developed applications in this area are the Aware home and the Smart Santander functionality. In the US, some major cities like Boston have plans , how to implement the Internet of Things in most of their systems ranging from their parking meters, sprinkler systems, and sewage grates are been scheduled to be interlinked and connected to the internet. Those applications will offer significant break throughs in terms of saving money and energy.

B. Healthcare

Most of the healthcare systems in many countries are inefficient, slow and prone to error. This can be easily changed since the healthcare sector relies on the numerous activities and devices which can be automated and enhanced through technology.

Additional technology that can facilitate numerous operations like sharing of report to multiple individuals and locations, kipping of the record and dispensing medications would go long way in changing the healthcare sector. A lot of benefits that Internet of things application offers in the healthcare sector that are more categorized into tracking of patients, staff, identifying, as well as authenticating, individuals, and the automatic gathering of data. Hospital workflow can be improved once patients flow is tracked. The additional authentication and identification reduce incident which may be harmful to patient, maintains record and cases of fever mismatching infants. In addition, automatic data collection and transmission is vital process automation, reduction of form processing timelines, automated procedure auditing and medical inventory management. The Sensor devices allows functions centered on patients, particularly, in diagnostic, conditions and gathering real-time information about patients' health indicators . utility domain names in this area consist of; being able to reveal a affected person's compliance with prescriptions, telemedicine answers, and indicators for patients' well-being. Thereby, sensors may be applied to outpatient and inpatient sufferers, dental Bluetooth gadgets and toothbrushes which could deliver facts after they may be used and patient's surveillance. other factors of IoT in this capability include; RFID, Bluetooth, and c084d04ddacadd4b971ae3d98fecfb2a among others. those will substantially enhance dimension and tracking techniques of crucial features like blood pressure, temperature, heart charge, blood glucose, levels of cholesterol, and many others. The packages of net of factors (IoT) and net of everything (IoE) are

further being prolonged via the materialization of the net of Nano-matters (IoNT) . The notion of

IoNT, because the call implies, is being engineered by using integrating Nano-sensors in numerous gadgets (things) using Nano networks. scientific software, as shown in fig is one of the predominant focuses of IoNT implementations. utility of IoNT in human frame, for treatment purposes, facilitates get right of entry to to facts from in situ elements of the body which were hitherto in reachable to experience from or by using the use of the ones scientific instruments incorporated with bulky sensor size. for this reason, IoNT will permit new clinical records to be accumulated, main to new discoveries and better diagnostics.

C. Smart Agriculture and Water Management

The IoT has the capability to strengthen and decorate the agriculture region thru inspecting soil moisture and in the case of vineyards, tracking the trunk diameter. IoT would permit to manipulate and maintain the quantity of vitamins discovered in agricultural merchandise, and regulate microclimate situations so that it will make the maximum of the production of veggies and fruits and their nice. furthermore, reading climate conditions allows forecasting of ice statistics, drought, wind changes, rain or snow, for this reason controlling temperature and humidity tiers to prevent fungus in addition to different microbial contaminants. with regards to farm animals, IoT can help in figuring out animals that graze in open places, detecting damaging gases from the animal excrements in the farms, and also controlling boom conditions in offspring to enhance chances of fitness and survival and so forth. furthermore, via IoT software in agriculture, a number of wastage and spoilage may be averted thru right tracking strategies and management of the complete agriculture field. It additionally results in better electricity and water manage.

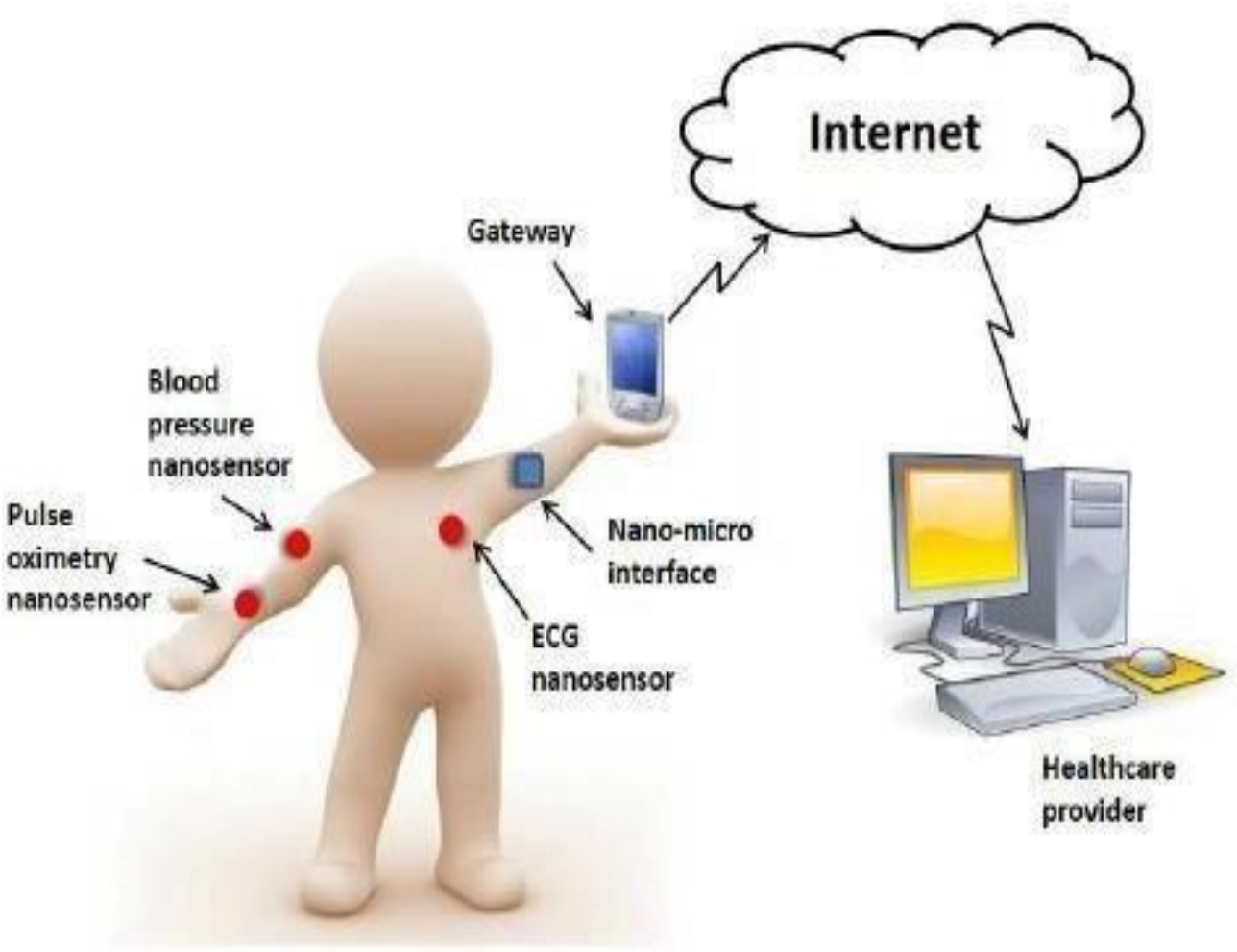

Fig :2 Internet of Nano Things

D. Smart Living

In this area, IoT can be carried out in far flung manage gadgets wherein you possibly can remotely transfer home equipment on and off for this reason stopping injuries in addition to saving power . other smart home appliances encompass refrigerators equipped with liquid crystal display (Liquid Crystal show) displays, allowing one to understand what is available interior, what has over stayed and is nearly expiring as well as what desires to be restocked. This statistics also can be related to a smartphone application allowing one to access it while outdoor

the residence and therefore purchase what is wanted. moreover, washing machines can permit one to remotely screen laundry. in addition, a huge range of kitchen devices can be interfaced through a telephone, consequently making it possible to adjust temperature, like in the case of an oven. a few ovens which have a self-cleaning characteristic can be without difficulty monitored as well. In terms of protection in the home, IoT may be implemented thru alarm systems and cameras can be set up to screen and locate window or door openings as a result stopping intruders.

E. Smart Environment

The environment has a important position within all factors of lifestyles, from humans, to animals, birds and additionally flora, are all affected via an unhealthy surroundings in one way or another. There have been severa efforts to create a wholesome surroundings in phrases of removing pollutants and lowering wastage of resources, but the lifestyles of industries, as well as transportations wastes coupled with reckless and dangerous human actions are commonplace location elements which always damage the surroundings. therefore, the environment calls for smart and revolutionary ways to assist in monitoring and coping with waste, which offer a giant amount of data that forces governments to install place systems with a purpose to guard the environment. clever environment techniques integration with IoT generation should be created for sensing, tracking and evaluation of gadgets of the environment that provide potential benefits in achieving a sustainable lifestyles and a green international. The IoT era lets in watching and handling of air fine through records collection from faraway sensors throughout cities and presenting round the clock geographic insurance to accomplish better methods of coping with traffic jams in principal cities. additionally, IoT generation may be applied in measuring pollution tiers in water and consequently enlighten selections on water usage. In waste control, which includes various sorts of waste, like chemical substances and pollutants being detrimental to the environment and to humans, animals, and plants as nicely, IoT also can be implemented. this could be finished by using environmental protection by using controlling industrial pollutants through instantaneous tracking and control systems mixed with supervision similarly to selection making networks. This serves to lessen waste .

3. Research Challenges

For all of the above capacity packages of IoT, there has to be right feasibility into the extraordinary domain names to examine the achievement of a few programs and their functionality. As with another form of generation or innovation, IoT has its challenges and implications that ought to be looked after out to allow mass adoption. despite the fact that the contemporary IoT allowing technology have substantially improved in the latest years, there are nevertheless numerous problems that require interest, as a result paving the manner for brand new dimensions of research to be carried out. for the reason that IoT idea ensues from heterogeneous technologies which can be used in sensing, collecting, movement, processing, inferring, transmitting, notifying, dealing with, and storing of records, a variety of studies challenges are sure to arise. these studies challenges that require attention have consequently spanned one-of-a-kind research regions .

A. Privacy and Security

Thanks to the fact that IoT has emerge as a vital element as regards the destiny of the net with its elevated usage, it necessitates a want to correctly address protection and accept as true with features. Researchers are aware about the weaknesses which presently exist in lots of IoT devices. furthermore, the basis of IoT is laid on the existing wireless sensor networks (WSN), IoT as a consequence architecturally inherits the same privacy and protection troubles WSN possesses . diverse assaults and weaknesses on IoT systems prove that there's certainly a want for extensive ranging security designs so that you can protect data and systems from stop to give up. Many assaults commonly make the most weaknesses in precise gadgets thereby gaining get admission to into their structures and therefore making comfy devices inclined . This safety hole similarly motivates complete protection answers that encompass research that is efficient in applied cryptography for facts and machine protection, non-cryptographic safety strategies as well as frameworks that help developers to come up with secure systems on devices which can be heterogeneous. there's a want for more studies to be performed on cryptographic protection offerings that have the capability to operate on useful resource constrained IoT devices. this would allow specific skilled users to securely use and installation IoT structures no matter the inadequate consumer interfaces that are available with nearly all IoT gadgets. similarly to the safety and safety factors of the IoT, extra regions like confidentiality in conversation, trustworthiness, and authenticity of verbal exchange parties, and message integrity, and supplementary protection necessities ought to also be integrated. those may include features like being capable of save you verbal exchange of diverse events. as an instance, in commercial enterprise transactions, smart objects should be prevented from facilitating competitors' get entry to to exclusive statistics in the gadgets and for this reason the usage of this records maliciously.

B. Processing, Analysis and Management of Data

The process for processing, analysis and facts management is quite difficult due to the heterogeneous nature of IoT, and the huge scale of facts amassed, specially in this period of large data . presently, most structures make use of centralized structures in offloading facts and carrying out computationally intensive tasks on an international cloud platform. though, there may be a regular challenge about traditional cloud architectures now not being effective in terms of moving the large volumes of information which can be produced and fed on by IoT enabled devices and to have the ability similarly help the accompanying computational load and simultaneously meet timing constraints . maximum systems are therefore relying on modern-day answers such as cellular cloud computing and fog computing that are both based totally on edge processing, to mitigate this project.

C. Monitoring and Sensing

Although technology concerned with monitoring and sensing have made extraordinary development, they're continuously evolving specially focusing on the electricity performance and shape element. Sensors and tags are usually anticipated to be energetic constantly as a way to achieve on the spot statistics, this thing makes it essential for power efficiency especially in lifetime extension. concurrently, new advances in nanotechnology/biotechnology and miniaturization

have allowed the improvement of actuators and sensors on the Nanoscale.

Conclusion

The IoT can great be defined as a CAS (complex Adaptive gadget) so as to keep to adapt hence requiring new and progressive forms of software engineering, structures engineering, project control, in addition to severa other disciplines to expand it further and manage it the coming years. The application regions of IoT are quite numerous to allow it to serve one of a kind customers, who in turn have distinctive needs. The generation serves three categories of customers, individuals, the society or groups and institutions. As mentioned in the application section of the research paper, the Internet of things has without a doubt a large functionality to be a exceedingly transformative force, a good way to, and to a degree does already, undoubtedly effect hundreds of thousands of lives international. according to, this has become even extra obtrusive, as unique governments around the arena have shown an hobby in the IoT concept through presenting more investment inside the subject that is supposed to facilitate similarly research. a terrific example is the chinese government.

Acknowledgement

I would like to expand gratitude to project guide **Prof. Vijay.M.Rakahde** who guided by providing the valuable suggestion in numerous way on this project which gave us the inspiration to improve our self independency. Secondly I would like to express my gratitude toward the project mentor **Prof. Lawlesh.N.Yadav** who help in finalizing the work done within the limited time period, I would also like to express heartfelt thanks to Head Of Department **Lawlesh.N.Yadav** who has given us a platform where we can work on developing the projects and demonstrate the practical applications.

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Classification Algorithm on Chronic Diseases using HE

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Abstract – **In persistent kidney disease (CKD) is the various great contributor to morbidity and mortality from non-communicable illnesses which can affected 10–15% of the worldwide populace.**

CKD to detect chronic kidney disease patient's information regarding various clinical parameters the data is collected from UCI Machine learning Repository. The main objective of paper is to deal mainly with different classification algorithms and compare accuracy. PCA is applied and binary classification algorithms starting off with KNN, Logistic Regressor, Support Vector Machine Regressor with RBF- kernel and Decision Tree. A plot of roc-auc and log-loss has observed for each training and cross-validation data and best hyper-parameters were selected for each of the model and performed building ensembles with Random Forest classifier and Stacking Classifier and they seem to perform pretty good than the other models. After training the model performed testing using test data and results were pretty good. The effects from the experiments indicated that RF primarily based on recursive function removal with go validation has higher performance than SVM and DT. In the end created a web-application to make it easy to use and test. In the backend we had our pipeline which performed attribute transformation followed by prediction by our best models.

Keywords: Support Vector Machines ,EHR, K-nearest Neighbor, CKD Binary Classification, Logistic Regressor, Random Forest, Decision Tree, RBF-kernel, Stacked Classifier, SVM, DT, KNN

I. INTRODUCTION

Chronic Kidney Disease is a typical and significant illness that is prominently found in India and even globally. Kidney illness needs explicit clinical treatment dependent on an interminable state of patients from initial stage to final stage. The techniques will shift dependent on the reason. The treatment generally comprises of actions to regulate signs and indications, decrease inconveniences, and moderate movement of the illness [1]. In diagnosing it specialists direct a few trials of a patient in the research facility for example blood, urine, and so on. The creatinine is an ordinary left-over resulting from the muscle breakdown. Quantification of the level to which the kidneys are sifting the blood for the evacuation of creatinine can be done using a simple blood test. The presence of protein in the urine can be tested using a simple urine test. Protein specifically (albumin) is a part of the blood that doesn't ordinarily go through the kidney channels into those tests. The specialists generally decide the condition and treatment of patients and this information will be recorded in Electronic Health Record (EHR) as clinical information of patient.[2]

The causes of chronic kidney disease are diabetes and high blood pressure, which are responsible for up to two-thirds of the cases. Diabetes happens when your blood sugar is too high, causing damage to many organs in your body, including the kidneys, as well as blood vessels, nerves and eyes. High blood pressure, or hypertension, occurs when the pressure of your blood against the walls of your blood vessels increases. If uncontrolled, or poorly controlled, high blood pressure can be a leading cause of heart attacks, strokes and chronic kidney disease. Also, chronic kidney disease can cause high blood pressure chronic kidney disease, also called chronic kidney failure, describes the gradual loss of kidney function. The kidneys filter wastes and excess fluids from the blood, which are then excreted in form of urine number of inhabitants in Indian individuals that experience the ill effects of the kidney diseases has multiplied over the time and the circumstance has taken a terrible shape. Significant number of the grown-up individuals experiences the ill effects of a portion of different types of kidney maladies. Chronic Kidney Disease (CKD) incorporates several types of diminished capacity of kidneys like a weakened kidney or kidneys that are in danger because of mellow, moderate and extreme constant kidney disappointment [3].

The individuals having age in late sixties or early seventies around the world 20 % men and 25% of ladies have CKD. Infectious sicknesses namely impact intestinal sickness or AIDS are supplanted by non-infectious illnesses. These include kidney ailment, diabetes or coronary illness as the aggregate wellsprings of untimely impermanence around the globe. Majority of these passing's happen in nations with center or low-salary bunch individuals, while 25 percent of this weight happens to individuals with underneath 60 years old [4].

850 million people throughout the world are likely to have

Kidney disease from different factors [21]. Evaluation of classifiers such as K-NN, RF and ANN on a dataset of 400. Wrapper feature selection were implemented and five features were selected for model construction in the study. The highest classification accuracy is 98% by RF and a RMSE of 0.11. S. Tekale et al. [10] worked on "Prediction of Chronic Kidney Disease Using Machine Learning Algorithm" with a dataset consists of 400 instances and 14 features. They have used decision tree and support vector machine. The dataset has been preprocessed and the number of features has been reduced from 25 to 14. SVM is stated as a better model with an 96.75

II. ITERATURE REVIEW

C.Sathish Kumar and P.Thangaraju [1] has proposed a three pre-processing techniques namely missing value replacement, normalization and discretization were used to filter the data set. After every filteration three classifiers namely Naive Bayes, Multilayer Perceptron and Support Vector Machine were applied to the pre-processed data set. Results displayed that after pre- processing, Support Vector Machine outperforms all the other classifiers in terms of accuracy. The time taken to build the model by using above algorithms is not accurate so many more algorithms need to be performed and compared.

Mubarik et. al. [2] has projected a framework that will aid specialists in treating their patients with kidney disease. Support Vector Machine (SVM) technique was used for the creation of this framework. The study mainly is divided as classification modeling and framework development. Guidelines and model for the classification of kidney disease was discovered from the classification modeling. The Decision Support System created by this diagnosis has some principal highlights like reading file, Classifying entities, tolerable error limit and diagnosis. The precision of this framework is 92.34 %. This framework has relied upon SVM to help specialist in more accurately choosing the patient with chronic kidney disease.

Yedilkhan et. al. [3] have considered kidney diseases and proposed new automatic classification algorithm. It can be used to find dependent on physical assessments, research facility tests and clinical history having qualities like non-meddling, modest and spare. The exhibition proportions of SVM classifier with linear kernels were being assessed so as to locate the best scores for affectability, particularity, and exactness measurements utilizing SVM with linear kernel.

Vijayarani and Dhayanand [4] have concluded that Support Vector Machine performs superior to Naive Bayes by improved precision to anticipate kidney diseases.

Chatterjee et. al. [5] present Modified Cuckoo Search (MCS) trained Neural Network (NN) to efficiently detect CKD at an earlier stage. MCS model has been proposed to conquer the issue of utilizing nearby pursuit-based learning algorithms to prepare the NNs. The NN weight vector is upgraded by applying MCS for NN preparing. The local search-based learning algorithms might be caught in neighborhood optima and issue has been defeated utilizing MCS to prepare the Neural Network and it really attempts to limit the Root Mean Squared Error (RMSE) included during the preparation procedure of the NN.

Zhang and Rothenbacher [6] proposed the comparison to detect CKD. The middle predominance of CKD was 7.2% in people matured 30 years or more seasoned. In people matured 64 years or more established pervasiveness of CKD fluctuated from 23.4% to 35.8%. It is a worldwide medical issue with an expanding commonness, and greater expense.

Krishnan and Sumit [7] present the exploration study that 10% of individuals in the overall is experiencing CKD.

Ahmed and Aljaaf [8] proposed propelled phase of CKD can be seen by certain side effects, for example, tiredness, swollen lower legs. There are banters on the reasons for such ailment. A few causes for the most part rely upon certain circumstances squeezing the kidneys. Be that as it may, National Institute of Diabetes, Digestive and Kidney Diseases announced that primary driver of CKD are hypertension and diabetes. Notwithstanding these reasons, National Health Service (NHS) declared that CKD can be influenced because of elevated cholesterol, kidney infection, polycystic kidney illness, blockages in the progression of pee, long haul, normal utilization of specific drugs.

Gunarathne W.H.S.D et. al. [9] have concluded that machine learning algorithm has forecasted through data analytics for CKD by using classification algorithms such as Multiclass Logistic Regression, Multiclass Decision Forest, and Multiclass Neural Network. The primary centre was to distinguish another CKD patient's wellbeing condition by centering increasingly highlighted regions which will assist with having a superior thought regarding patient's condition and stages utilized were business understanding, information understanding, information arrangement, demonstrating, assessment, sending. The Microsoft Azure machine learning can be utilized to apply all the four classifiers to the dataset. By utilizing this studio, it anticipated the precision of result Decision Forest predicted 99.1%, Multiclass Decision predicted 96.6%, Logistic Regression predicted 95.0% and Neural Network predicted the accuracy 97.5%. Advantage is that expectation procedure is less tedious and it will assist the specialists with starting the medicines ahead of schedule. Furthermore, it can also be used to diagnose additional patients with lesser amount of time.

Sirage Zeynu and Shruti patil [10] presented survey prediction of CKD using data mining. The main objective is to observe the application of data mining, classification algorithm and feature selection methods to analyse and predict different disease. Chronic kidney disease and other diseases can be very well analyzed and predict by data mining and feature selection methods. Survey was done to find out hidden pattern of relationship which is related to CKD. In this paper technique used are k-nearest Neighbour (KNN), Artificial Neural Network (ANN) and decision tree. Methods have been used to identify and predict for chronic kidney to improve the performance accuracy of the algorithms.

Tommaso Di Noia et. al. [11] proposed Automatic tool has been created and made accessible for both online web applications and android versatile application for checking interminable kidney disease is available or not. In this paper it portrayed a choice emotionally supportive network abusing a troupe of ANNs to anticipate end stage

of kidney disease (ESKD). The model has been worked via preparing a lot of neural systems by means of a dataset

of Bari. The framework has been executed as a Restful help and both an Android customer and a Web customer are at present accessible to get to.

Almasoud and Ward [22] aimed in their work to test the ability of machine learning algorithms for the prediction of chronic kidney disease using subset of features. They used Pearson correlation, ANOVA, and Cramer's V test to select predictive features. They have done modeling using LR, SVM, RF, and GB machine learning algorithms. Finally, they concluded that Gradient Boosting has the highest accuracy with an F-measure of 99.1

III. EXISTING SYSTEM

The data source for this study is St. Paulo's Hospital. It is the second-largest public hospital in Ethiopia which admits large number of patients with chronic diseases. There are dialysis treatment and kidney transplant center in the hospital. The dataset for this study is patients' records of chronic kidney disease from patients admitted to the renal ward during 2018 to 2019. Some of them were obtained from the same patient history data at different times of different stages. Chronic Kidney Disease firstly in this system the data is collected from UCI Machine learning Repository. Dataset is used to pursue for precision using three classification algorithms i.e. Naive Bayes, Support Vector Machine and Multilayer Perceptron. Firstly, three pre-processing techniques discretization, missing worth replacement and normalization used which find out all missing values. While performing pre- processing state it has found that 24 properties have some degree of misplaced characteristics. The most misplaced data found is Red Blood Cells has 38% missing data for example around containing patient's data gathered over a time of thirty-eight years (1972–2010) at Renal Unit of the University

152 events from 400 models are misplaced and furthermore White Blood Cell check has found 27% misplaced data for example around 106 events from which 400 cases are absent. Moreover, rbcc (Red Blood Cell count) found 131 events of the hard and fast 400 cases which are misplaced. It contains up to 33% missing data. This misplaced data can basically influence the finishes from available information can be analysed. This misplaced data is filled by displacing missing characteristics and the number of shuffling mode or mean. For every single misplaced data mean substitution strategy is used to override the data and also mean assessment of each and every attribute is used to setup the misplaced data event for the proportionate characteristic. Ensuing to recover misplaced characteristics entire data can be normalized to give best impetus and each incentive to be 1 also base motivator for each credit to be 0.

Here are the following steps of algorithm [1][2]. Step 1: Load the CKD data set.

Step 2: Complete the classification process on the CKD data set utilizing three classifiers in particular SVM, MLP, Naive Bayes.

Step 3: Find and break down the exactness of over three classifiers.

Step 4: Reload the CKD data set again from vault.

Step 5: Apply three pre-processing methods, for example, Discretization, Missing Value Replacement and Normalization individually in a specific order to the CKD data set.

Step 6: After each channel, order the data set utilizing Naive Bayes, MLP, SVM classifiers and Discretization.

Step 7: Determine and investigate the classifiers precision in the wake of pre-processing methods.

Step 8: Relate the exactness of the classifiers when using the pre-preparing methods

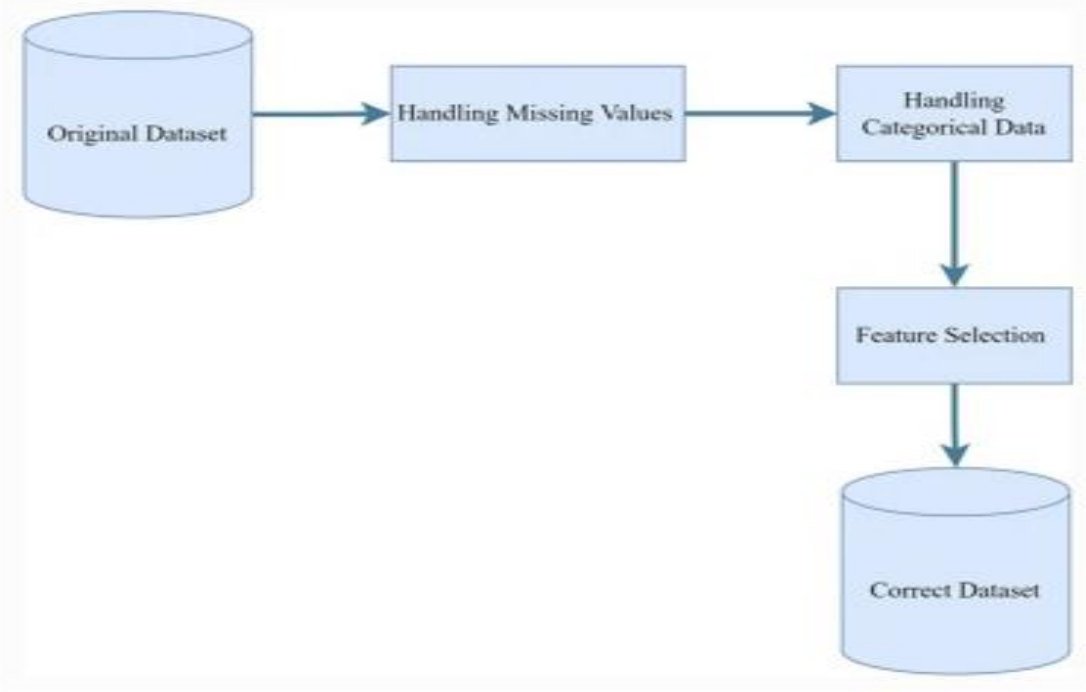

Figure 1. Chronic kidney disease dataset preprocessing steps

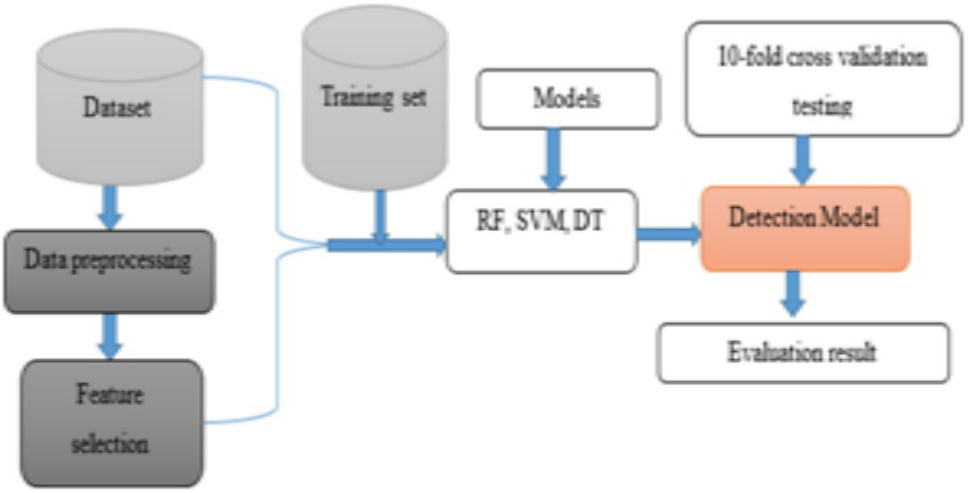

Figure 2.Existing Model building flow diagram

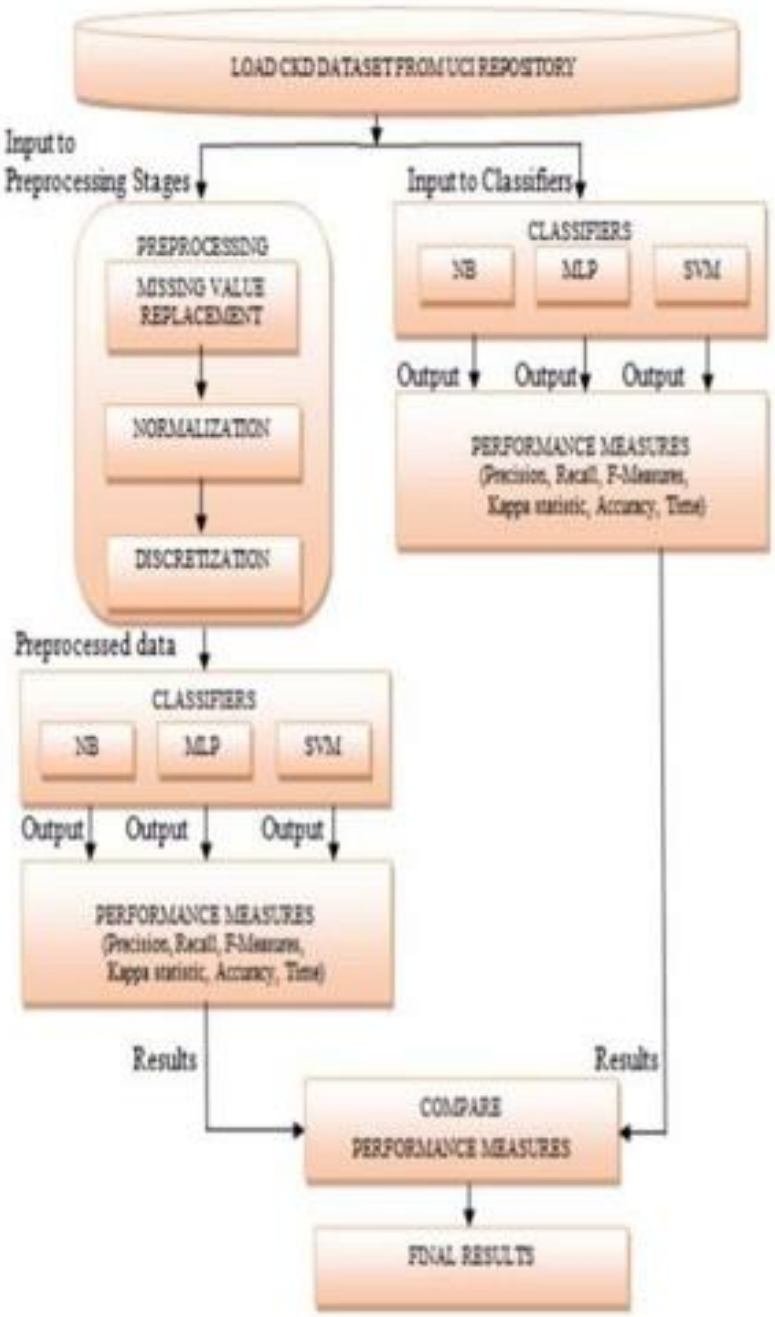

Figure 3. Block diagram of Existing system

Classifier	Accuracy
NB before pre-processing	90.00%
NB after replacing missing values, Normalization and Discretization	92.25%
MLP before pre-processing	91.75%
MLP after replacing missing values, Normalization and Discretization	91.00%
SVM before pre-processing	97.75%
SVM after replacing missing values, Normalization and Discretization	98.75%

TABLE I. Classifier Accuracy before and after applying pre-processing technique

After comparison of all algorithms result will be compared based on accuracy received and final output will be calculated based on the above result. Hence while comparing the result after filteration all the output was completely different and difficult to identify CKD present or not.[1][3][4][7][11]

Performance evaluation is the critical step of developing an accurate machine-learning model. Prediction model shall to be evaluated to ensure that the model fits the dataset and work well on unseen data. The aim of the performance evaluation is to estimate the generalization accuracy of a model on unseen/out-of-sample data. Cross-Validation (CV) is one of the performance evaluation methods for evaluating and comparing models by dividing data into partitions. The original dataset was partitioned into k equal size subsamples called folds: nine used to train a model and one used to test or validate the model. This process repeated k times and the average performance will be taken. Tenfold cross-validation have been used in this study. Different performance evaluation metrics including accuracy, precision, recall, f1-score, sensitivity, specificity have been computed.

True positive (TP): are the condition when both actual value and predicted value are positive.

True negative (TN): are the condition when both the actual value of the data point and the predicted are negative.

False positive (FP): These are the cases when the actual value of the data point was negative and the predicted is positive.

False negative (FN): are the cases when the actual value of the data point is positive and the predicted is negative.

Recursive Feature Elimination with Cross-Validation (RFECV): An optimization algorithm to develop a trained machine-learning model with relevant and selected features by repeatedly eliminating irrelevant features. It repetitively creates the model, keeps aside the worst performing feature at each iteration, and builds the next model with the remaining features until the features are completed to select best subset of features [25]. It eliminates the redundant and weak feature whose deletion least affects the training and keeps the independent and strong feature to improve the generalization performance of the model [26]. This method uses the iterative procedure for feature ranking and to find out the features that have been evaluated as most important. Because this technique work interacting with a machine learning model, it first builds the model on the entire set of features and ranked the feature according to its importance.

IV. PROPOSED SYSTEM

Firstly, the CKD dataset is taken and tested for accuracy by doing Exploratory Data Analysis, Null value Imputation based on mean, median, group by, Feature Engineering binarzing, log transformation and after modelling Predictions in terms of probability is compared with stacking classifier against as shown. In chronic disease information guide of this framework is acknowledged by three sections: Train Dataset, Modelling and Stacking as appeared in Figure 4. The development of the Dataset is available on Kaggle tool and contains several parameters like age, blood-pressure, specific gravity, albumin, red blood cell count, pus cells, pus cell clumps, bacteria, blood glucose random, blood urea, serum creatinine and so on. It contains a total of 25 parameters. The data was collected over a period of two - month period in India contains about 600 rows and two class labels = 'ckd' (chronic kidney disease) and 'nckd' as shown in

S.No.	Attributes	Attribute Category	Attribute Description	Attribute Values
1	age	Numerical	Age	Years
2	bp	Numerical	Blood Pressure	mm/Hg
3	sg	Nominal	Specific Gravity	1.005, 1.010, 1.015, 1.020, 1.025
4	al	Nominal	Albumin	0, 1, 2, 3, 4, 5
5	su	Nominal	Sugar	0, 1, 2, 3, 4, 5
6	rbc	Nominal	Red Blood Cells	Normal, Abnormal
7	pc	Nominal	Pus Cell	Normal, Abnormal
8	pcc	Nominal	Pus Cell Clumps	Present, Not_Present
9	ba	Nominal	Bacteria	Present, Not_Present
10	bgr	Numerical	Blood Glucose Random	mgs/dl
11	bu	Numerical	Blood Urea	mgs/dl
12	sc	Numerical	Serum Creatinine	mgs/dl
13	sod	Numerical	Sodium	mEq/L
14	pot	Numerical	Potassium	mEq/L
15	hemo	Numerical	Haemoglobin	gms
16	pcv	Numerical	Packed Cell Volume	0, 1, 2...
17	wbcc	Numerical	White Blood Cell Count	cells/cumm
18	rbcc	Numerical	Red Blood Cell Count	millions/cumm
19	htn	Nominal	Hypertension	Yes, No
20	dm	Nominal	Diabetes Mellitus	Yes, No
21	cad	Nominal	Coronary Artery Disease	Yes, No
22	appet	Nominal	Appetite	Good, Poor
23	pe	Nominal	Pedal Edema	Yes, No
24	ane	Nominal	Anemia	Yes, No
25	class	Nominal	CKD, Not_CKD	CKD, Not_CKD

TABLE II. Dataset that contains attribute, attribute description and values

Figure 2 and Table 2. optimize the above problem for the following classification metrics log-loss, ROC-AUC score, precision, recall, and F1-score. Approach to solve this problem was the same as that to solve any binary classification problem.

As shown in Figure 2 It has train dataset to prepare a model, to train it and the test dataset is new data where the output values are withheld from the algorithm [12]. It performs predictions from the trained model on the inputs from the test dataset and compare them to the withheld output values of the test set working on Exploratory Data Analysis and looked at what the data contains the following which is implemented upon null value imputation for the missing attributes.

Figure 3. Train dataset of ckd or notckd classification.

Once that is done, it should follow to continue with EDA (Exploratory data analysis) univariate analysis as well as multivariate analysis deciding upon attributes which are important in solving the problem. Binarizing the features or applying some kind of group-by aggregation is some of the strategies that were followed to build new features and working on log transformations to the features which followed skewed distributions or performed reflection along with log transformation to obtain Gaussian distribution for the feature. Validation of the newly obtained feature will help to do statistical analysis like correlation check with target variable and analysis of variance in certain cases. All the above exploration will apply on train data. Distribution of target variable for both positive and negative class is almost same. A pipeline going to transform the attributes in cross-validation into required features. Instead of it going to just perform single fold cross-validation and checked for log-loss and roc-auc score for both training and cross- validation data [13].

On the modelling part while doing research work PCA was done to know the distribution of features and the kind of variance explained by each of them. It was observed that data might be linearly separable after seeing the scatter plot of two features which explained maximum variance. Then decided to build binary classifiers starting off with KNN, Logistic Regression, Support Vector Machine Regression with RBF-kernel and Decision Trees. After that we decided to implement testing using test data and results was very good. In the end web-app application is implemented to make it easy to use and test. In the backend pipeline is used to performed attribute transformation followed by prediction by our best models.

Let us describe the following points in given Figure 3 step by step follow as:

Step1: Load the CKD data set.

Step2: perform data Pre-Processing i.e. Impute attribute plus cells, replacing null values of packed cell volume, Imputing null values in white blood cell count.

Step3: Perform feature selection modelling.

Step4: Apply Principal Component Analysis on developed feature set to visualize if there is any separation in data points that can observe in lower dimension. PCA is applied on standardized data. So first convert the above feature frame into standardized data frame and apply PCA to see how it can observe variance in data.

Step5: Building a simple Logistic Regression model and after each set Transforming the Input data to build the feature set for testing and cross validation and Building a Decision Tree with no hyper-parameter tuning.

Step6: Heat maps to compare AUC and Log loss for train and Cross Validation data.

Step7: Perform Decision Tree Classifier with hyper-parameter tuning and compare it with all algorithms i.e. Support Vector Machine, Logistic Classifier, Random Forest, Decision Tree, K- nearest Neighbor, and Stacked Classifier.

Step8: Apply Stacking classifier used to test data by checking precision recall, F1-score, log-loss and roc-auc.

Classifier	AUC_Score	Log_Loss
Logistic Regression (1_ratio=1.0, max_iter=1000)	1.000000	0.063457
KNeighbors Classifier(n_neighbors=3)	0.980769	0.868558
Decision Tree Classifier (max_depth=3)	0.980769	0.863489
(DecisionTree Classifier (max_ features= auto)	1.000000	0.052073
Stacking Classifier(estimators=[('logCif',\n)	1.000000	0.065721

TABLE III. Classifier Accuracy and log loss after applying pre-processing techniques

As shown in Table2 the classification algorithm display accuracy score and log loss after applying pre-processing techniques and all the missing data on particular field is calculated as zero

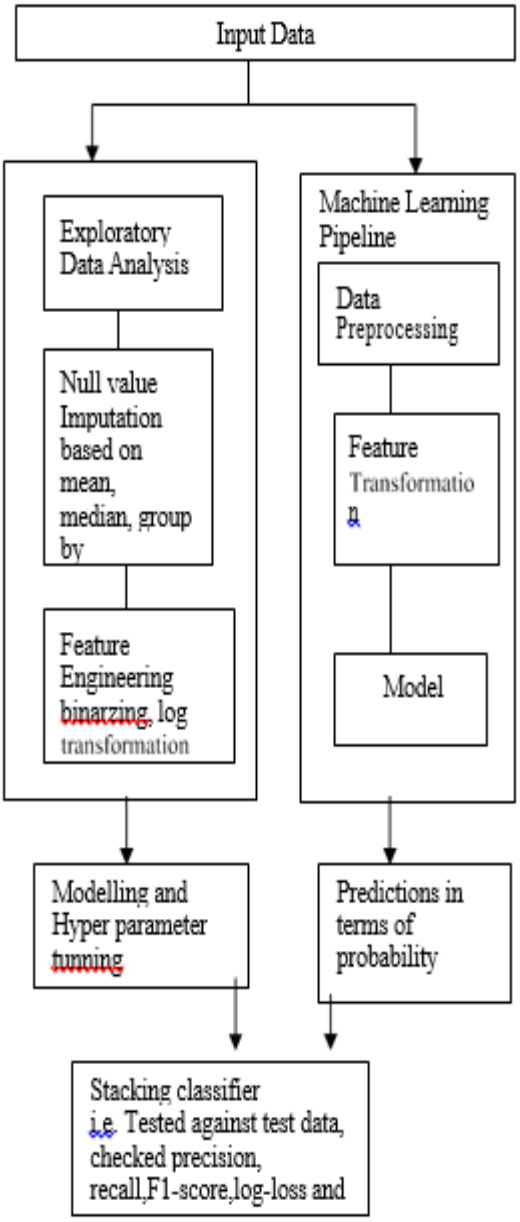

Figure 4. Block Diagram of proposed system.

V. RESULT

In output section figure 4 to figure 7 contains 11 attributes

i.e. patient's age, blood pressure, albumin, sugar, blood glucose random, blood urea, serum creatinine, sodium, hemoglobin, red blood cell count, white blood count and five classifier algorithms is been applied which showed the values in 0's and 1's. 0 represents ckd is not detected and 1 represents ckd is detected

Attributes contains numeric, nominal values. 1.Age(numerical) age in years

2.Blood Pressure(numerical) bp in mm/Hg 3.Albumin(nominal) al - (0,1,2,3,4,5)

4.Sugar(nominal) su - (0,1,2,3,4,5)

5.Blood Glucose Random(numerical) bgr in mgs/dl 6.Blood Urea(numerical) bu in mgs/dl

7. Serum Creatinine(numerical) sc in mgs/dl

8. White Blood Cell Count(numerical) wc in cells/cumm 9.Class (nominal)class - (ckd, notckd)

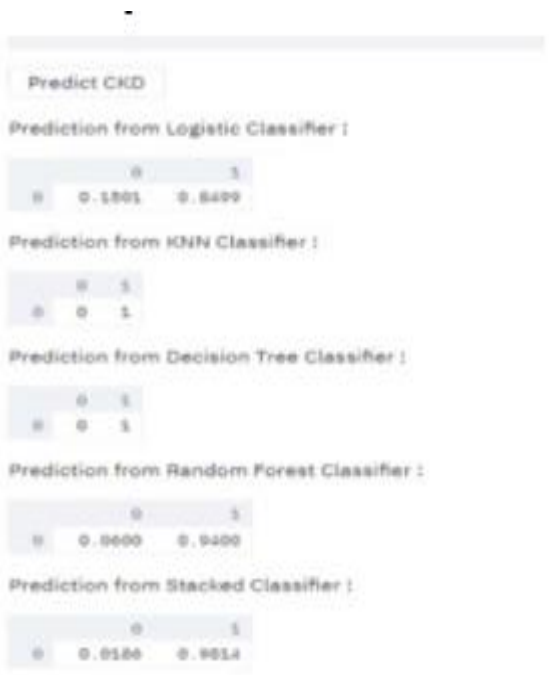

Figure 6: Values with CKD not present.

Figure 4 and 5 shows the value enter in web-based application predicted chronic kidney disease is not present.

Figure 5. Values with different features.

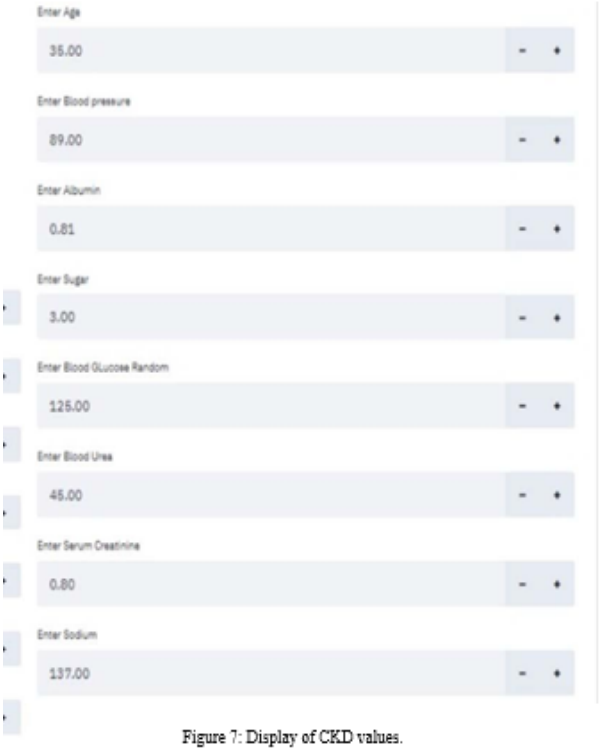

Figure 7: Display of CKD values.

Figure 6 and 7 shows the value enter in web-based application predicted chronic kidney disease is present.

In Figure 7 Algorithm which has the higher accuracy with the minimum execution time has chosen best algorithm. In this Classification each classifier shows different accuracy rate. Stacking Classifier has the maximum classification accuracy and it is considered best classification algorithm.

Figure 8: Values with CKD present.

VI. CONCLUSION

To prevent the progress of persistent kidney disorder to kidney failure. on this look at 3 system-getting to know models RF, SV, DT, and two function choice strategies RFECV and united states were used to build proposed models. the existing system pre- processing techniques like normalization and substitution of missing value has been applied in dataset to check and improve the accuracy but it showed result by using only three algorithms

i.e. Naive Bayes, Multilayer Perceptron and Support Vector Machine classification but results were compared and no proper filtrations of missing value took place. So, in this paper come up with a binary classification solution and also existing algorithms implemented helped to get new accurate value by combination of all new algorithm in proposed system to solve the above problem of pre-processed data using missing value and to train data performed exploratory data analysis, null value imputation based on mean, median and group by and also feature engineering, binarizing, log-transformation is been decided to use to train data. Modelling section has been implemented using PCA by performing different classifier i.e. Support Vector Machine, Logistic Classifier, Random Forest, Decision Tree and K-nearest Neighbor are used to perform roc-auc, log-loss for performance metric measurement. Stacking classifier is used to test data by checking precision recall, F1-score, log-loss and roc- auc

Specifically, pipeline is used to transform the attributes in cross-validation into required features. In the backend used pipeline which is performing attribute transformation followed by prediction by best models to perform single fold cross-

validation and checked for log-loss and roc-auc score for both training and cross-validation data and plot of roc-auc and log- loss was observed for each training and cross-validation data and best hyper-parameters were selected for each of the model. In the end after modelling created a web-app to make it easy to use and test by entering data of patient in attributes like age, blood pressure, albumin, sugar, blood glucose random, blood urea, serum creatinine, sodium, haemoglobin, red blood cell count, white blood cell count by entering all the field it will predict ckd by comparing all the algorithms whether it is present or not in form of 0 & 1. 0 represents ckd is not detected and 1 represents ckd is detected.

VII. FUTURE SCOPE

This work will be considered as research for the healthcare system for Chronic kidney disease patient. Extension to this work is that implementation of deep learning since deep learning provides high-quality performance than machine learning algorithms.

ACKNOWLEDGEMENT

We are thankful to all those who helped us make this paper, for the valuable information provided by them in their respective fields. We are grateful for their co-operation during the writing of the paper.

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Build near real time social media intelligence using web scraping and visualization

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Abstract—**social media has become a powerful tool for marketers and advertisers to reach their target audience. With the help of platforms like Facebook, Twitter, Instagram, and YouTube, businesses are able to create campaigns that are more engaging and effective than ever before. In addition to providing valuable insights into customer behavior, social media also allows businesses to share content with a wider audience in real time. By leveraging the power of social media, marketers and advertisers can create more effective strategies that have the potential to generate substantial results. Brands are always looking for ways to increase their market share and grow their customer base. One way to do this is by understanding the consumers better. Retailers often use market research to figure out who their target audience is, what they want, and how they behave. With the combination of web scraping and data visualization to build a near real time platform to analyze incremental data it is the best way to help researchers to understand the audience.**

Keywords—**Web Scraping, Social Media, Data Mining**

I. Introduction

The term social media refers to a computer-based technology that facilitates the sharing of ideas,thoughts, and information through virtual networks and communities. Social media is internet-based and gives users quick electronic communication of content, such as personal information,documents, videos, and photos. Users engage with social media via a computer, tablet, or smartphone via web-based software or applications.

Social media originated as a way to interact with friends and family but was later adopted by businesses that wanted to take advantage of a popular new communication method to reach out to customers. The power of social media is the ability to connect and share information with anyone on Earth or with many people simultaneously.There are many social media platforms worldwide but the biggest social media platform is listed as below.

YouTube is an increasingly popular platform for social media marketers due to its broad reach and potential for creative content. With YouTube, businesses can create engaging videos that effectively convey their message to a wide audience. Additionally, YouTube's advanced targeting capabilities make it easier than ever to target specific demographics and increase the likelihood of reaching the right people with your message. This makes YouTube an essential tool for any serious social media marketer looking to get the most out of their campaigns.

Social media YouTube data analysis is the process of analyzing user data collected from YouTube to gain insights into user behavior and preferences. This data analysis can be used to inform marketing decisions, optimize content, and more. With the increasing popularity of YouTube videos, it is essential to understand how users interact with this platform so that businesses can make informed decisions about their video content strategy.

Web scraping is the process of extracting data from a website. It is a method for gathering information without having to enter the site manually and extract it. Web scraping can be done by using a programming language or by using an online service. Web scraping is used in market research because it provides access to data that would not be available otherwise, as well as being able to quickly gather large amounts of data with little effort. It is used in order to get a

more complete understanding of what is happening in the market and in an industry, as well as being able to track changes to produce better analysis.

II. Related Work

Social Media Analytics is concern with developing and evaluating informatics tools and frameworks to gather, monitor, analyze, summarize, and visualize social media data, usually driven by specific requirements from a target application.is an interdisciplinary research area that's concerned with developing, adapting and increasing informatics tools, frameworks and methods to trace, collect and analyze an outsized amount of structured, semi structured and unstructured social media data to extract useful patterns and data. Graphic theory is probably the goal strategy for analyzing social media platforms in the first period of such a platform [1].

The operating system says used in social media data with certain conclusions the goal of determining the key components of the system,

for example, harps and communications (e.g. Facilitators and volunteers). They are not influenced by this, the community is respected as the customers they have physical movement or sensation of different clients, the

method of tracking or impact on the choices made by different clients in the system. This hypothesis has kept it extremely powerful on the scale of the story data

[2]. This is because it is equipped beyond the actual physical representation function of information to be used in information structures. Centrality measure was used to investigate power.

Clients in the same social system group always decide things and manage each one others consider experience in things or installed features. This is known as the recommender framework.

Considering the similarities between hubs in the field of communication hubs CF method known as cofiltering can be used which forms one of the three phases of a recommendation framework (RS) , can be used for

study relationships between customers. Items can be placed in a client considering the measurement of their common organization [10]. Where the main failure of CF is the minimum of information, based on content (other RS technique) investigate information structures to submit suggestions. Be that as it may, the cross types of methods often suggest suggestions by joining CF and data-based recommendations [11].

III. SYSTEM ARCHITECTURE

Building a social media intelligence platform is about developing and evaluating informatics tools and frameworks for collecting, monitoring, analyzing, summarizing, and visualizing communication data, often driven by specific needs from a targeted application.

Social media and statistical analysis provides a rich source of educational research challenges for social scientists, computer scientists. For building this platform we follow the architecture which is cost effective and most of the technology are open source technology.

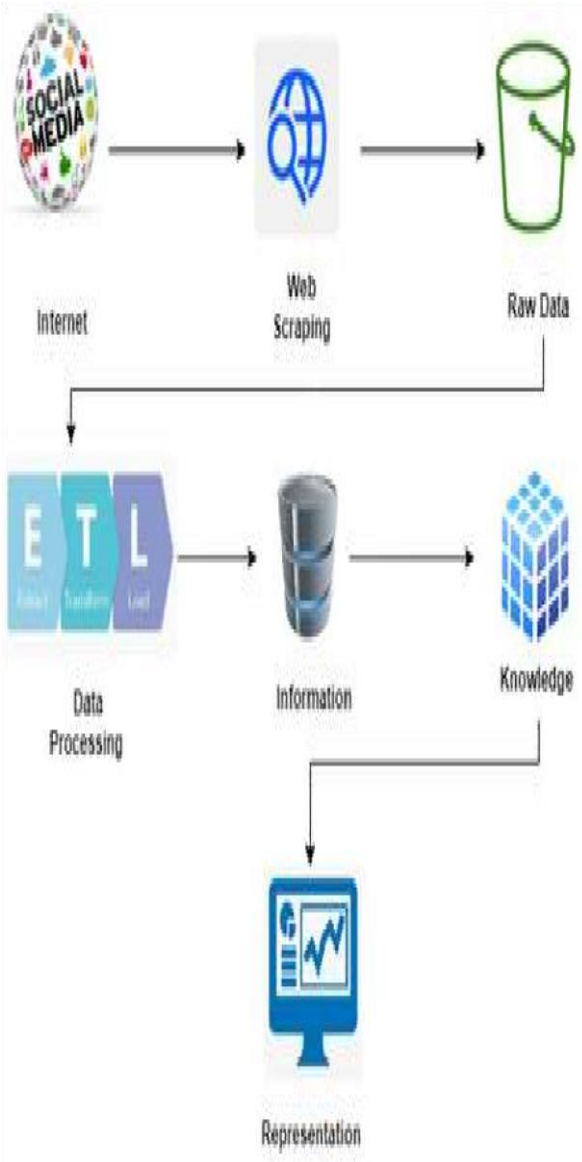


Fig 1. Near Real Time Social Media Intelligence Architecture.

A. Internet

The internet has revolutionized the way businesses market their products and services. With the ability to reach customers around the world, marketing on the internet has become a powerful tool for businesses of all sizes. From SEO to pay-per-click campaigns, digital marketing tactics can be used to reach target audiences and increase visibility for brands. As such, it is no surprise that more businesses are turning to online marketing as a way to maximize their success in today's digital world.

The internet is an ever-growing platform for communication, collaboration, and entertainment. It has become the most powerful tool for businesses to reach their target audience through branding. Branding is the process of

creating a unique identity for a product or service in order to differentiate it from competitors and be more memorable to customers. Through branding, businesses can create a strong online presence and build trust with their customers.

B. Web Scraping

Although social media data is accessible through APIs, due to the amount of data marketing, many major sources such as Facebook and Google make it very difficult for students to gain full access to their 'raw' data; There are very few social data sources that provide affordable data donations to academics and researchers. News services such as Thomson Reuters and Bloomberg often charge a premium for access to their data. In contrast, Twitter recently announced a Twitter Data Grants program, in which researchers could request access to Twitter social media tweets and historical data for information on its large data set (Twitter has over 500 million tweets per day). We can build web scraping applications using programming language, API and open source technology.

- Selenium
- Python Beautiful soup
- Graph API : Facebook , Instagram etc.

C. Data Processing & Information

Once the data comes into the raw bucket, cleaning up random text data (e.g., standard text), especially real-time data streamed at high frequency, introduces many research problems and challenges.

D. Knowledge

Comprehensive analysis of the field of data mining for ideas the process of segmenting, viewing and understanding data on a website is called segmentation. Large data blocks are cut into smaller sections and the process is repeated until the correct level of detail is reached for better analysis. Cutting and dialing therefore presents data in new and different ways and provides a closer look at it for analysis.

E. Representation

Visual representation of data in which information is summarized in a particular system for the purpose of conveying information clearly and effectively in graphic ways. Given the size of the data involved, visibility will grow significantly. For visualization we can use multiple tools or libraries but in our project we used which is mentioned below:

- Matplotlib
- Seaborn

1. IV. DESIGN REQUIREMENTS

A use case diagram is a simplest representation of a user's interaction with the system that shows the relationship between the user and the different components of the system in which the user is involved. A use case diagram can identify the different types of the users of a system and the different

use cases and will often be accomplished by other types of the diagrams as well

2. Use Case Diagram.

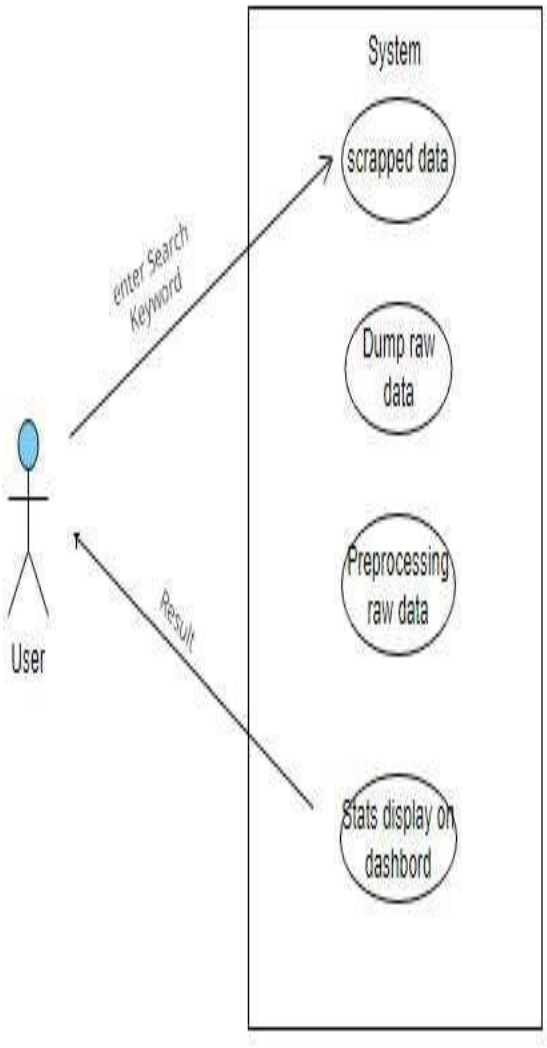


Fig 2. Design Requirements

3. DATA FLOW DESIGN

A DFD(Data Flow Diagram) is a graphical representation of the 'flow' of data through an information system,modeling its process aspect.A DFD is often used as a preliminary step to create an overview of the system,which can later be evaluated. DFD can also be used for the visualization of data processing.

A DFD shows what kind of information will be an input to a system and its respected output,where the data will come from and go and where the data will be stored.It does not show the hidden information like time taken by process how the process completed internally etc.

4.

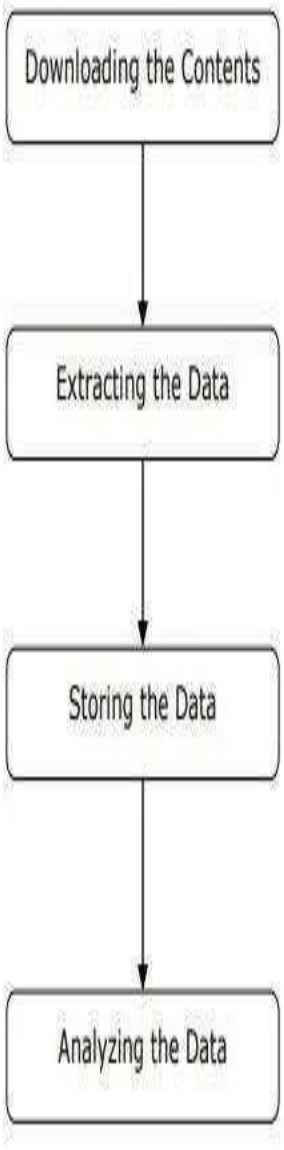


Fig 3. Data Flow Diagram

5. V. REQUIREMENTS

The hardware and software requirements of our project is as follow

F. Hardware Requirements

1. Processor- Intel core i3 and above
2. RAM- 4GB or above
3. Hard Disk- 4GB or above

G. Software Requirements

1. Windows 8 or above
2. Python 3.6.7
3. Selenium 4.7
4. PIP and NumPy 1.13.1, pandas, matplotlib, seaborn
5. Jupyter Notebook

6. VI. RESULT AND ANALYSIS

Social media YouTube data analysis is the process of analyzing user data collected from YouTube to gain insights into user behavior and preferences. This data analysis can be used to inform marketing decisions, optimize content, and more. With the increasing popularity of YouTube videos, it is essential to understand how users interact with this platform so that businesses can make informed decisions about their video content strategy.

H. Keyword Searching Using Selenium WebDriver

Once we run the code system automatically go to the YouTube site and append the specified data into created DataFrame.

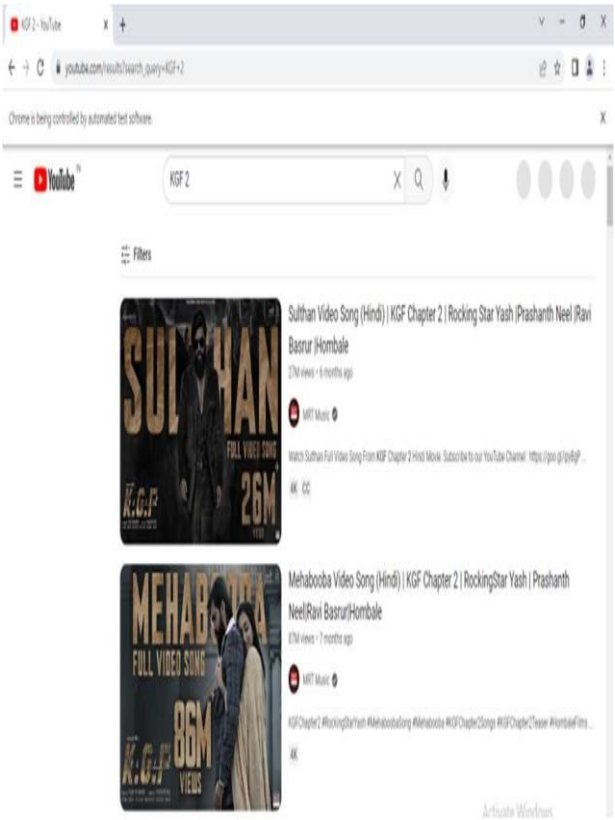


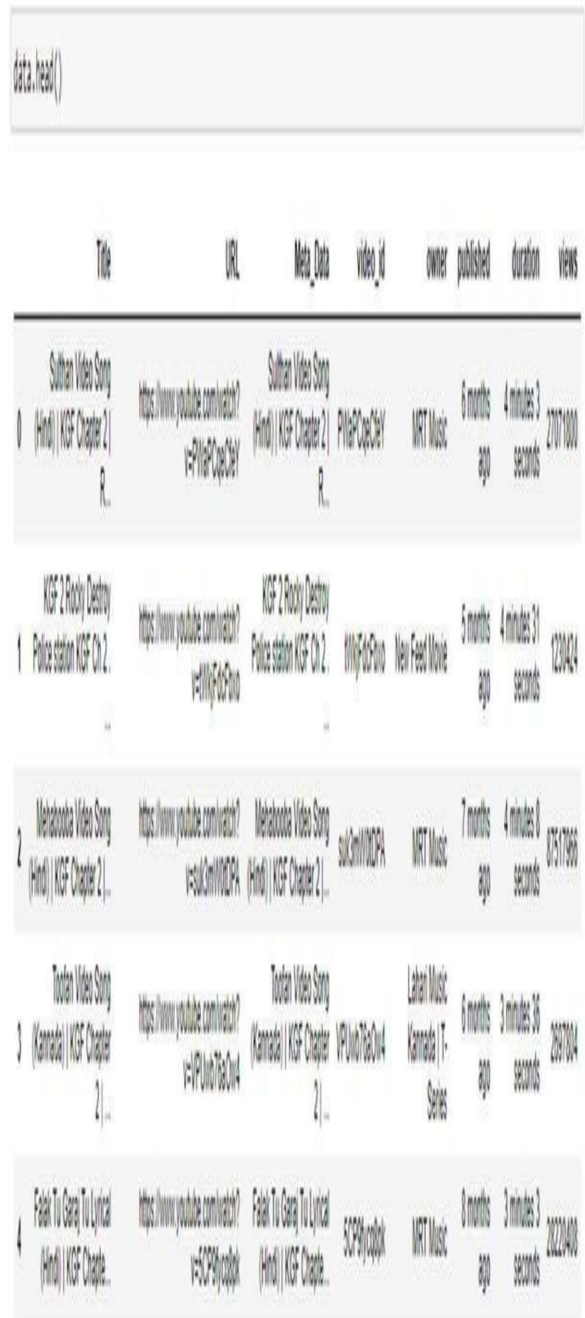
fig 4. Search Keyword on YouTube

Once Data come into Dataframe its looks like below with Title , Meta Data (Description) , URL from HTML Page.

Out[10]:

	Title	URL	Meta_Data
1	Sulthan Video Song (Hindi) | KGF Chapter 2 | R...	https://www.youtube.com/watch?v=PWaPCqeCteY	Sulthan Video Song (Hindi) | KGF Chapter 2 | R...
1	KGF 2 Rocky Destroy Police station KGF Ch 2 :...	https://www.youtube.com/watch?v=tWkjFdcFbxo	KGF 2 Rocky Destroy Police station KGF Ch 2 :...
1	Mehabooba Video Song (Hindi) | KGF Chapter 2 |...	https://www.youtube.com/watch?v=suK3mW0tDPA	Mehabooba Video Song (Hindi) | KGF Chapter 2 |...
1	Toofan Video Song (Kannada) | KGF Chapter 2 | ...	https://www.youtube.com/watch?v=VPUwb76aOw4	Toofan Video Song (Kannada) | KGF Chapter 2 | ...
1	Falak Tu Garaj Tu Lyrical (Hindi) | KGF Chapte...	https://www.youtube.com/watch?v=5CP9jyco8pk	Falak Tu Garaj Tu Lyrical (Hindi) | KGF Chapte...
1	Mehabooba Video Song (Telugu) | KGF Chapter 2 ...	https://www.youtube.com/watch?v=5xwM12SOXEE	Mehabooba Video Song (Telugu) | KGF Chapter 2 ...
1	Full Video: Yadagara Yadagara KGF Chapter 2 | ...	https://www.youtube.com/watch?v=PiKKs62zE-A	Full Video: Yadagara Yadagara KGF Chapter 2 | ...
1	Mehabooba Video Song (Kannada) | KGF Chapter 2...	https://www.youtube.com/watch?v=TNFXSKbQ3JA	Mehabooba Video Song (Kannada) | KGF Chapter 2...
1	The Monster Song - KGF Chapter 2 | Adithi Saga...	https://www.youtube.com/watch?v=R4He_Gcn7cA	The Monster Song - KGF Chapter 2 | Adithi Saga...
1	KGF Chapter: 2 | Rocky's KGF | Powerful People...	https://www.youtube.com/watch?v=858wcJAWCcE	KGF Chapter: 2 | Rocky's KGF | Powerful People...
1	Toofan Video Song (Hindi) | KGF Chapter 2 | Ro...	https://www.youtube.com/watch?v=zR5-HbFW6hc	Toofan Video Song (Hindi) | KGF Chapter 2 | Ro...
1	Gravity and Logic Ke Dushman !! India vs Pakis...	https://www.youtube.com/watch?v=EPUqA_F4RJA	Gravity and Logic Ke Dushman !! India vs Pakis...
1	Kaun Banega Crorepati (Sasta Edition)	https://www.youtube.com/watch?v=RtMnzruo-h8	Kaun Banega Crorepati (Sasta Edition) by Tigg...
1	KGF 2 Dekh Ke Nischay To Pagal Hi Ho Gaya 😂	https://www.youtube.com/watch?v=dVeTc1GNERo	KGF 2 Dekh Ke Nischay To Pagal Hi Ho Gaya 😂 by...
1	KGF vs RRR vs PUSHPA | Mega Mashup | DJ Dalal ...	https://www.youtube.com/watch?v=lNJLhbKWI70	KGF vs RRR vs PUSHPA | Mega Mashup | DJ Dalal ...

Fig 5.Scrapped data stored in DataFrame



data.head()

	Title	URL	Meta_Data	video_id	owner	published	duration	views
0	Sulthan Video Song (Hindi) | KGF Chapter 2 | R...	https://www.youtube.com/watch?v=PWaPCqeCteY	Sulthan Video Song (Hindi) | KGF Chapter 2 | R...	PWaPCqeCteY	MRT Music	6 months ago	4 minutes 3 seconds	2707180
1	KGF 2 Rocky Destroy Police station KGF Ch 2. ...	https://www.youtube.com/watch?v=tWkjFdcFbxo	KGF 2 Rocky Destroy Police station KGF Ch 2. ...	tWkjFdcFbxo	New Feed Movie	5 months ago	4 minutes 31 seconds	1230424
2	Mehabooba Video Song (Hindi) | KGF Chapter 2 |...	https://www.youtube.com/watch?v=suK3mW0tDPA	Mehabooba Video Song (Hindi) | KGF Chapter 2 |...	suK3mW0tDPA	MRT Music	7 months ago	4 minutes 8 seconds	87517966
3	Toofan Video Song (Kannada) | KGF Chapter 2 |...	https://www.youtube.com/watch?v=VPUwb76aOw4	Toofan Video Song (Kannada) | KGF Chapter 2 |...	VPUwb76aOw4	Lahari Music Kannada | T-Series	6 months ago	3 minutes 36 seconds	2697804
4	Falak Tu Garaj Tu Lyrical (Hindi) | KGF Chapte...	https://www.youtube.com/watch?v=5CP9jyco8pk	Falak Tu Garaj Tu Lyrical (Hindi) | KGF Chapte...	5CP9jyco8pk	MRT Music	8 months ago	3 minutes 3 seconds	2222048

Fig 6. Data After ETL process

A real-world data generally contains noises, missing values, and maybe in an unusable format which cannot be directly used for analysis. Data preprocessing is required for cleaning the data and making it suitable for the system which increases the efficiency of the system. After cleaning data it look like clean and now it is easy to use for analysis purpose.

I. Extract Comments and Cleaning the Comments

YouTube Comments Scraping is a process of extracting comments from YouTube videos. It has become an essential tool for marketers and researchers looking to gain insights into the opinions of their target audience. By scraping YouTube comments, businesses can monitor customer sentiment in real-time, track competitor performance, and identify trends in public opinion. This data can be used to inform marketing strategies, product development decisions, and customer service initiatives.

	Comments
Neutral Gear	"My grandfather used to say that once in your ...
JSingh_Fauz	Once in your life you need a doctor, a lawyer,...
Pinkius Piacus	Much respect to the farmers\n20\nReply
Jesse Tombstone	We are nothing without our farmers!\nThey are ...
Marvli mann	RICH PEOPLE PLAYS THE MONEY GAME TO WIN. POOR ...
...	...
Punjabischoolclub	These farmers are protesting against 3 controv...
Sam Phoenix	Canada government complaints against India in ...
tova lynch	Where is the spokesperson for the Indian gover...
Niraj Tayde	We Support our Farmer brother's n sister's (d...
Zord Shenlong	I love India famer \n7\nReply

Fig 9. Final Extracted Comments

J. Some Data Analysis and Observations

YouTube is an increasingly popular platform for social media marketers due to its broad reach and potential for creative content. With YouTube, businesses can create engaging videos that effectively convey their message to a wide audience. Additionally, YouTube's advanced targeting capabilities make it easier than ever to target specific demographics and increase the likelihood of reaching the right people with your message. This makes YouTube an essential tool for any serious social media marketer looking to get the most out of their campaigns.

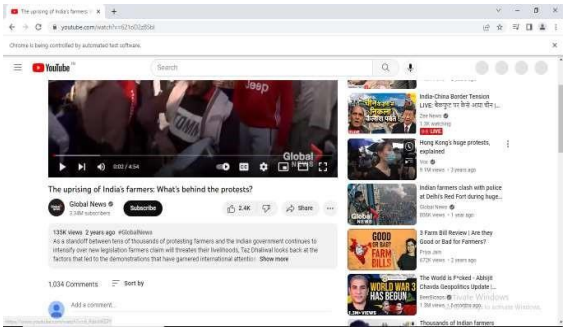
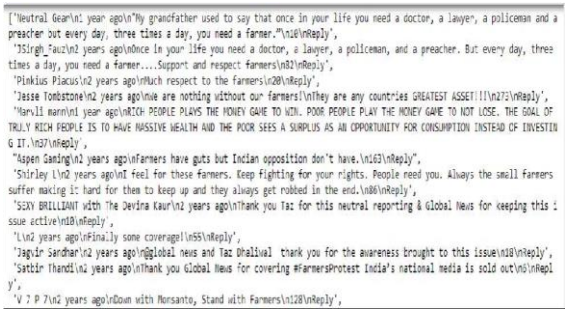


Fig 7.Find all comment from YouTube



```
['Neutral Gear\n1 year ago\n"My grandfather used to say that once in your life you need a doctor, a lawyer, a policeman and a
preacher but every day, three times a day, you need a farmer."\n16\nReply',
 'JSlrgh_7auz\n2 years ago\nOnce in your life you need a doctor, a lawyer, a policeman, and a preacher. But every day, three
times a day, you need a farmer....Support and respect farmers\n82\nReply',
 'Pinkius Placus\n2 years ago\nMuch respect to the farmers\n20\nReply',
 'Jesse Tombstone\n2 years ago\nWe are nothing without our farmers!\nThey are any countries GREATEST ASSET!!!\n273\nReply',
 "Harvll mann\n1 year ago\nRICH PEOPLE PLAYS THE MONEY GAME TO WIN. POOR PEOPLE PLAY THE MONEY GAME TO NOT LOSE. THE GOAL OF
TRULY RICH PEOPLE IS TO HAVE MASSIVE WEALTH AND THE POOR SEES A SURPLUS AS AN OPPORTUNITY FOR CONSUMPTION INSTEAD OF INVESTIN
G IT.\n37\nReply',
 'Aspen Gaming\n2 years ago\nFarmers have guts but Indian opposition don't have.\n163\nReply',
 'Shirley L\n2 years ago\nI feel for these farmers. Keep fighting for your rights. People need you. Always the small farmers
suffer making it hard for them to keep up and they always get robbed in the end.\n86\nReply',
 'SEXY BRILLIANT with The Devina Kaur\n2 years ago\nThank you Taz for this neutral reporting & Global News for keeping this i
ssue active\n10\nReply',
 'L\n2 years ago\nFinally some coverage!\n55\nReply',
 'Jagvir Sardhar\n2 years ago\n@global news and Taz Dhaliwal  thank you for the awareness brought to this issue\n18\nReply',
 'Sattir Thandi\n2 years ago\nThank you Global News for covering #FarmersProtest India's national media is sold out\n9\nRepl
y',
 'V ? P ?\n2 years ago\nDown with Monsanto, Stand with Farmers\n128\nReply',
```

Fig 8. Extract all comment from YouTube

Regular Expressions (Regex) is an essential tool for text analytics. It is powerful in searching and manipulating text strings. Compared to the traditional approach for processing strings with a combination of loops and conditionals, one line of regex can replace many lines of code. Regex expression used to preprocess the author comment means remove garbage values from received sentences like special character, numerical value which is not making any sense for analysis.

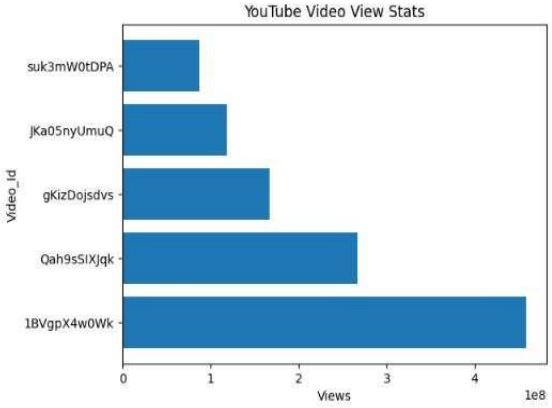


Fig 10.YouTube Video View Bar Graph

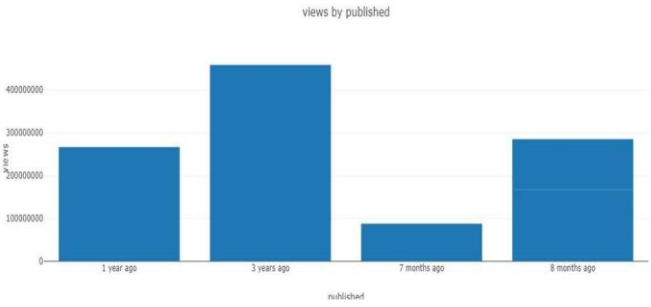


Fig 11. Bar Graph of views by Published

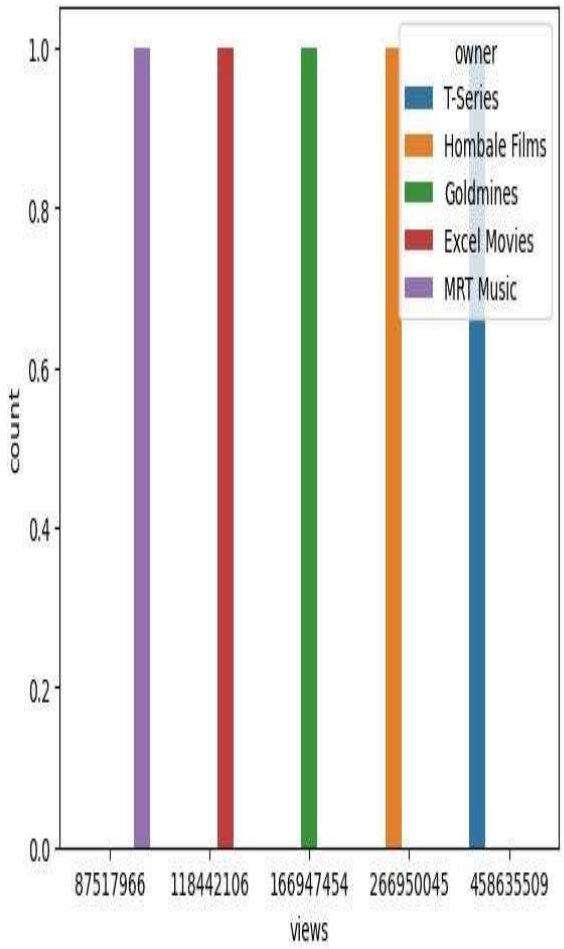


Fig 12. Countplot of views with respect to owner

Fig 13. Tree Plot of search keyword

VII. CONCLUSION AND FUTURE SCOPE

The project concludes by highlighting the Web Scraping technique along with sentimental analysis. This chapter gives an indication of the direction in which the future work should be carried out. The chapter is organized into two sections as follows:

- Conclusion
- Future Work

A. Conclusion

The main goal of this project was to explain how to use web scraping techniques to gather data from the web and display it in a meaningful way. We were able to accomplish this goal by using data from different social media platform to create a meaningful inside for business use. It will save a great deal of loading time. In fact, you would save yourself time and financial loss in a very nice way using this social media intelligence system.

B. Future Scope

Some limitations of this study are the unstructured, irrelevant ,missing attribute values. To build a sentimental model of received data with many null and irrelevant values may lead to some issues in analysis. Testing these models with large valid datasets with minimal or no missing attribute values reveals more insights and better analysis.

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[21]

Using Motion Capturing Technology for Visualization Requirements

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Abstract: **In this paper, we describe a development of the Motion Visualization System which make us understand intuitively a series of action of an actor by coordinate's information obtained from motion capture system (MC System). "Motion capture technology" was initially applied in a very narrow field, mainly in the field of animation films. With the maturity of motion capture technology, its application fields are becoming more and more extensive, such as motion analysis and sports training. A complete motion capture system usually includes multiple parts such as signal acquisition equipment, data processing, data transmission, and sensors. At present, motion capture systems mainly include optical motion capture systems, electromagnetic motion capture systems, and mechanical motion capture systems. What we call motion capture today usually refers to the use of sensors and software to transcribe the movements of real actors into the movements of digital models in 3D games or animations. The interaction follows the paradigm of moving from mimicking kinetic material into a self-reflection teaching approach. The interactive avatar is the reflection of the performer, but on the same time the avatar depicts a character, a dance partner which can inspire the user who moves to explore different ways of moving.**

Keywords**: Motion Capture, Motion Visualization, 3D models.**

1. INTRODUCTION

Many types of motion capture system (MC System) is used for not only entertainment fields of movies and computer graphics animations but also any fields like sports, action analysis and so on. The motion data acquired from MC System include various information and the volume of data grows very large. For showing the motion, special software is used and the transform the data sequence into animation of acting body is generally used method. And for showing some characteristics of the motion, many methods are proposed like curve graph for angle and/or speed, overlaying picture and so on. The curve graphic representation is suitable for long time motion with repetition. However, from the representation we have no way to get some characteristics of the motion except our eyes. Trough motion capture technology, various real actions of people in three-dimensional space can be collected, and the collected data information can be entered into the virtual model, thereby generating a series of motion data records. Mechanical motion capture relies on mechanical devices to track and measure motion trajectories. A typical system consists of multiple joints and rigid links, and angle sensors are installed in the rotatable joints, which can measure the changes in the rotation angle of the joints. When the device moves, according to the angle change measured by the angle sensor and the length of the connecting rod, the position and movement trajectory of the endpoint of the rod in space can be obtained. The angle sensor measures and records the rotation angles of the joints. According to these angles and the mechanical dimensions of the model, the pose of the model can be calculated, and these pose data are transmitted to the animation software so that the character model in it can also make the same pose. This is an early motion capture device, but there is still a certain market until now. Foreign countries have given this device a very vivid name: "Monkey." An application form of mechanical motion capture is to connect the moving object to be captured with the mechanical structure, and the motion of the object drives the mechanical device, which is recorded by the sensor in real time.

2. MOTIVATIONS

The idea of the method proposed in this paper is based on principle of slit camera. The slit camera is used for judgments of horse racing and track sports, the media art and so on. On another our research, principle of the slit camera is applied to video scene display compactly and to extract features of video scene. The best feature of the slit camera is to be able to display the local domain of the space of long time scene compactly and to extract characteristics of the scene by wellknown image processing techniques on displayed images without original scene. So we need no programs for extraction of some kind of characteristics other than using package software like Photoshop. To show and extract the characteristics of motion, we transform position and/or angle data given by sensors at a moment to a colour line which correspond to one slit of the slit camera, and place the lines in a row every moment. Now, we describe how to visualize motion of four limbs as a example of our method. Four limbs (Right arm, left arm, right leg and left leg) are corresponding to sensor number 7-9, 8-9, 3-9, and 4-9 respectively.

3. Related Work

Recent research papers describe relevant experiments of adopting mo-cap technologies and interactive interfaces in screen, augmented and virtual reality settings. In the following section we describe related work relevant to dance education which use different technologies of motion capture, such suits with optical mo-cap, and Kinect. A prototype dance training support system (Just Follow Me) with motion capture and mixed reality technologies. The system uses an intuitive "ghost" metaphor and a firstperson viewpoint for effective motion training. Using the ghost metaphor (GM), it visualizes the motion of the trainer in real time as a ghost (initially superimposed on the trainee) that emerges from one's own body. The trainee who observes the motion from the first-person viewpoint "follows" the ghostly master as closely as possible to learn the motion. "YouMove" a system for learning full body movements with

a direct application in dance education. It allows users to record and learn physical movement sequences through a simple recording system that allows anyone to create and share training content. The training system uses recorded data to train the user using a largescale augmented reality mirror. The system trains the user through a series of stages that gradually reduce the user's reliance on guidance and feedback. YouMove is comprised of a Kinect-based recording system, and a corresponding training system. Introduces a motion analysis and comparison framework that is based on Laban Movement Analysis (LMA), used also in the context of teaching folk dances, and a prototype virtual reality simulator in which users can preview segments of folk dance performed by a 3D avatar and repeat them. Describe a prototype system that automatically evaluates dance performances against a dance professional performance and provides visual feedback to the performer in a 3D virtual environment. The system acquires the motion of a performer via Kinectbased human skeleton tracking, making the approach viable for a wide range of users, including home enthusiasts. Kinect-based system that combines the functionality of studio mirrors and prescriptive images to provide the user with instructional feedback in real-time. The results of its usability evaluation with ballet students [16], show a potential for its use in ballet education but improvements of Super Mirror are needed to comply with the standardized subject matter expert's criteria.

3.1. Dance Data Collection. "Dance data acquisition" is the first step in the dance virtual visualization scene design of motion capture technology. Data acquisition is a prerequisite and foundation in the process of dance digitization. In the process of dance digitization, data acquisition is a prerequisite and foundation. Only after the data information has been collected, the data information can be presented through the subsequent virtual display platform [13]. At present, dance data collection mainly includes three parts: first, "collecting dance materials." There are many dance materials in our country, and there are many channels for collection, such as individual performances, stage performances, and folk visits. The relevant personnel should prepare the collection equipment in advance and choose more advanced digital cameras, digital cameras, etc. Second, "digitize the material." After the dance materials are collected, they should be systematically organized. During this process, the relevant personnel should actively listen to the suggestions of professional dancers, make reasonable use of the dance materials, and then perform dance demonstrations based on the dance materials finally sorted out. Through the motion capture system, capture those classic dance moments and realize the digitalization of dance. Third, "Building 3D Models." The threedimensional model is constructed in 3 ds Max. The reference is based on the general body proportions of most men and women, and the corresponding costume models are established in combination with dance characteristics. It should be noted that the models are mainly divided into two types: one is the "fine model," which is generally not displayed on the virtual platform and is mainly saved as a kind of data which saves 360-degree video flies; the other is the "fine model." One is the "simple model," which is mainly used for virtual platform display. There are many classifications of dance, and combined with the characteristics of different dances, it is also possible to carry out "key binding," that is, to systematically evaluate the bound skeletal model and set relevant weights.

3.2. Dance Animation. Dance animation can be understood as the combination of "3D animation" and "motion capture data." 3 ds Max, Motion Builder, and other software can well link 3D animation and motion capture data. At this point, the work of data acquisition and dance animation is basically completed. After that, export the model file, motion data, etc. through 3 ds Max, and save it in FBX format.

3.3. Display System. At present, the "display system" mainly uses the three-dimensional game engine UNITY 3D. Tis display system includes the following modules in the opening session, just like film and television dramas, basically every three-dimensional animation video will introduce some basic information, such as production unit, content introduction, system name, which has become a conventional general title module; dress-up module - In short, this module is mainly used to change clothes, according to different regions, different dance style, and switch between different clothing animation models; camera control module: - unity 3D is a very popular 3D game engine because it has a very powerful control ability, through the dance movements presented by the 3D model. The viewer can observe from various angles, and can basically achieve a 360-degree panorama. At this time, the viewer will feel very wonderful. The presentation of the dance and the change of perspective can be controlled by a small mouse in the hand. At present, the camera control module can be programmed independently, or the default control system can be used: the dance selection module—the classification of dance can be measured from different dimensions. The dance selection module is mainly used to select the type of dance. At present, the main types of dances are dances performed on a large scale and in a standardized manner on major holidays, some minority dances circulated in the folk, some collective dances created by people spontaneously, and some dances composed and performed by dancers with special talents, used for dances on some special occasions, with certain funny elements and commemorative meanings in Children's Day, weddings, and corporate annual meetings; gender selection module - the role of this module is well understood, which is to distinguish male dancers and female dancers. In the three-dimensional game engine U-NITY 3D display system, through the coordinated operation of these five modules, the effect of virtual demonstration is finally presented. This system can now be used not only on computers but also on mobile phones.

4. Method of Motion Visualization System

The idea of the method proposed in this paper is based on principle of slit camera. The slit camera is used for judgments of horse racing and track sports, the media art and so on. On another our research, principle of the slit camera is applied to video scene display compactly and to extract features of video scene. The best feature of the slit camera is to be able to display the local domain of the space of long time scene compactly and to extract characteristics of the scene by well-known image processing techniques on displayed images without original scene. So we need no

programs for extraction of some kind of characteristics other than using package software like Photoshop R. To show and extract the characteristics of motion, we transform position and/or angle data given by sensors at a moment to a color line which correspond to one slit of the slit camera, and place the lines in a row every moment. Now, we describe how to visualize motion of four limbs as a example of our method. Four limbs (Right arm, left arm, right leg and left leg) are corresponding to sensor number 7-9, 8-9, 3-9, and 4-9 respectively. We explain about the left arm movement. We are drawing red line from coordinate original point to left elbow and to back (Figure 4). In this case, difference vector between No.8 and No.9 represents direction of left arm and the angle θ is computed easily. Then corresponding to the angle information θ, color information on RGB is determined following way. Because range of value θ is $\theta = 2/\pi \geq 0 \geq -2/\pi$. So we
set the RGB value of line as follows.

R = 255, G = 0 and B = 0, when $\theta = 2/\pi$.
R = 0, G = 0 and B = 255, when $\theta = -2/\pi$

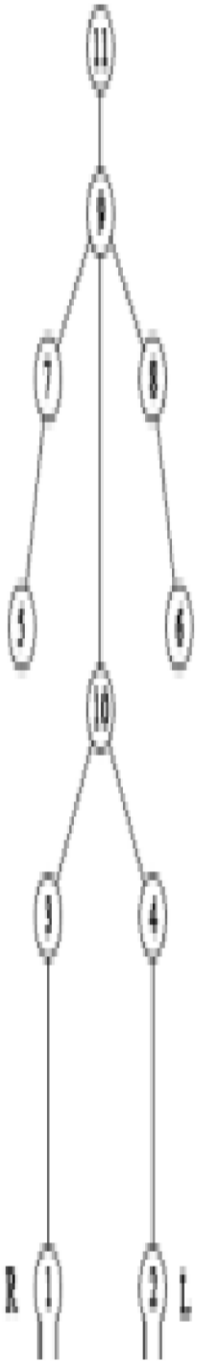

Figure 1: Human Model

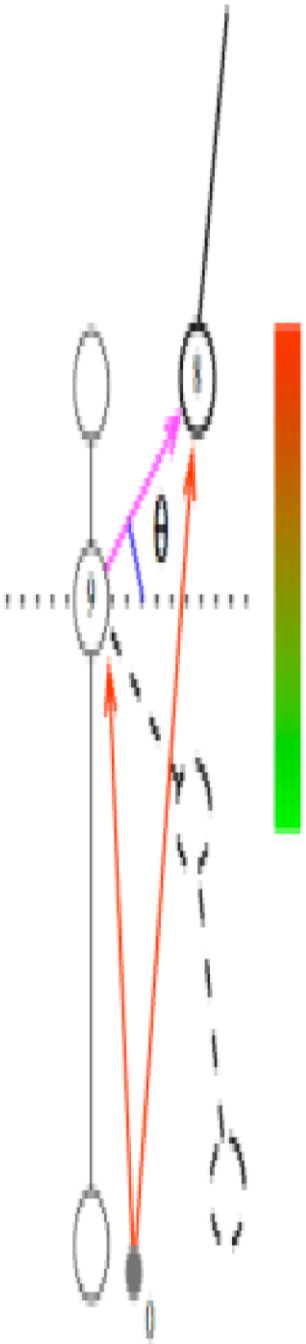

Figure 2: Vector & Degree

The color of intermediate angle is shown in Figure 2. Figure 3 shows the movement of right arm, left arm, right leg, and left leg as a color belt. A horizontal axis of the color belt shows time. As shown in Figure 3, we can understand intuitively a series of action of an actor especialy repetition of an action. This is data of a certain the radio gymnastics which is well known as a healthy physical exercise in Japanese. This exercise consists 13 phrase about three minutes (Figure 4).

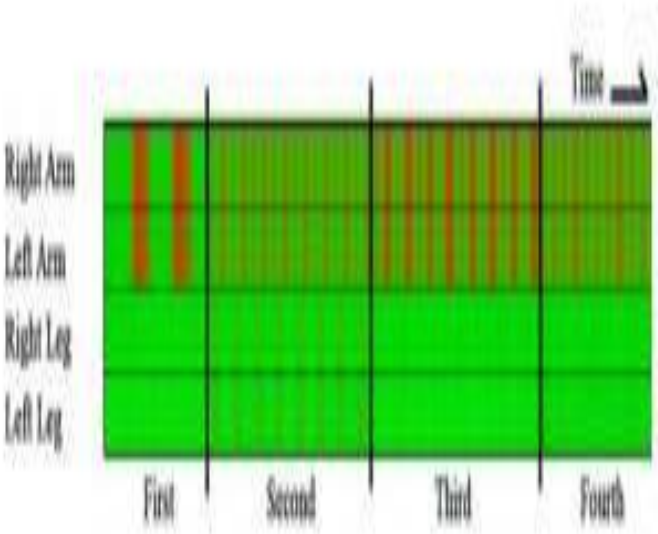

Figure 3: Color Belt

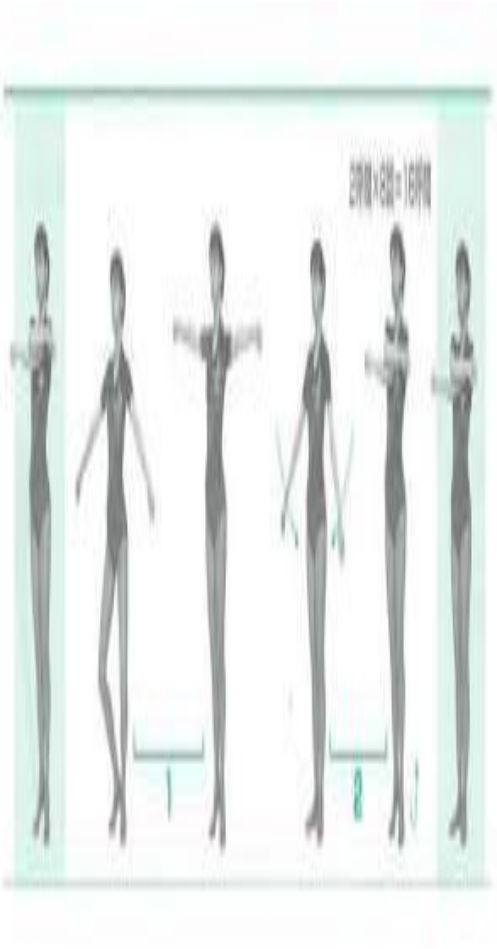

Figure 4: Sample of physical exercise

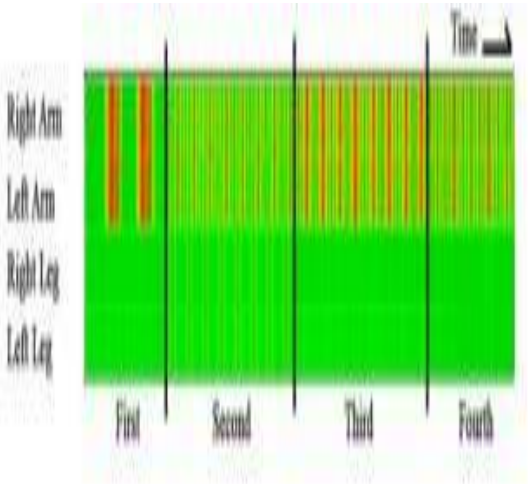

Figure 5: Color Belt2

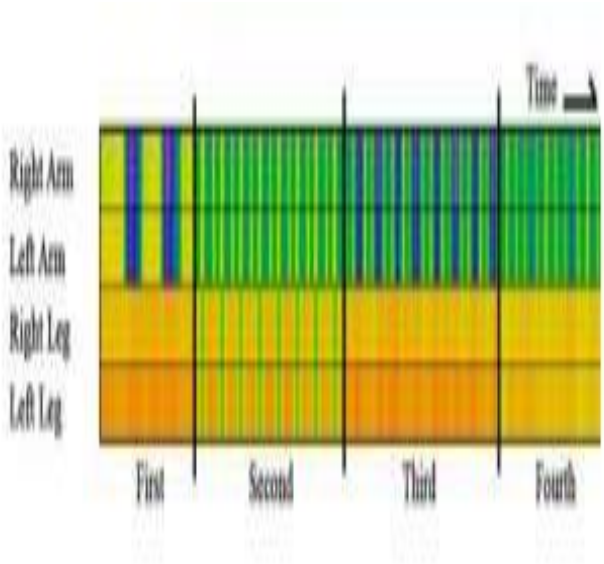

Figure 6: HSV Conversion

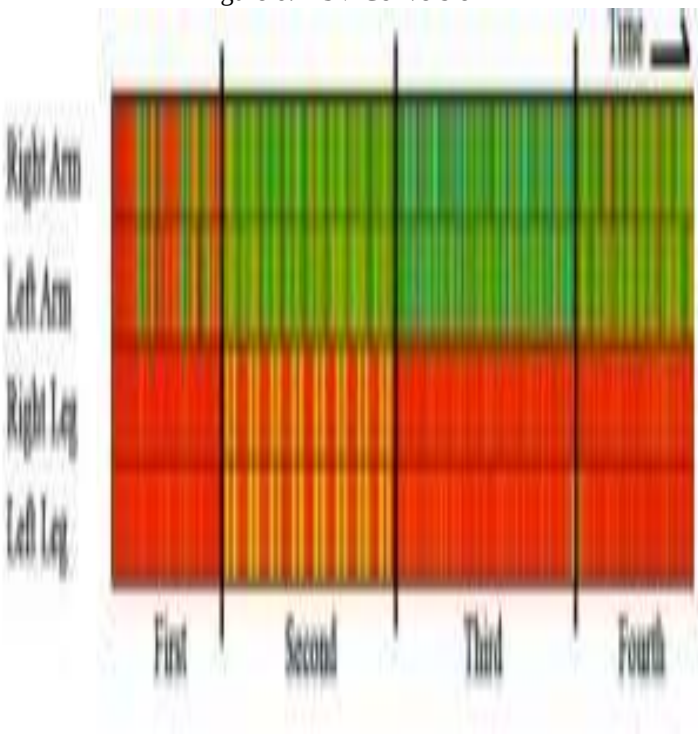

Figure 7: Prewitt Filter (Hue threshold value:0)

5. VISUALIZATION VARIATIONS

The user, whether this is the performer alone or the teacher, can make some initializations and choose among different options of visualizing the different parameters. These parameters mostly are particle systems and motion trails. Our particle systems consist of a large number of primitive 3D shapes. Their behavior replicates phenomena such as smoke, fire etc. and they are produced by an emitter. The emitter is an invisible spot which operates as the source of the particles that are being rendered. Our Motion trails are entities

that consist of large number of sprites that are too close to each other and replicate the effect of a light trail.

5.1 User Interface (UI) :Through this menu the User can change several settings during the session. For the time being we have implemented controls such as buttons for changing the camera view , morphing to another avatar ,taking screenshots, recording videos, restarting the scene and hiding the menu itself, switches for activating/deactivating particles and sliders for adjusting the shape of the motion trails and the duration that they remain rendered .However, there are corresponding hotkeys for quicker actions.(Figure 8) The user can decide on which joint of the avatar he/she will put the particle emitters, and therefore decide to bring the performer's focus and attention on a particular body part or joint. The switches and sliders allow the user to change the mode of emitting style. This can inspire different qualities of movement. In the following section we describe in detail what these different options and variations for the visualizations are.

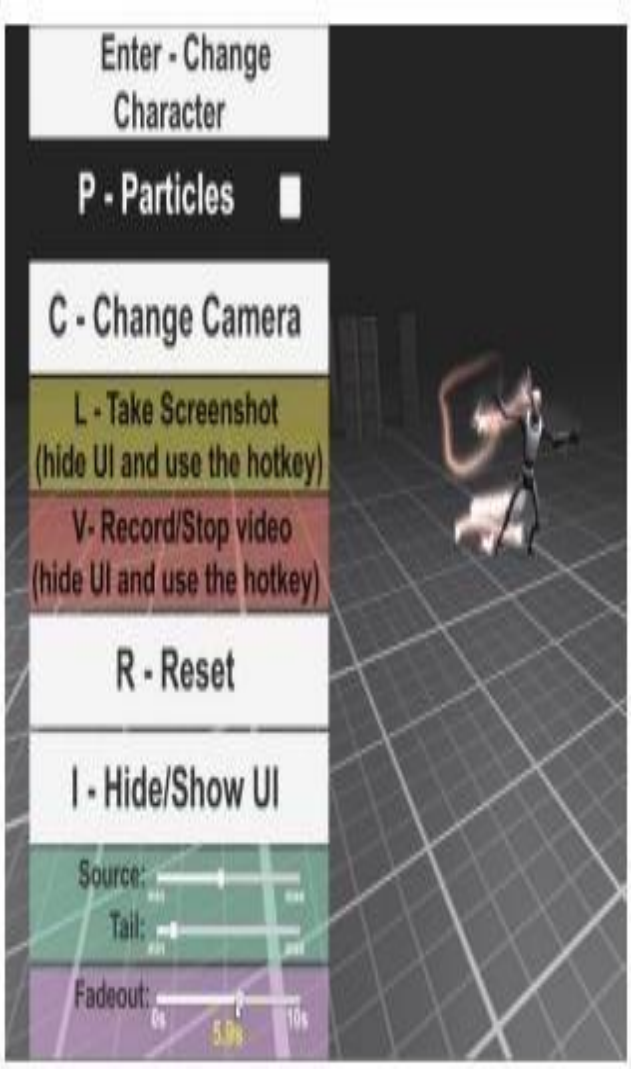

Figure 8: UI and avatar (a) with motion trails

5.2 Avatar variations One of the main questions when it comes to teaching dance through animation, is how the avatar looks like and how the characteristics of this avatar reflect the body image related with the dance practice or context . In this work, through the simple interface, the user can choose different avatars -predefined 3D models. In the following figures, four of the different anthropomorphic Unity avatars, which have been used in the experiments are shown. In addition, we have collaborated with a 3D artist, for creating additional customized 3D models depicting anthropomorphic but more abstract shapes. Figure 9 shows one of these anthropomorphic prototypes which depicts a "sharp" character with spikes on its back. It is true however, that all the examples shown in the Figures, reflect a variety of mainstream or archetypical characters and more abstract body representations. The different avatars allow the interactive experience to range from a gamified, creative experience, which can be addressed also to children, to an improvisation environment where the looks of the character can guide the performers' movement qualities into a "motion story".

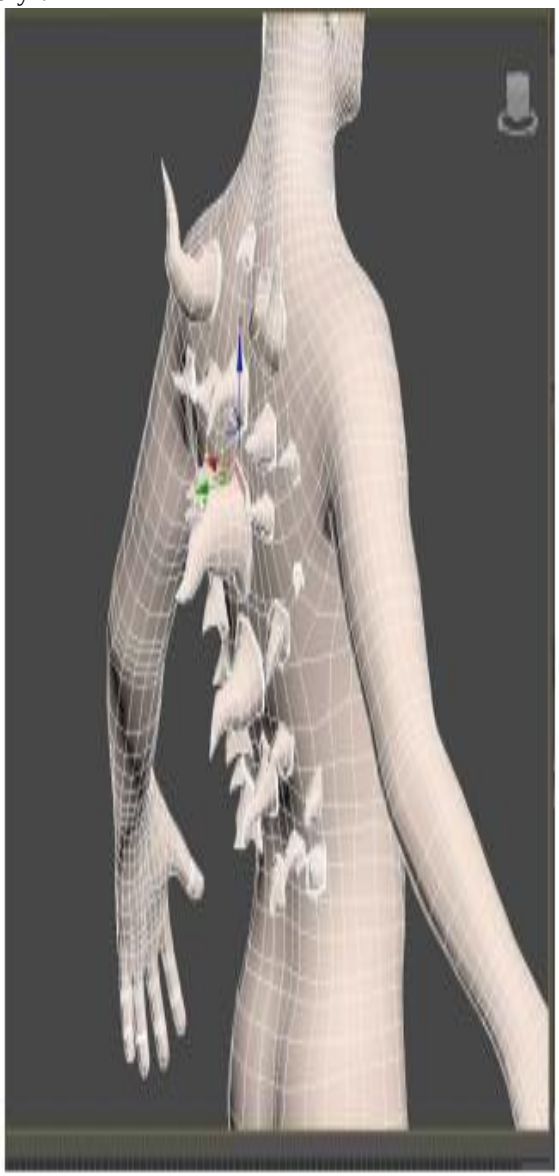

Figure 9: Initial prototype of 3D model with spikes Also, there are be three emitting modes:

Continuous Mode Particles are pre-emitted during the session and when the User changes the avatar, the flow of the particles doesn't start again from scratch. This mode is currently used for the particles.

Fade-in Mode Particles start to be emitted when the session starts. Also when the User changes avatar, the emitter starts again from scratch and a fade-in effect is created. This mode is currently used for the particles.

Trigger Mode Motion trails are rendered only when the Avatar moves the joint where the emitter is attached to. When a specific joint stops moving, its corresponding emitter stops rendering. The fade-in and fade-out effects apply here too. This mode is currently used for the motion trails.

5.3 Screenshot and Video recording. The system provides recording options for archiving and further analysis of the movement of each performer in relation to the different options of visualizations. The user (performer) can record her/his actions by recording the session as an image sequence (which can be edited to a video with a video editing software) in order to see how its avatar moves, how it interacts with the visual world and how the particles visualize his/her movement, after finishing the dance learning task, or improvisation. Also, a recording can be made in the Animate software, where it will be exported as a .bvh file which contains mocap data and will show the movement of the skeleton, which can be later edited in an 3D animation software.

6. Conclusion and Future Work

Using the visualizing method proposed in this paper, it is possible to display to be compressing time and space by color belt image and to extract of characteristics of motion by applying image processing method. The virtual visual scene design of dance based on motion capture technology is of great significance for the diversified presentation and inheritance of dance, especially for some relatively classic and small minority dances, because fewer people learn these dances, these dance forms are facing a crisis of inheritance. The virtual visual scene design of dance based on motion capture technology can better protect these minority ethnic dances, so that more people can see the charm of this dance and are willing to inherit and develop it.

For the future, we will look for a way to feature extraction and representation for a more comprehensible way

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Enhancement of Security and Avoidance of Insecure Direct Object Reference (IDOR) in Web Application

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Abstract— **This research has explored the issue of insecure direct object references (IDOR) in web applications, which can allow attackers to gain access to sensitive resources and perform unauthorised actions. Also discuss various methods to prevent this vulnerability, including implementing proper authorization checks, using access control lists, and employing tokenization to securely reference objects. In this research, also propose an innovative solution that utilities machine learning algorithms and anomaly detection techniques to identify potential IDOR vulnerabilities before they can be exploited. This solution involves fuzz testing user input to discover potential IDOR issues and then leveraging machine learning algorithms to determine which input values are most likely to lead to unauthorized access. By proactively identifying and addressing IDOR vulnerabilities, this approach can help organizations enhance the security of their web applications and protect against attacks that could compromise sensitive data and systems.**

Keywords— IDOR, Security, Web Application, Network, Vulnerability1. Introduction

I. Introduction

Insecure Direct Object Reference (IDOR) http://www.hdfcbank.com/transaction.php? is a security vulnerability related to using id=113 identifiers to directly access internal

The term IDOR gained popularity after objects without additional authorization appearing in the OWASP (Open Web checks.

Application

Most websites repeatedly generate user

Security Project) 2007 Top 10. However,

IDs, cookie IDs, and other identifiers. For this is just one example of many access example, suppose one user's ID is 112 and control the next user's ID is 113. Database implementation errors that can lead to requirements are:

access control bypass. [5] IDOR http://www.hdfcbank.com/transaction.php? vulnerabilities are most commonly id=112

associated with horizontal privilege http://www.hdfcbank.com/transaction.php? escalation, but can also occur in id=112

conjunction with vertical privilege

The IDOR vulnerability allows hackers to escalation. access other users' data simply by changing the

Example

IDOR vulnerability with direct references to database objects Consider a website that uses the following URL to access the customer account page, which retrieves information from the backend database: [3] https://insecurewebsite.com/customer_account?customer_number=132355

Here, the customer number is used directly as a record index in queries made against the main database. If there are no other controls, an attacker can simply modify the customer_number value, bypassing the access controls to view the records of other customers. This is an example of an IDOR vulnerability that results in horizontal elevation of privileges.

An attacker can perform horizontal and vertical privilege escalation by changing the user to a user with additional privileges while bypassing access controls. Other possibilities include exploiting leaked passwords or changing settings when an attacker accesses a user's account page.

IDOR vulnerability with direct references to static files

IDOR vulnerabilities are common when sensitive resources reside in static files on the server-side file system. For example, a website may store transcripts of chat messages on disk with ascending filenames and allow users to retrieve them by visiting a URL such as:

https://insecurewebsite.com/static/12144.txt

In this situation, an attacker could simply rename the file to obtain a transcript created by another user, thus obtaining the user's credentials and other sensitive data.

II. BRIEF HISTORY

If the server doesn't check incoming HTTP requests to access objects, there is a vulnerability known as an Insecure Direct Object Reference. The application exposes the underlying object details to the attackers since it is unable to verify the legitimacy of the person attempting to access an object. Attackers then obtain access to the object without authorization and change the value of the object's ID parameter to carry out their malicious actions.

As a result, users can be unknowingly forwarded to dangerous pages. In the worst situation, users' private and confidential financial and personal information may potentially be compromised.

Three security flaws lead to the Insecure Direct Object References vulnerability:

- To adjust an object reference, a client can change user-supplied data such as form or URL parameter values.
- The web server makes an internal process or item directly accessible.
- For access to internal objects, the programme doesn't do enough authorization checks.

The effects of the attack may be disastrous because object references reveal information about the core implementation details of the application.

A successful IDOR attack can have different impacts, such as:

Unauthorised access to sensitive data: – Object references often include database IDs, which attackers can access to expose sensitive information about the application/users. The unauthorised user can also use database entries to prepare malicious SQL payloads for further attacks.

Object manipulation: – Attackers who have access to internal references have direct access to the application's data and state. Attackers can then edit the exposed items to change data, gain access to secret features, or gain more power.

Direct file access: – In order to influence the host's file system, malicious users can combine IDOR attacks with directory transversal attack strategies. This enables individuals to freely upload and download files and alter content that other users access.

Priority levels of IDOR vulnerability based on their severity:

P1 - Account takeover, access to highly sensitive data (credit cards, etc.)

P2 - Modifying/deleting other users' public data, private/public sensitive data (tickets, invoices, payment information, etc.) P3 - Access / Delete / Modify Personal Data (limited personal information: name, address, etc.) P4 - Access to unrelated data IDOR Vulnerability At the discretion of the program manager.

III. IMPLEMENTATION OF SECURE CODING TO AVOID IDOR

The IDOR vulnerability primarily causes unauthorised access to user account information on the backend of the web application using unauthenticated support in SQL.

With the code below, an attacker can change the information_schema parameter of the web application and enter multiple account numbers to retrieve information.

```
String query = "SELECT * FROM
information_schema WHERE account = ?";
PreparedStatement test =
connection.prepareStatement(query, ... ); pstmt.setString(1,
request.getParameter("information_schema")
);
ResultSet results = test.executeQuery( );
```

General Remediation

The disclosure of private object references like keys or file names should be avoided by developers. Parameter validation must be implemented correctly. All of the Referred objects should be verified. Tokens ought to be created in a way that only the user may map them to them; they shouldn't be made available to the general public.

Query Component : id=23

Here, we can see that the /profile page is being requested, and the query component includes the parameter id with the value of 23. This page might be displaying private user information to us, and by altering the value of the id parameter, we could view information about other users.

Post Variables: Reading through a website's forms may occasionally disclose fields that are open to IDOR abuse. Consider the HTML code below for a form that refreshes a user's password as an illustration.

```
<form method=”POST” action=”/updatepassword”>
<input type=”hidden” name”user_id”
value=”123″> <div>New Password:</div>
<div><input type=”password”
name=”new_password”></div> <div><input
type=”submit” value=”Change
Password”>
</form>
```

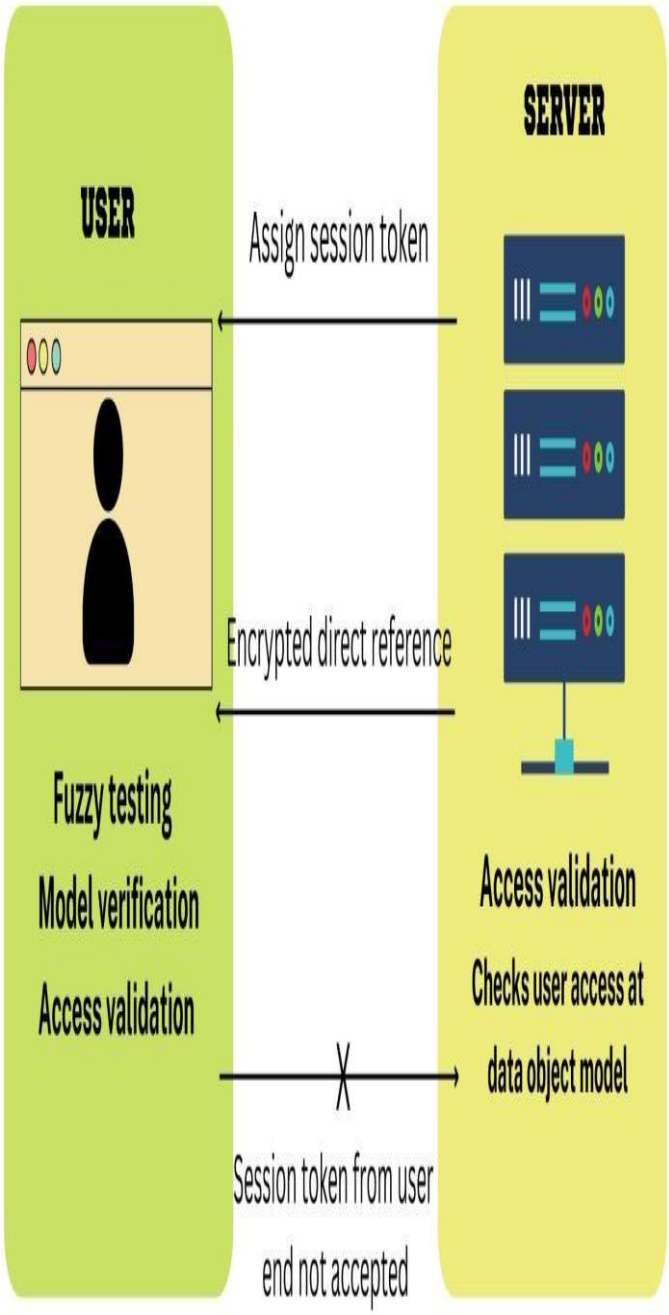
Here, above the code user_id is passed to a webserver in a hidden field. Changing the value of this field from 123 to another user id may result in the password of another user's account being changed.

Session cookies for enhancing website security

Cookies are used to remember your session when you visit a website like this one. Typically, this will entail delivering a session id, which is a large string of random, difficult-to-guesstext, such as 5db28452c4161cf88c6f33e57b62a357 the web server will use the session cookies to securely validate and retrieve user's data. Examplehttps://pass.com/messages?user_key=5db28 452c4161cf88c6f33e57b62a357

The website would be more secure, and the attacker would have a far more difficult time guessing the key. However, the majority of websites use unsafe, direct, object, and reference.

These types of "Direct Object References" expose IDOR vulnerabilities, allowing anyone to obtain information that is not associated with his identity.



Why and when to use cookies ?

Cookies enable us to keep track of the status of the programme using tiny files stored on the user's computer because the HTTP protocol is stateless. Where the cookies are kept is up to the browser.

Internet Explorer frequently stores them in the Temporary Internet Files folder. The user experience can be customised by giving customers the freedom to choose their preferences. The subsequently requested page is customised in accordance with the preferences stored in the cookies.

Cookie example code <?php setcookie(cookie_name, cookie_value, [expiry_time], [cookie_path], [domain],
[secure], [httponly]);

?>

A simple software that enables us to save the user name in a cookie with a 10-second expiration time. The implementation of the "cookies.php" example from above is displayed in the code below..

<?php setcookie("user_name", "Guru99", time()+ 60,'/'); // expires after 60 seconds
echo 'the cookie has been set for 60 seconds';?> Output : the cookie has been set for 60 seconds

Retrieving cookie value:

Create another file named "cookies_read.php" with the following code.

<?php print_r($_COOKIE); //output the contents of the cookie array variable ?>

Output:

IV. PROPOSED SYSTEM

Proposed system to prevent IDOR protection: There can be various ways to prevent from IDOR some of the ways are stated below:

1.Fuzzy Testing – Before submitting the code to the server, the developer must fix all of the mistakes. For instance, logging onto any social networking website takes an email address and password. To minimise input, the password and email must both follow a specified format.

2.Model Verification – In order to concentrate on model verification, numerous fields are associated with the post parameter in this model verification module, thus the developers need to safeguard the website against parameter tampering. You might also refer to it as parameter verification. Verifying that a string is within the appropriate minimum and maximum lengths is a form of verification. Also, make sure that the system is free of any undesirable characters, such as some special characters like ->. plus a lot more.

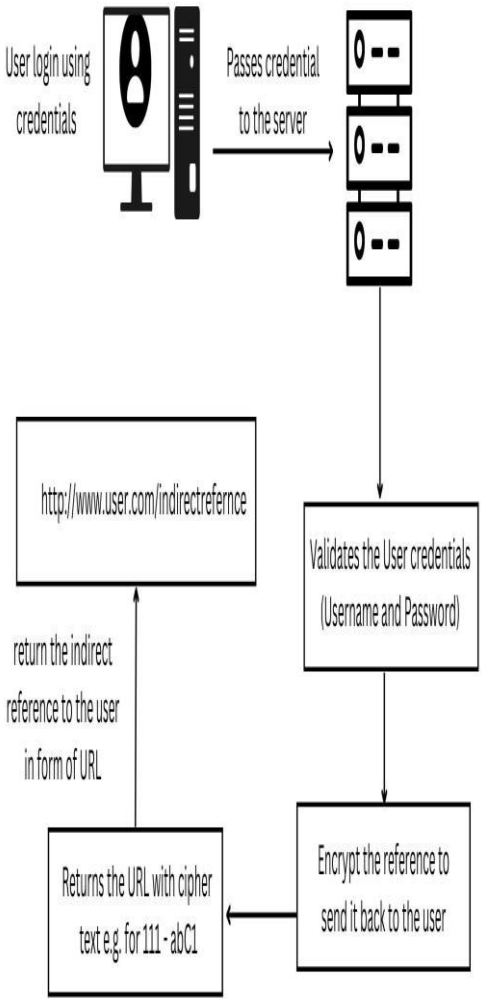
3.Access validation – The best strategy to stop an IDOR attack is to carry out user access validation. The system/application should stop the request if an attacker tries to tamper with the database or any application code after confirming the user's access. 4.Avoid Exposing Direct Object References - Use the data already existing in the user's session on the server to find the resources to serve rather than relying on the references in the URL. If users are only permitted to access their profile, like in the www.example.com/profile/3032 route solution we just reviewed, we may utilise the logged-in user's ID in the session to retrieve it, negating the need to send id as a URL parameter.

5.Use an Indirect References Map- We can utilise the indirect reference map technique if the developer is unable to prevent revealing the references to objects in the URL. The fundamental concept is to replace the sensitive direct reference in the URL with an unpredictable random value (such as GUID)

6.Check User Access at the Data-Object Level - This defence method deals with the vulnerability's main cause, an inadequate or absent access check. First, you should never limit access control to client-side checks because an attacker can quickly get around these. It is rather simple to include permission checks at the functionality or route level while implementing the serverside access controls.

We have discovered that encryption algorithms like RSA, AES, and Base 64

V. CONCLUSION



approaches can be used to prevent Insecure Direct Object Reference.

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Predicting Position of User Equipment Using Machine Learning

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Abstract—**This case study focuses on estimating position of User Equipment in a radio network using neural networks. Both Convolutional Neural Network and Dense Neural Network were used based on the available features. The model's performance was validated using K-Fold cross-validation.**

Keywords—***channel impulse response, user equipment, convolutional neural network, dense neural network, K-fold cross validation.***

I. INTRODUCTION

In positioning scenarios, multipath, non-line-of-site (NLOS), indoor coverage and non-ideal synchronization may create obstacles that can be challenging to solve using conventional techniques. As a result, an AI-based positioning strategy is employed.

The aim of performing this study is to estimate the position of a user experiment (x, y) in a given area using features of a radio network gathered by eighteen base stations. Following are the features incorporated in training the neural network.

1. Channel Impulse Response (CIR): The technique of channel sounding involves figuring out a transmission channel's impulse response, particularly a cellular radio channel. The idea was inspired by traditional acoustic distance-measuring techniques, such as using an echo sounder to gauge water depth. The channel impulse response (CIR), which includes the magnitude and phase of the signal, gives intricate, thorough information on the effect of the channel of interest on a radio signal. As a result, it is perfect for describing the channel. The radio channel is negatively impacted by reflection-induced signal echoes, diffraction and scattering-induced distortions, building and tree induced shadow effects, and even weather-related impacts like rain and snow.
2. Reference Signal Received Power (RSRP): In order to always connect to the cell tower with the best signal, user equipment continuously scans the signals emitted by all neighboring cell towers. A modem uses a value known as RSRP to decide which tower to connect to. Reference Signal Received Power (RSRP) is the linear average of the power contributions made by the resource elements that transmit cell-specific reference signals within the bandwidth of the measurement under consideration (in [W]). The antenna connector on the user equipment (UE) is to be used as the RSRP's reference point. With the restriction that relevant measurement accuracy standards must be met, the
3. UE implementation is left to decide how many resource elements within the considered measurement frequency spectrum and within the measurement time are employed by the UE to estimate RSRP.
4. Time of Arrival (TOA): The time of arrival (TOA) is the length of time it takes for a signal to travel from the source to the receiver. In order to measure the TOA information, the source and all of the receivers must be precisely synchronized. If a two-way or round-trip TOA is computed, a similar system is not required. The measured distance between the source and the receivers is obtained by multiplying the computed TOA by a specified propagation speed, typically represented by the letter c. The source must be located on the circumference of the circle that the measured TOA represents having its center as the receiver in a two-dimensional (2D) space

   A distinct intersection point between three or more of these circles produced by the noise-free TOAs corresponds to the source position. To estimate a two- dimensional position of a source, a minimum of three sensors are needed, and these can be represented as a collection of circular equations. By using the optimization criterion and the known sensor array geometry, the source position can be calculated.[8]
5. Time Delay of Arrival (TDOA): TDOA is a positioning method that is calculated by finding the difference between the TOA of radio signals. In a

real-time location system (RTLS), TDOA is used to precisely determine the location of tracked entities in real-time, such as tracking tags attached to personnel or important assets. It requires three or more remote receivers (probes) that can pick up the desired signal. Each probe is time-synchronized to record the appropriate I/Q data blocks. To determine the difference in arrival times at each probe, software modifies the time signature of each I/Q data set. This reveals the variation in the source's separation from each pair of probes. A collection of curving lines indicating answers to the distance equations are produced by using many probes.

6. Position (Pos): Determines the x and y co-ordinates of a User Equipment in a given area on the basis of features such as fingerprinting, received signal strength (RSS), angle of arrival (AOA), time of arrival (TOA), time difference of arrival (TDOA), etc. One can directly

change the TOA and RSS to reflect the range measurement.

An ensemble model composed of Convolutional Neural Networks and Deep Neural Networks were used for the final prediction where all four features were given as input attributes. A K-Fold cross validation method was used to validate the neural network's performance.

II. BACKGROUND

Wireless technology enables communication between users or the movement of data between locations without the use of cables or wires. Radio frequency and infrared waves are used for a lot of the communication.

The two types of wireless networks that are most frequently encountered in real-world situations are:

1. Local Area Network (LAN): Used in places such as your office's internal network or your home's network of devices (computers, game consoles, mobile phones and tablets connected to the same router in one location form a local area network). In the past, establishing a local area network required a wired connection using what is known as an "ethernet cable." WiFi is currently widely utilized for local networking, even if wired networks are still extremely popular for a variety of factors, including superior protection from interference and security when compared to wireless.
2. Wide Area Network (WAN): The Internet could be seen as a wide area network (WAN), a sort of network that spans a greater area. Because they are typically faster, more dependable, and less prone to interference, wires are utilized to move the majority of the data moving through the network in the case of the Internet. But still, more and more people are using cellular data to access to the Internet wirelessly since the introduction of the contemporary smartphone and other portable devices like tablets.

The advent of Industry 4.0 and the development of mobile wireless technology, from 3G/4G to 5G, have led to an increase in the complexity of wireless system design. Due to demands for effective resource sharing among growing user bases, wireless networks have also grown more challenging to operate. Since traditional rule-based engineering approaches are no longer sufficient to address these problems, many engineers are turning to artificial intelligence (AI) as a solution.

Artificial intelligence (AI) has introduced the sophistication required for contemporary wireless applications, from coordinating communications between autonomous vehicles to optimizing resource allocation in cellphone conversations.

The fifth-generation (5G) mobile network era has made it possible to integrate edge computing, big data, Internet of Things (IoT), artificial intelligence (AI) and other technologies. Big data analytics, accurate parameter estimation, interactive decision making, and compelling applications of wireless networks (e.g., heterogeneous networks (HetNets), cognitive radio (CR), Internet of Things (IoT), and machine to machine (M2M) networks) have all been successfully supported by AI algorithms. Future wireless network architecture integration of AI has emerged as a technology trend for investigation and research. The architecture for wireless network transmission in the future will benefit greatly from AI. In addition, more study is required on how AI is applied to modelling communication network channels, network operation and maintenance, network security audits, and other areas.[7]

The function of AI in wireless technology will grow along with the variety and volume of devices linked to networks. Engineers need to be ready to integrate it into evermore complicated systems. Future success of the technology will depend on understanding the advantages and existing uses of AI in wireless networks, as well as the best practices required for effective implementation.

III. METHODOLOGIES IMPLEMENTED IN THE MODEL

Machine learning lifecycle is a systematic iterative process of developing an optimal model ready for incorporation into a production system and consumption by the targeted end-users. It involves training, testing, and deployment of the model. Following are the methodologies incorporated in this model: -

1. Dense Neural Network: A node layer of an artificial neural network (ANN) consists of input layer, one or more hidden layers, and an output layer. Each node, or artificial neuron, is connected to other nodes and has a weight and threshold that is associated with it. Any node whose output exceeds a defined threshold value is activated and begins supplying data to the network's topmost layer. In this instance the activation function used prominently was Rectified Linear Unit (ReLU).

2.Convolutional Neural Network: Convolutional neural networks outperform other neural networks when given inputs such as images, voice, or audio. There are three main categories of layers:

a. Convolutional layer

b. Pooling layer

c. FC (fully-connected) layer

A convolutional network's primary layer is the convolutional layer. The fully-connected layer is the last layer and convolutional layers or pooling layers, come after it. The CNN[1][2] becomes more complicated with each layer, detecting larger areas of the image. Initial layers specify basic elements like colors and borders. The prominent features or shapes of an object are first recognized when the visual data moves through the CNN layers, and eventually the intended object is recognized.

3. K-Fold Cross Validation: A resampling technique called cross-validation is used to assess machine learning models on a small data sample. The process contains a single parameter, k, that determines how many groups should be created from a given data sample. Thus, the process is frequently referred to as k-fold cross-validation. In applied machine learning, cross-validation is usually used to measure how well a machine learning model performs on untrained data. That is, to use a small sample to assess how the model will generally perform when generating predictions on data that was not utilized during the model's training.

IV. METRICS FOR EVALUATION OF MODEL

To evaluate performance of the model, following metrics were used: -

1. Mean Squared Error (MSE): MSE measures the amount of error in a statistical model. It is defined as the mean or average of square of difference between the actual values and the predicted or estimated values. It is represented mathematically as follows: -

$$MSE = n^{-1}\sum ni=1(yi - ypred)2 \quad (1)$$

Closer the value of MSE is to zero, more accurate the model is.

2. Position error at 0.9 cdf: A cumulative density function (cdf) is used to describe the probability distribution of the variables. In this case the cumulative density function was plotted against position error in model and the error at 90% cdf was observed. Lower the error value, more accurate the model is.

V. IMPLEMENTATION OF MODELS

The dataset is a labelled set of wireless communication data which contains large amounts of channel samples in different forms which can be used for AI-based wireless communication research.[12]

The implementation of the model took place in four stages. In the first stage, channel impulse response was provided as input to the neural network model. In the second stage, RSRP, TDOA and TOA were used as input features. In the third, all four inputs were given to the neural network. Results of all three stages were compared to see which approach was more optimal and accurate and validated using K-Fold Cross Validation Method.

A. Stage 1: Channel Impulse Response

In the initial stage, Channel Impulse Response was used to predict the position of User Equipment. The dimensions of the input are as follows: -

(80,000, 18, 256, 2)

Since the input is 4 dimensional, a convolutional neural network[5] approach was used. Following is the model of neural network that was implemented.

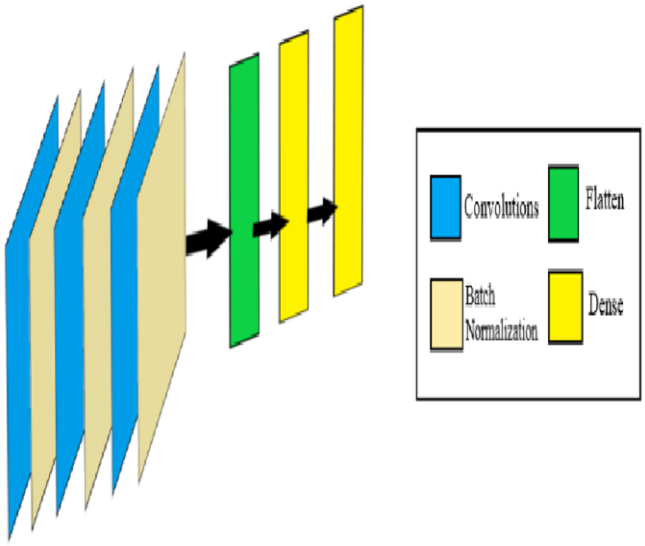

Fig. 1. This figure shows the flow of Convolutional Neural Network executed for stage 1 i.e., predicting position of User Equipment using Channel Impulse Response.

B. Stage 2: RSRP, TDOA and TOA

In the second stage the input data given was RSRP, TDOA and TOA. Each of them had a dimension of: -

(80,000, 18)

Since the data provided was two dimensional, all three inputs were merged to form a three-dimensional data of the form: -

(80,000, 18, 3)

This input was fed into a model containing Dense layers. An illustration of the model incorporated is shown below: -

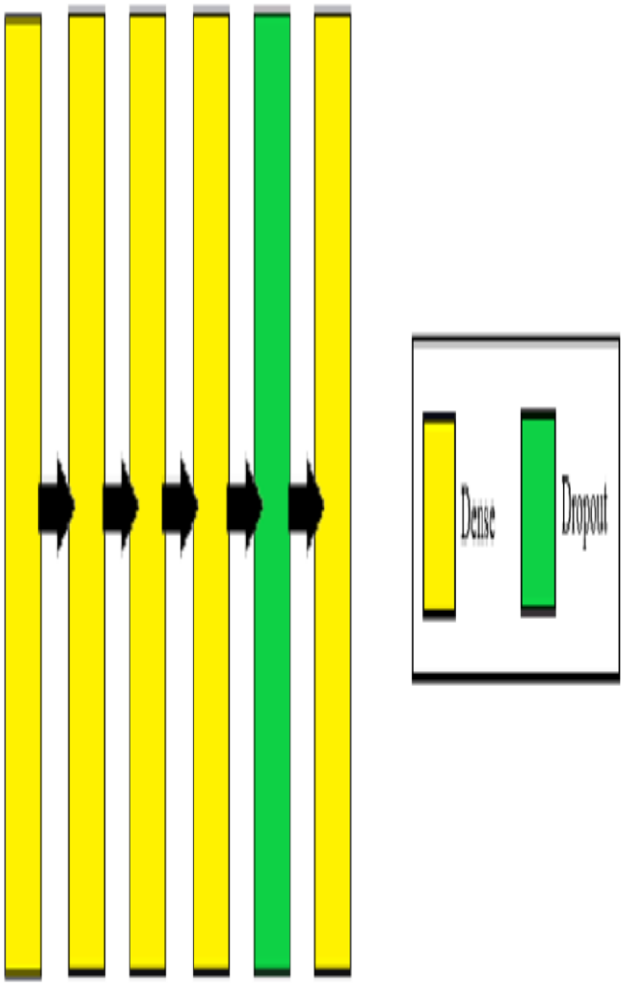

Fig. 2. The figure shows the execution of a simple Artificial Neural Network, taking inputs rsrp, tdoa and toa, comprising only of Dense Layers along with one dropout layer.

C. Stage 3: Ensemble Model

This penultimate stage used all four inputs for prediction. Considering the fact that inputs were of different dimensions, an ensemble approach was used. Here the models were defined functionally. In the first part of the ensemble

convolutions were declared to predict position on getting CIR as input. In the second part dense layers were used so as to predict using RSRP, TDOA and TOA. Outputs from the final layer of both the models were then concatenated and a Dense layer was mentioned to predict the final position of User Equipment. The ensemble approach is illustrated diagrammatically below: -

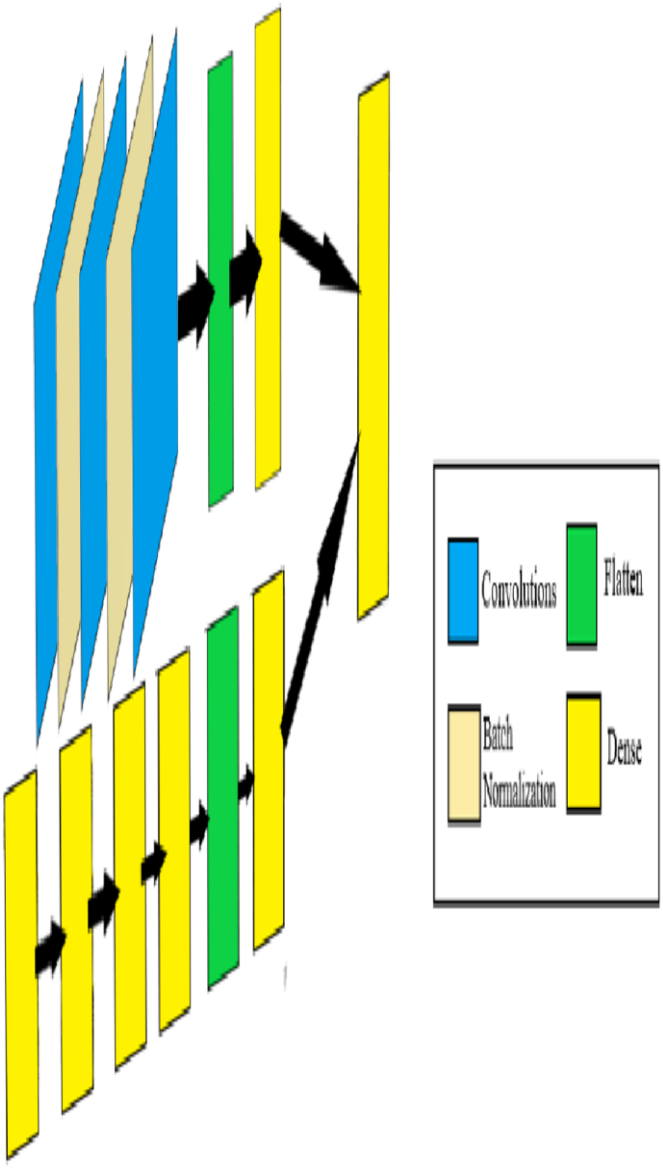

Fig. 3. Figure shows flow of neural network model in two stages. The first one being a Convolutional model and the second one being a dense neural network model, both outputs merging into one dense layer which provides position of User Equipment as output.

D. Stage 4: Validation using K-Fold Cross Validation

The final stage consisted of validating the above ensemble model using K-Fold Cross Validation[13]. 5 folds were used and after the conclusion of execution of each fold, the MSE and position error at 0.9 cdf was noted. The above folds were iterated over both 30 and 50 epochs.

VI. RESULTS DISCUSSION

Upon execution of all the above stages, following were the results: -

Model	**No. of Epochs**	**MSE**	**Position Error at 0.9 cdf**
Stage 1: CNN	25	1.0143	2.141
Stage 2: ANN	300	0.5967	1.288
Stage 3: Ensemble Model	50	0.0676	0.519

a. The above table displays MSE values and position error after execution of each model.

During analysis it was found that the ensemble model provided the most accurate result with very low position error. To further prove this statement the cdf plot and a frequency plot which shows the distribution of error are shown below:

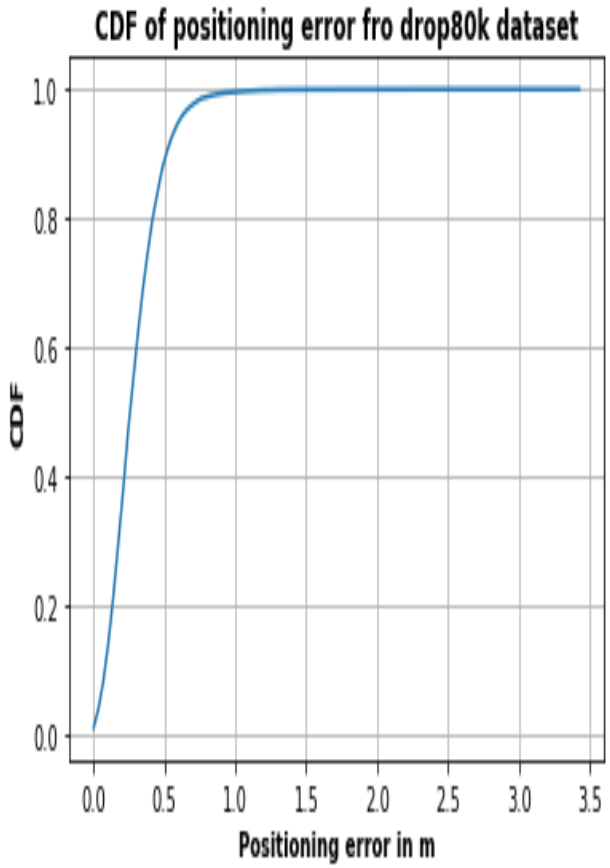

Fig. 4. Cumulative Density plot for ensemble method.

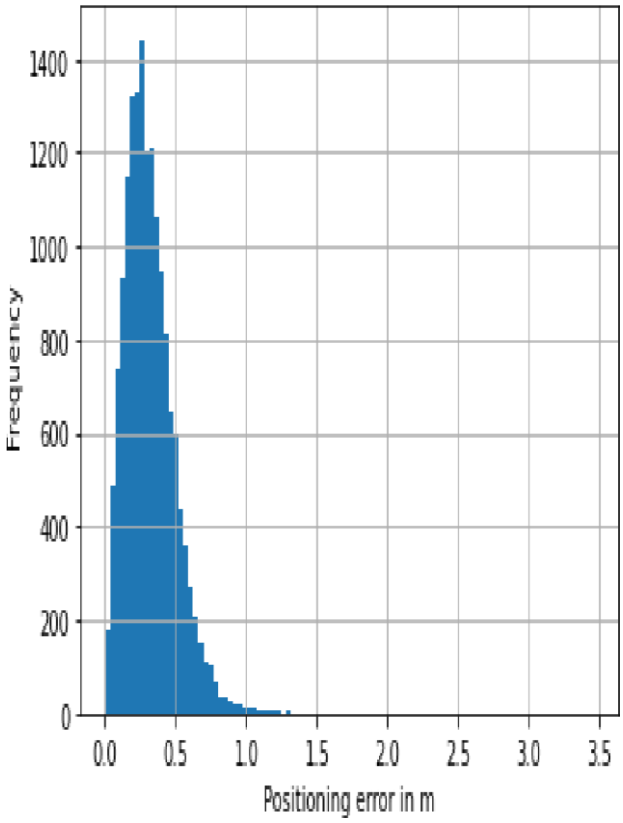

Fig. 5. Frequency plot for ensemble method.

As observed in the frequency plot, majority of the position error is approximately distributed between 0.0 and 0.55 making the model most accurate amongst the three.

K-Fold Cross Validation was performed on the Ensemble model iterating over both 30 epochs and 50 epochs to observe how results change with changes in input values. MSE values and position error at 0.9 cdf after execution of each fold is tabulated below: -

Epochs: 30			
Indices of samples inputted	**K-Fold Value**	**MSE**	**Position Error at 0.9 cdf**
0-16000	1	0.1257	0.7448
16000-32000	2	0.098	0.6516
32000-48000	3	0.1131	0.7219
48000-64000	4	0.1261	0.7307
64000-80000	5	0.13	0.7458
Epochs: 50			
Indices of samples inputted	**K-Fold Value**	**MSE**	**Position Error at 0.9 cdf**
0-16000	1	0.1135	0.6482
16000-32000	2	0.1277	0.7447
32000-48000	3	0.0659	0.537
48000-64000	4	0.0947	0.6346
64000-80000	5	0.0676	0.5236

b. The above table displays MSE values and position error at 0.9 cdf after execution of K-Fold Cross-validation over 30 and 50 epochs.

The MSE values and position error values changed with changes in input values and better results were observed while iterating the folds on 50 epochs. This goes on to validate the accuracy of predictions of position produced by the ensemble model and how these results could be improved by increasing the number of iterations.

ACKNOWLEDGMENT

I would like to express my sincere gratitude to Mr. Keerthi Srinivas, direct guide, Mr. Venkatesh Muralidhara and Mr. Hari Swaroop Kanzal Venkatesh (Director L1 Development) of Altiostar Networks India Pvt. Ltd. without whose guidance and support this project would not have been possible.

It would be unfair to not acknowledge the help and support given by the Professors, students, friends etc.

Particularly, my sincere thanks to the faculty guide Mrs. Jagruthi Jadhav for her guidance and constant support. Immese gratitude is offered to the HOD, Dr. Megharani Patil, the Principal, Dr. B. K. Mishra and the college management for their support.

FUTURE SCOPE

While the above method provided a good result, there is further scope to improve the model in following aspects: -

1. The above model can be run on increased number of epochs to achieve better accuracy.
2. The model should be robust to different types of input features and be able to predict with the given data.
3. While being robust to varied types of features, it must also be able to compute the position of user equipment's without taking up too much memory.
4. The model must also be able to compute data in real time.

CONCLUSION

In this paper a deep learning-based approach for estimating position of User Equipment in a radio network is proposed. The results show that an ensemble model taking all four inputs would outperform other models implemented in this study. The same has been validated by the use of K-Fold Cross-Validation. This goes on to provide a promising direction for future research in the field of wireless networks.

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A Comprehensive Review on Explainable AI Techniques, Challenges, and Future Scope

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Abstract- **Artificial Intelligence (AI) has been making remarkable advancements in recent years and has the potential to revolutionize many aspects of our lives. From self-driving cars to healthcare systems, AI has the ability to make tasks easier, faster, and more accurate. However, the increasing reliance on AI has raised concerns about its transparency, accountability, and interpretability. eXplainable AI (XAI) is a field that focuses on explaining the predictions made by AI systems. This has become increasingly important as AI is being used in sensitive and critical applications such as medical diagnoses, financial risk assessments, and criminal justice decisions. It is essential to ensure that the decisions made by AI systems are transparent, trustworthy, and can be justified to stakeholders. The paper explores the challenges associated with creating explainable AI systems and the different techniques that are being developed to overcome these challenges. Further it presents a summary of the strengths and weaknesses of various XAI techniques. The paper will provide an overview of the state-of-the-art in XAI and highlight the need for further research in this field.**

Index Terms **– *eXplainable AI (XAI), Machine Learning***

I. INTRODUCTION

Artificial Intelligence (AI) has become an increasingly ubiquitous technology, permeating various domains such as healthcare, finance, and transportation [1]. While AI systems have demonstrated remarkable performance, there are growing concerns over their lack of transparency, accountability, and interpretability [2]. This lack of transparency is often referred to as the "black box" problem and is a major hindrance to the widespread adoption of AI systems. The need for more transparent AI systems has led to the development of a new field called eXplainable AI (XAI) [3]. XAI aims to design and develop AI systems that can provide humanunderstandable explanations for their predictions, decisions, and internal workings.

XAI has gained significant attention in recent years, and researchers have developed various techniques for improving the interpretability of AI systems. These techniques range from model-agnostic methods, such as saliency maps and feature importance analysis, to modelspecific methods such as decision trees and rulebased models

The motivation behind the research in the field of XAI aims to overcome the challenges of gaining transparency and trust in the decisions made by the AI/ML models, compliance with regulations, improved decisions and model selection for solving a specific problem.

1. Transparency and Trust: The black-box nature of AI systems has led to a lack of trust and accountability among stakeholders. XAI aims to address this issue by providing explanations for the predictions and decisions made by AI systems. This increased transparency can lead to improved trust and confidence in AI systems.
2. Compliance with Regulations: There are various regulations and ethical guidelines that mandate the need for explainable AI systems, such as the European Union's General Data Protection Regulation (GDPR) and the US's Algorithmic Accountability Act.
3. Improved Decisions: Explainable AI can help decision-makers understand the reasoning behind AI predictions and decisions, allowing them to make better-informed decisions. This is especially relevant in high-stakes domains such as healthcare and finance.
4. Model Selection: XAI can help practitioners compare and evaluate different AI models, making it easier to choose the most appropriate model for a given task.

There are different challenges associated with Explainable AI as stated by authors of [4]. One of the primary challenges in XAI is developing methods for making AI models transparent and interpretable, without sacrificing performance. A black-box model is one in which the decision-making process is not clearly understood, making it difficult to trust the output of the system. This lack of transparency can be especially problematic in critical applications, such as medical diagnosis or autonomous driving, where the consequences of incorrect decisions can be severe. XAI aims to address this issue by developing methods for making AI models more interpretable and transparent so that the decision-making process is better understood and trusted.

Another challenge in XAI is developing methods for interpreting the output of AI models in a way that is meaningful to humans [4]. This is particularly important in applications where the model makes decisions that significantly impact people's lives. For example, in a medical diagnosis application, it is important to be able

to understand why a model made a particular diagnosis so that healthcare professionals can verify the accuracy of the decision. Similarly, in autonomous driving, it is important to be able to understand why a model made a particular driving decision so that the safety of the system can be assessed.To address these challenges, XAI research has focused on developing new methods for making AI models more interpretable, such as using local explanations, feature importance methods, and model distillation. Another approach is to develop new AI models that are inherently interpretable, such as decision trees and rulebased systems. XAI research has also focused on developing new methods for visualizing the output of AI models, such as using heat maps, saliency maps, and activation maps.

In addition to these general challenges, XAI also faces several specific challenges based on the different phases of the machine learning life cycle: design, development, and deployment [4]. During the design phase, XAI researchers must consider the interpretability and transparency requirements of the system, and choose the most appropriate AI models and methods. During the development phase, XAI researchers must implement these models and methods, and ensure that they are validated and tested. During the deployment phase, XAI researchers must ensure that the system is deployed in a way that is secure and trustworthy, and that the decision-making process is transparent and understandable.

This paper provides a comprehensive review of stateof-the-art XAI techniques. We categorize XAI techniques into two broad categories: Inherently Interpreting methods and post-hoc methods. We also highlight the open research challenges in XAI and suggest directions for future research. This paper provides a comprehensive overview of the XAI field and serves as a useful reference for researchers, practitioners, and decision-makers interested in developing more transparent and interpretable AI systems.

II. RELATED WORK

The Machine Learning models that exist in the literature can be distinguished into two types, Inherently Interpretable Models, and Post-hoc Explainable Models. The inherently interpretable models are selfexplanatory or interpretable by design whereas post-hoc explainable models are prebuilt models that are explained by external XAI techniques. [5]

A. Inherently Interpretable Models

In general, the models which are understandable by themselves fall under the category of Inherently Interpretable Models, they are also known as transparent models. Examples of such models are as follows:

A.1. Linear Regression/Logistic Regression-

Linear Regression is a machine-learning model used to predict a value of the dependent variable y, given the value of the independent variable x. This model assumes the linear dependence between the input (Predictor) and output (Predicted) variables, inhibiting an adaptable fit to the data. This nature of the model fits it under the category of inherently interpretable models. The models' explainability can be correlated with different users depending on the application. Although Linear Regression/Logistic Regression possesses the properties of an inherently interpretable model, depending on the context, it may fall under both categories. For example, for ML experts the model is self-explanatory but in the case of the users who are not ML experts, post-hoc explainability techniques (like visualization) can be used to interpret the behavior of the model. This model is used in practice by many researchers. The authors of [6],[7], [8] and [9] agree that the overall model evaluation gives an improvement over a baseline.

A.2. Decision Trees-

Decision trees are a popular tool in Explainable AI (XAI) because they provide a clear and interpretable representation of the decision-making process used by the model. A decision tree is a tree-like model that makes predictions by recursively partitioning the data into smaller subsets based on the values of the predictor variables until each subset consists of instances with similar values for the response variable. The tree structure of a decision tree can be visualized, and the decisions made by the model can be traced from the root to the leaves, making it easy for humans to understand how the model is making its predictions [10], [11]. The internal nodes of the tree represent the questions being asked about the data, and the leaves represent the final predictions. In XAI, decision trees can be used to generate explanations for the predictions made by the model. For instance, the tree structure can be used to identify the most important features used by the model to make its predictions, and the decisions made at each node can be used to highlight the reasoning behind the prediction. This makes decision trees a useful tool for applications where interpretability is important, such as medical diagnosis, fraud detection, and customer segmentation. However, it is important to note that decision trees can have limitations when dealing with complex and non-linear relationships between the predictor variables and the response variable. In these cases, decision trees can easily overfit the data, leading to poor generalization performance on new data. To address this issue, ensemble methods, such as Random Forests and Gradient Boosting, are often used to improve the robustness and accuracy of decision tree models.

A.3. K-Nearest Neighbours-

K-Nearest Neighbours (KNN) is a simple and intuitive machine learning algorithm that is used for classification and regression tasks. In KNN, the prediction for a new instance is based on the majority vote or average of the k-nearest neighbours in the training data. In KNN, the distance metric used to determine the nearest neighbours can be customized, such as Euclidean distance, Manhattan distance, or Cosine similarity. The value of k, the number of nearest neighbours used for prediction, is a tunable parameter that can be optimized through cross-validation or other model selection methods [12], [13]. In Explainable AI (XAI), KNN is used as a baseline model for comparison with more complex models, such as deep learning networks, to assess their performance and interpretability. KNN provides a simple and interpretable representation of the decision-making process used by the model, making it easy for humans to understand how the model is making its predictions. However, KNN can have limitations when dealing with large and high-dimensional datasets, as the computation time and memory requirements can become prohibitive. In these cases, other machine learning models, such as decision trees or support vector machines, may be more appropriate.

A. 4. Rule-Based Models-

Rule Based Models use rules to represent the knowledge coded in the systems. They are widely used in expert systems for knowledge representation [14]. The first approach discussed here is The Bayesian Rule Lists. This was first introduced by Ben Letham and Cynthia Rudin in 2015 [15]. They proposed a rule list classifier for stroke prediction in which the rules are represented as a sequence of conditional if-else-if constructs. The classifier predicts the stroke risk in advance, considering the different factors leading to a stroke condition in patients. The interpretability of decision statements is simplified by the high dimensional and multivariate feature space by the discretization of if-then conditions. The decision list has posterior distribution yielded by the Bayesian rule list. Healthcare experts or doctors want to make certain decisions, so they want simple models which are easily understandable by themselves rather than complex models. Although the model is simple, another criterion is that the predictions made by the model should be accurate. In this paper, the researchers designed a generative model to produce if/else-if lists that strike a balance between accuracy, interpretability, and computation. Another approach that can be linked to rule-based models is Fuzzy rules/ systems. Fuzzy rules are a kind of if-then statements specifying some conditions and generating truth to a specific degree instead of complete true or false results. A deep rulebased fuzzy system is used to predict patients' mortality in the ICU. It consists of a diverse dataset combining categorical and numeric attributes in a hierarchical manner [16].

Rule-based models are useful in various fields in terms of interpretability. The main problem with the approach is the amount and the length of the rules generated. The main objective of the rule-based approach is that the user can analyze, interpret, and understand the model. The number of rules in a model will improve the performance of the model, but at the same time, it may compromise the interpretability. It may become difficult to interpret if there are many antecedents.

A.5.Risk Scores-

Risk scores refer to the predictions or assessments generated by AI models in terms of risk levels. These scores are used to identify the level of risk associated with a particular decision or event [17]. In XAI, the risk scores are accompanied by an explanation of the reasoning behind the score, which helps humans understand and interpret the results of the AI model. The goal of XAI is to provide transparent and interpretable models that can be trusted by humans, especially in sensitive and high-stakes applications, such as credit risk assessments, fraud detection, or medical diagnosis.

A.6. Generalized Additive Models-

Generalized Additive Models (GAMs) are a class of non-parametric statistical models used in Explainable AI (XAI) to make predictions based on a linear combination of smooth, non-linear functions. GAMs are a flexible alternative to traditional linear models and can capture complex relationships between the predictor variables and the response variable. In XAI, GAMs are used to generate explanations for the predictions made by the model. For instance, the smooth functions in a GAM can be interpreted as the contribution of each predictor variable to the prediction, providing insights into the model's decision-making process. This makes GAMs well-suited for applications where interpretability is important, such as medical diagnosis [18], financial forecasting [19], and risk management. However, while GAMs provide a more transparent view of the model's decision-making process compared to black-box models, the interpretability of the smooth functions can still be limited, particularly when dealing with high-dimensional data or complex interactions between predictor variables.

A.7.Prototype-Based Models-

Prototype-based models are a class of machine learning models that are used for classification and clustering tasks. They work by representing each class or cluster as a prototype or representative feature vector. The prototypes are learned from the data and can be thought of as the central or average feature representation of the

data points belonging to a particular class or cluster. During the classification or clustering process, new data points are compared to the prototypes and assigned to the closest class or cluster based on a distance metric, such as Euclidean distance or cosine similarity. The decision boundary between the classes or clusters is defined by the prototypes [20]. Prototype-based models are often used in Explainable AI (XAI) because they are simple and intuitive to understand and can provide straightforward explanations for the predictions made by the model. For instance, in a classification task, the prototypes can be used to represent the decision rules used by the model, making it easy for humans to understand how the model is making its decisions.

However, prototype-based models can have limitations when dealing with complex and non-linear data distributions, as the prototypes may not accurately represent the underlying relationships between the features and classes. In these cases, other machine learning models, such as deep learning networks, may be more appropriate.

B. Post-hoc Explainable Models

Posthoc Explainable Models refer to machine learning models that have been trained to make predictions, but the explanations for the predictions are generated after the fact, rather than being built into the model itself. Posthoc explanation methods are used to generate explanations for the predictions made by black-box models, such as neural networks and gradient-boosting machines, which can be difficult to interpret. These methods can provide a local or global explanation for the predictions, either by highlighting the features used by the model to make the prediction or by approximating the decision boundary used by the model.

B.1.Local Explanation:

It refers to the process of understanding the behavior of an AI model by examining the contributions of individual input features to the model's prediction. The goal of local explanation is to understand why the model made a particular prediction for a specific instance, rather than trying to understand the behavior of the model in general. There are several methods used for generating local explanations, including Feature Importance, Rule-Based, Saliency Maps, Attention Mechanisms, Prototypes/Example Based, and counterfactuals. Some popular Local Post-hoc explainable models include:

*B.1.1 LIME, or Local Interpretable Model-Agnostic Explanat*ions is a method for generating local explanations for complex machine learning models. The goal of LIME is to provide a simple and interpretable explanation for the predictions of any machine learning model, regardless of the underlying architecture.[21] and all its variations [22, 23].

LIME works by approximating the complex machine learning model with a simpler, interpretable model in the vicinity of a specific prediction. It does this by perturbing the input features of a specific instance and measuring the impact on the model's prediction. The resulting relationship between the input features and the model's prediction is then used to generate an interpretable explanation for the prediction.

LIME has several advantages over other local explanation methods. First, it is model-agnostic, meaning that it can be used with any machine learning model, regardless of the underlying architecture. Second, it provides explanations that are simple and interpretable, making it easier for humans to understand the reasoning behind a model's prediction. Third, it is computationally efficient, making it possible to generate explanations for large numbers of predictions in a reasonable amount of time.

B.1.2. SHAP (SHapley Additive exPlanations): The method is based on the concept of Shapley values from cooperative game theory and provides a fair and consistent way to distribute the contribution of each feature to a prediction. The main idea behind SHAP is to attribute the prediction of a machine-learning model to each of the input features. The method computes the expected value of the prediction when a feature is included in the input and when it is not and uses this information to calculate the contribution of each feature to the prediction.[24]

SHAP has several advantages over other explanation methods. It is model agnostic; thus it can be used with any machine learning model, regardless of the underlying architecture. It provides consistent and fair explanations, meaning that the contributions of each feature to the prediction are based on a well-defined mathematical framework. Also, it can generate both global and local explanations, allowing for a complete understanding of the behavior of the model.

Another approach to tackle the contribution of each feature to predictions has been coalitional Game Theory [25] and local gradients [26]. Similarly, by means of local gradients [27] test the changes needed in each feature to produce a change in the output of the model.

B.1.3. Rule-Based Approach-Anchors: The goal of anchors is to provide a simple, interpretable explanation for the predictions of a machine learning model by identifying the input features that are most important for the prediction. Anchors work by generating a small set of rules, called anchors, that are used to explain the prediction of a model. These anchors are based on the relationships between the input features and the model's

prediction, and they are designed to be both simple and interpretable [28].

The main advantage of anchors is their simplicity and interpretability. By using a small set of rules to explain a prediction, anchors provide a straightforward way to understand the reasoning behind a model's decision.

B.1.4. Saliency Maps: The goal of saliency maps is to highlight the input features that have the greatest impact on the prediction of a machine learning model [29].

A saliency map is a visual representation of the model's decision, where the most important input features are highlighted. The map is generated by computing the gradient of the model's prediction with respect to the input features and visualizing the resulting information as a heatmap, where the color encodes the magnitude of the gradient.

Saliency maps have several advantages over other explanation methods. They provide a visual representation of the model's decision, making it easier for humans to understand the reasoning behind a prediction. They can be generated for any machine learning model, regardless of the underlying architecture. Also, they provide a global explanation of the model's behavior, which can be useful in identifying potential biases in the model's decision-making process.

B.1.5. Prototype/Example-Based Approach: The goal of prototype-based explanations is to provide a humanunderstandable explanation of a machine learning model's prediction by comparing the input to a set of prototypes or examples. Prototype-based explanations work by identifying a small set of prototypes or examples that are representative of the data and are used to explain the prediction of a machine-learning model [30]. The model's prediction is explained by comparing the input features to the prototypes and identifying which prototypes are most like the input. The main advantage of prototype-based explanations is their simplicity and interpretability. By comparing the input features to a small set of prototypes, prototypebased explanations provide a straightforward way to understand the reasoning behind a model's decision.

B.1.6. Counterfactuals: The goal of counterfactual explanations is to provide an explanation of a machine learning model's prediction by showing how the prediction would change if a certain input feature were different. Counterfactual explanations work by generating alternative inputs that are like the original input except for one or more features. The model's prediction for these alternative inputs is then compared to the original prediction to determine how the prediction would change if the input features were different [31, 32].

The main advantage of counterfactual explanations is their ability to show how a model's prediction would change if certain input features were different. This can be particularly useful in understanding the decisionmaking process of a model and identifying any biases that may be present.

The local explanation is important in XAI because it provides a way to understand the behavior of complex AI models and makes the decision-making process more transparent. This is particularly important in applications where the model makes decisions that significantly impact people's lives, such as medical diagnosis or autonomous driving. By providing a way to understand the reasoning behind a model's prediction, local explanation helps to build trust in the model and increase its overall effectiveness. *B.2. Global Explanation*:

It refers to methods that provide an understanding of the behavior of a machine learning model across the entire data distribution. The goal of global explanations is to provide a comprehensive and holistic understanding of a model's behavior, beyond just a single input or prediction.

Global explanations can be achieved through various methods, such as feature importance measures, modelagnostic interpretability techniques, and model-specific techniques. Feature importance measures provide a ranking of the most important features in a model, helping to identify which features drive the predictions the most. Model-agnostic interpretability techniques, such as partial dependence plots and individual conditional expectation plots, provide a way to understand the relationship between the model's predictions and the input features. Model-specific techniques, such as decision trees and rule-based models, provide an explicit representation of the model's decision-making process and allow for a stepby-step explanation of the model's predictions.

B.2.1 Feature importance measures: These methods provide a ranking of the most important features in a model, helping to identify which features drive the predictions the most. The most used methods include permutation importance, mean decrease impurity, and mean decrease accuracy [33].

B.2.2 Model-agnostic interpretability techniques: These methods provide a way to understand the relationship between the model's predictions and the input features, without relying on any specific model architecture. Partial dependence plots and individual conditional expectation plots are examples of model-agnostic interpretability techniques.

B.2.3 Model-specific techniques: These methods provide an explicit representation of the model's decision-making process and allow for a step-by-step explanation of the

model's predictions. Examples of model-specific techniques include decision trees and rule-based models.

B.2.4 Model-level explanations: These methods provide an overall explanation of the model's behavior, regardless of the specific input or prediction. Modellevel explanations can be provided through various methods, such as decision surface visualization, model predictions on synthetic data, and model predictions on an artificial validation set.

B.2.5 Model Distillation: Model distillation provides a way to understand the behavior of a complex machine learning model by training a smaller, simpler model to mimic the behavior of the complex model. By looking at the predictions and decision-making process of the student model, it is possible to obtain a global explanation of the behavior of the complex model.

Model distillation provides a holistic view of the model's behavior, as opposed to local explanations, which focus on the behavior of the model for specific input instances. The student model provides a distilled version of the complex model's behavior, which can help provide a better understanding of how the complex model makes its predictions and can be used to detect and address any biases or limitations in the model's behavior.

B.2.6 Representation-Based Approach:
Representationbased explanations refer to methods that explain the decisions of a machine learning model by focusing on the representations learned by the model. These representations are typically intermediate representations in the model, such as activations in a neural network, and can provide insight into how the model is processing the input data.

In representation-based XAI, the focus is on understanding the internal workings of the model by examining the learned representations. This can help to identify what features of the input data are being used by the model to make its decisions and how these features are being combined to produce the final prediction. Additionally, representation-based explanations can help to identify any limitations or biases in the model's behavior and to understand the general structure of the model's representations.

There are several methods for generating representation-based explanations, including activation maximization, occlusion, and gradient-based methods. These methods can be used to generate visualizations of the model's representations, such as saliency maps or activation maps, which can provide insight into the model's behavior. Additionally, representation-based explanations can be used to understand the performance of the model, debug the model, and improve its accuracy.

The methods that fall under global explanation in XAI cover a wide range of techniques and provide different perspectives on the behavior of a machine learning model. By combining these methods, a comprehensive understanding of the model's behavior can be obtained, increasing the overall transparency and interpretability of the model.

III. COMPARATIVE ANALYSIS

Comparative analysis of inherently interpretable and post-hoc techniques can be done based on various factors, such as the level of interpretability, the ease of implementation, the accuracy of the explanation provided, and the flexibility of the technique.

1. Level of Interpretability: Inherently interpretable techniques generally provide a higher level of interpretability than post-hoc techniques. Inherently interpretable models are designed to provide an explanation of the decision-making process at each step. In contrast, post-hoc techniques provide an explanation after the model has already been trained, and the level of interpretability may depend on the type of post-hoc technique used.

2. Ease of Implementation: Post-hoc techniques are generally easier to implement than inherently interpretable techniques. Inherently interpretable techniques require the model to be designed from scratch with interpretability in mind, which may not always be possible or practical. Post-hoc techniques can be applied to any trained machine learning model, regardless of the technique used to create it.

3. Accuracy of Explanation: Inherently interpretable techniques generally provide a more accurate explanation than post-hoc techniques. This is because the inherently interpretable models are specifically designed to provide an explanation of the decision-making process. In contrast, post-hoc techniques may rely on approximations or simplifications of the original model, which may not provide an accurate explanation.

4. Flexibility: Post-hoc techniques are generally more flexible than inherently interpretable techniques. This is because post-hoc techniques can be applied to any machine learning model, regardless of the technique used to create it. In contrast, inherently interpretable models are designed to work with specific types of data and may not be as flexible.

Both inherently interpretable techniques and post-hoc techniques have their advantages and disadvantages. Inherently interpretable techniques provide a higher level of interpretability and accuracy but may be more difficult to implement and less flexible. Post-hoc techniques, on the other hand, are easier to implement and more flexible but may provide less accurate explanations.

IV. TRADEOFF BETWEEN MODEL COMPLEXITY AND PERFORMANCE

The trade-off between model complexity, performance, and interpretability refers to the balance between these three factors in machine learning models. In general, more complex models tend to have higher performance, but lower interpretability. Conversely, models with simpler structures tend to be more interpretable but have lower performance.

For example, deep neural networks are complex models that are capable of achieving state-of-the-art performance on many tasks, but they are considered black-box models that lack interpretability. On the other hand, linear regression models are simple models that are easily interpretable, but they have lower performance compared to more complex models in many applications.

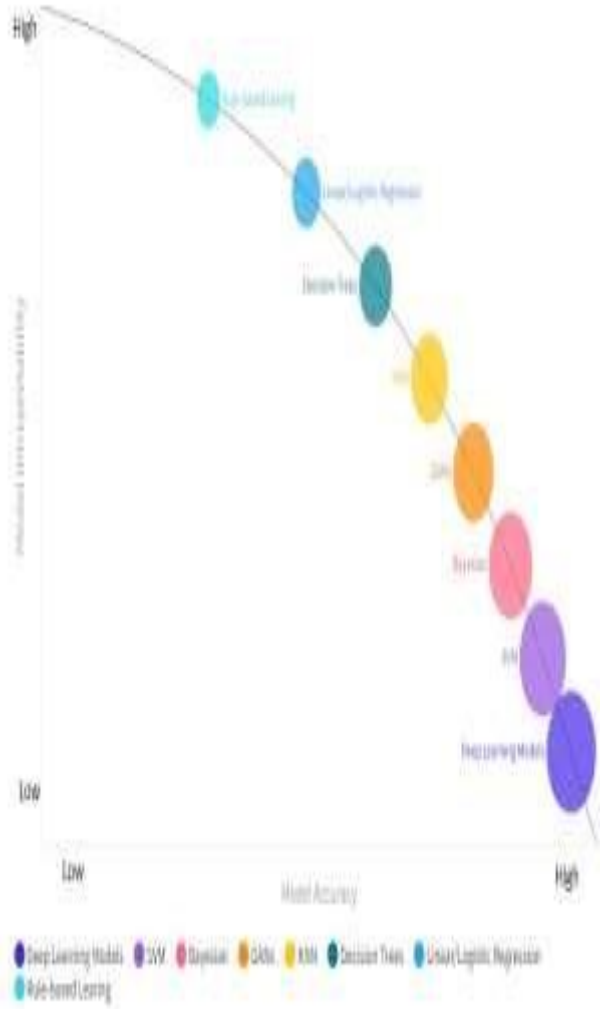

Fig. 1. Tradeoff Between Model Complexity And Performance

This trade-off poses a challenge in the field of Explainable AI (XAI), where the goal is to develop accurate and interpretable models. One approach to address this trade-off is to use post-hoc explainability methods that can be applied to complex models to make them more interpretable. Another approach is to use inherently interpretable models that balance model complexity and interpretability.

Eventually, the choice of model will depend on the specific requirements of the problem at hand and the trade-off between model complexity, performance, and interpretability that is acceptable.

V. CHALLENGES AND FUTURE SCOPE

Challenges associated with Explainable AI:

1. Trade-off between Explanation Quality and Model Performance: There is often a trade-off between the quality of explanations provided by XAI techniques and the performance of the underlying AI model.
2. Difficulty in Defining Explanations: There is no clear consensus on what constitutes a good explanation. Different stakeholders may have different criteria for what constitutes a satisfactory explanation.
3. Scalability: XAI techniques can be computationally expensive and may not be feasible for large, complex AI models.
4. Human Interpretability: The explanations provided by XAI techniques may not be easily understandable by human stakeholders, particularly if they are not experts in AI and machine learning.
5. Generalizability: XAI techniques that work well for one AI model or task may not work well for others. This makes it challenging to develop generalizable XAI techniques that can be applied across a wide range of AI models and tasks.

The field of Explainable AI (XAI) is a rapidly growing area of research that seeks to make artificial intelligence systems more transparent, understandable, and trustworthy. XAI is an interdisciplinary field that draws on knowledge from computer science, statistics, mathematics, psychology, philosophy, and other domains.

There are many exciting research opportunities in XAI that will help advance the field and make AI systems more accessible and usable. Some of the most promising areas of research in XAI include:

1. Improving explainability and interpretability methods: As AI models become more complex, it becomes increasingly difficult to understand how they make decisions. This lack of transparency can create challenges for the deployment of AI in critical domains and hinder its widespread adoption. Further research work is needed to develop new and improved methods for explaining the behavior of AI systems. This includes developing strategies that

provide explanations at different levels of abstraction and developing methods that are more intuitive and accessible to users.

2. Exploring the psychological and social aspects of XAI: AI models can encode biases and make unfair decisions, which can have serious consequences for individuals and society. Further research is needed to develop XAI methods that can help identify and address biases in AI systems. Researchers are interested in understanding how people perceive and understand explanations from AI systems, and how these explanations can be made more useful and usable.

3. Developing XAI for safety-critical applications: In critical domains such as healthcare, finance, and criminal justice, it is important to ensure that AI systems are transparent and trustworthy. Researchers are working to develop XAI methods that can provide safe and reliable explanations for these applications.

4. Integrating XAI with inference: Researchers are interested in exploring how XAI methods can be integrated with causal inference methods to provide more robust explanations for AI systems.

5. Developing XAI methods for autonomous systems: Autonomous systems, such as self-driving cars, require transparent and understandable explanations to ensure their safety and reliability. Researchers are exploring new XAI methods that can be used to explain the behavior of autonomous systems.

6. Combining XAI with active learning: Active learning is a machine learning technique that involves actively seeking information to improve the performance of a model. Researchers are exploring how XAI methods can be integrated with active learning to improve the transparency and reliability of AI systems.

7. Developing XAI for deep learning models: Deep learning models are highly complex and can be difficult to explain. Researchers are working to develop XAI methods that can provide meaningful explanations for these models.

8. Exploring the ethical and legal implications of XAI: As AI systems become increasingly widespread, it is important to understand the ethical and legal implications of their use. Researchers are exploring the ethical and legal considerations of XAI and developing guidelines for the responsible development and deployment of AI systems.

9. Improving the integration of XAI with other AI technologies: Researchers are exploring how XAI can be integrated with other AI technologies, such as reinforcement learning, to provide more comprehensive explanations for AI systems.

These are just a few of the many exciting research opportunities in XAI. As the field continues to grow, researchers will likely identify new challenges and opportunities for advancing the field of Explainable AI.

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An Exploratory Study On The Impact Of Digital Marketing And Innovations On E-Commerce Mechanism

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Abstract – **The banking sector is an important subset of our economy and plays a very crucial and significant part in its growth and development. The expansion and credibility of the banking sector are attributed to the fact that it caters to their financial needs and accordingly provides products and services to the customers. The innovation. Technology has brought about aparadigm shift in all aspects of banking like routine operations, transactions, products and processes, delivery ofservices in terms of various e- channels, credit administrationand credit management, audit and compliance and Fin Techspartnership. The study attempts to highlight the role of technology in banking and how technology-led innovations and initiatives will determine the business of banking as a whole. The significance of these technology- driven innovations and transformations is that they put both bankers and customers in a win-win situation. The objective of this study is to investigate the digital innovations adoptedby the Public Sector Banks and Private Sector Banks for e-commerce Practices in India. This study draws on existing literature in the form of scholarly articles annual reports of various Banks, Newsletters and various websites related to digital banking.**

Keywords: Digital Innovations (DI), Indian Banking System (IBS), Block Chain (BC), Artificial Intelligence (AI), FinTech.

I. INTRODUCTION

At Present, everyone desires a healthy, robust and sustainable banking system is critical for the growth and development of our economy. The banking system is the mainstay of our economy and Technology has become thebackbone of modern-day banking. The banking industry has witnessed a tremendous shift since 1969 after the nationalization of commercial banks. In 1997 ICICI bankwas the first bank to offer internet banking services. Since then, to survive in this competitive market almost every bank has shifted from paper-based banking to paperless banking, i.e., towards digital banking. The services provided by the banks to their customers create a huge impact on them. The success of the banks depends on thecustomer's attitude and perception, and satisfaction with theservices rendered by the banks. At present, there are 22 private sector banks and 12 public sector banks. Almost all banks are providing online service facilities. Nowpeople can do banking from anywhere at any time with very minimal cost. The development of electronic home banking has significantly necessitated the reorganization of banking services and operations. Digital modes have replaced the brick-mortar model of branches.

II. RESEARCH OBJECTIVES

a)To understand the changing digital scenario in the Banks in India
b)To examine the Digital Banking new trends and Innovations in Indian Banks.
c)To analyse the various Digital Banking Products and Services, Digital Banking Channels offered by Indian Banks.
d)To analyse the role of FinTech in Indian bankstowards digital transformation

Problem Formulation

Problem-1:-Use of various digital apps for providing digital innovation services to the customer in an efficient way core banking with secure and service

Problem: 2:-Providing various digital modes of service for better and safe digital banking which is innovative and preventive for money transfer and distribution

Hypothesis Development:

The researchers have taken two types of hypotheses for enhancing the digital innovation banking service in IndianBanking such as;
Ho: Null hypothesis has taken that, the digital Innovation mode of banking is not providing safe and secure banking service to their esteemed customer
H1: There is a need for use of a digital innovation mode of the banking system for a better banking service in Fin Tech areas of banking service.

III. RESEARCH METHODOLOGY

The Present study is exploratory, descriptive and based on secondary data. Secondary data and information havebeen collected from scholarly articles, annual reports of the selected banks, "RBI Report on Trend and Progress of Banking in India', 'RBI Working Group Reports, 'RBIBulletin, RBI Annual Reports, Reports published by various Sites of Government of India and various other Websites. For the present research work, various bankingjournals and other financial newspapers have also been referred to various studies on this area by several research agencies have also been considered.

IV. REVIEW OF LITERATURE

In the literature Review section, the researcher has to

trytheir level best for proving the authenticity of theresearch work reliably as related to the aforesaid research title "Role of Digital Marketing and Innovations on E-Commerce Practices - An Exploratory Study" henceforth, they have taken some of previous Authors research paper as a reference and trying to further extend the research work in a better way of study concerning the paper of Dr. Rajeshwari, M.Shettar (2019) [1]in his article entitled "Digital Banking an Indianperspective", focused on the benefits of digital banking. He also stated that the use of digital banking will reduce theoperating cost of the bank.

Ipsita Paria and Arunangshu Giri (2018) [2] in the article "A Literature Review on Impact of Digitalization on Indian Rural Banking System and Rural Economy" describe that digital banking has immense capacity to accelerate financial inclusion apart from offering the benefits of ease of operations and low-cost factor. K. Suma Vally and K. Hema Divya (2018) [3] in their article "A Study on Digital Payments in India with Perspective of Consumer's Adoption", highlighted that digital technology for payments system has resulted in the improvement of the quality of banking service leading to the achievement of the objective of cash-less society. According to S.V. Mohana Sujana, "Digitalization in the banking sector" (2018) [5] The paper focused on the role of digital banking, and the advantages and disadvantages of the online banking sector. Innovation is a crucial component for entities to generate value and offer competitive benefits (Tellis et al., 2009). Organizations adopt innovative models to reengineer their operations and increase their competitive strengths. Competitive advantage can be maintained by embracing innovation (Aydin and Dube, 2018). Innovation envisages the introduction of novel methods, new techniques, and reengineered processes to produce extraordinary results in the form of superior services and products (Oliva and Kotabe, 2019). So far as the word digital banking is concerned, 'Digital Banking' can be defined as the digitalization of various traditional banking operations and performance and processes that were earlier available to the customers by a visit to the bank's branch or ATM only. Digital Payments have been defined by the Payment and Settlement Act, 2007 as "electronic funds transfer means any transfer of funds which is initiated by a person by way of customers' mandate, authorization or instruction to their bank to initiate banking transactions by debit or credit to the bank account through electronic, online, internet, mobile apps and includes ATM, Point of sale, Card Payments, Direct deposits, transfers and withdrawal of funds." Digital Banking activities include online account/ fixed deposit opening, funds transfer, credit card payments, requests for cheque book, change/block pin numbers, Loan applications,bill payments and investments. Artificial intelligence is having a positive impact on the banking sector. The advanced presentations of AI and automation undoubtedly give useful skills. Language translation, chatbots, and virtual reality are just a few of the well-established claims, but many more are demonstrating a significant influence and effectiveness when used across industries [13]. (R. Goel, T. Singh, S. K. Baral,S. L. Sahdev & S. Gupta, 2022).

The history and evolution of Digital Banking are traced back to the 1960s with the launch of cards and ATMs. Developments of the World Wide Web and Internet Bankinghave also seen the simultaneous evolution of Digital Banking. Online Banking emerged in the 1990s. At that time, it was an idea, taking into consideration the securityand safety of customer financial data. The USA was the first country in the world to start online banking in October 1994.

Table-1: Digitalization in Banking

1980	• The mechanisation of Payment System Processes,Computerization • Standardisation of Cheques, Encoders, MICR Implementation and Minimal use of Bank Drafts and Cheques
1990	• Computerization of Branches, Expansion of Products and Services, Connectivity with other branches • Core Banking Systems, ATMs and ElectronicFunds Transfer, Online Banking
2010	• Internet Banking, Mobile Banking, Real Time Gross Settlement, National Electronic Funds • Transfer (NEFT) and National Electronic ClearingServices (NECS)
2011	• Emerging Financial Technology (FinTech), E-Collaborations with Fin Tech and Adoption of • New Technology, Biometrics and ChequeTruncation Systems
2012	• Rupay and National Automated Clearing House (NACH) Introduced by NPCI. Rupay-An Alternative to Visa and Master
2013	• Aadhar Enabled Payment System (AEPS)
2014	• *99# USSD Unstructured Supplementary Service Data
2016	• Unified Payment Interface (UPI), Bharat Bill Payment System (BBPS), National Electronic Toll • Collection System, Bharat Interface for Money(BHIM)
2017	• Bharat QR developed by NPCI, Master Card, Visa • Integrated Payment System - Money is transferred directly to the user's linked account
2018	• Release of RBI Report of the Working Group on FinTech and Digital Banking and Draft Enabling Framework for Regulatory Sand Box
2019	• RBI Payment System Vision 2019-2021 released
2020	• Availability of NEFT on a 24x7x365 Basis i.e., 16.12.2019

The Banking System in India has witnessed a radical transformation from the conventionalbanking system to the electronic banking system of convenience. Payment Systems in India keep on evolving from manual to electronic to digital banking with new emerging technologies and Innovations. It started in the 1980s with the need for Computerization, Electronic Payment Systems in 2010 and move on to Digital and Fin-Tech E-collaboration. Figure 2 reflects the timelines of the evolution and achievements of Payment Systems from the 1980s till date. RBI Payment System Vision 2018 was Infinity. India started adopting digital innovations in linewith innovations adopted by its global peers. ICICI Bank was the first bank to initiate the Internet banking revolution in India in 1997 under the brand name based on the four important strategic pillars ofrobust infrastructure, responsive regulation, customer centricity and effective supervision. The major achievements during this period, Customer focus started to shift from paper-basedclearing instruments like cheques, demand drafts

and pay orders which have a longer cycle of settlement of 3-4 days due to physical movement ofthe cheques from a place of deposit to clearing centre and then to the drawee bank for payment. Various Initiatives were taken by RBI, NPCI, Government of India and Banks in promoting different types of electronic and digital banking products such as:

- Real Time Gross Settlement (RTGS): An electronic and continuous transfer of funds on a real-time gross basis without netting. This payment system is used for high-value transactions above Rs2 lakh and the beneficiary receives the funds instantly
- Electronic Clearing Service (ECS): A retail electronic payment funds transfer system for transactions of bulk collection and payments which are repetitive. An ECS Debit andCredit transaction facilitates fund transfer from one bank to many bank accounts and many banksto one bank account.
- National Electronic Funds Transfer (NEFT): One-to-one nationwide electronic payment System where individuals, corporate, and firms can transfer funds to others having a bank account throughout India.
- Immediate Payment Service (IMPS): It is an arrangement which envisages instantaneous electronic funds transfer systems 24x7 between all the banks in India through ATM, Mobile and Internet
- Mobile Banking Mobile: Banking Services are offered 24x7x365 by banks to their customers through Mobile Applications via internetbanking or mobile data connection
- Card Payment System: Indian Customers are increasingly using Cards for shopping at point of sale, online shopping through the internet and mobile banking as compared to cash withdrawals at ATMs.
- Bharat Interface for Money (BHIM): An application for funds transfer on a Unified Payment Interface (UPI) for quick transactions of payments simply and easily. Customers can send and receive money through BHIM Application by using Virtual Payment Address i.e. UPI ID and Mobile number. BHIM transactions from NPCI Platform show that BHIM volume for the year FY2019-2020.
- ATMs and Point of Sales (POS): Numbers are also increasing. No. of ATMs and POS as of March 2020 is 210760 and 5137822 respectively. The amount of ATM transactions is 26769158 lakhs and POS transactions are 4764615 lakhs in 2019-20.
- Aadhaar Based Retail Payment Systems consist of Aadhar Enabled Payment Systems (Inter Bank) through Micro ATMs (e.g., Cash Deposit /Cash withdrawal) and APBS Credit (UIDAI number-driven Disbursement).

Clearing, Settlement & Payments	Lending, Capital raising & Deposits	Market Provisioning	Management of Investment	Risk Management &Data Analytics
Digital currencies Mobile and web-based payments Distributed ledger	Peer-to-peer lending Crowdfunding Digital currencies Distributed Ledger	Cloud computing Smart contracts e- Aggregators	Smart contracts Robo advice e- Trading	Artificial Intelligence, Robotics & Big data

Table-2: Significant Innovation in Fintech

Gomber et al. (2018) stated that Fin-Tech or digital innovations have played a pivotal role in transforming. The Indian Banking and Payment System is witnessing various new emerging technologies like Blockchain, Artificial Intelligence (AI), Robotic Process Automation (RPA), Biometrics, Chatbots, Machine Learning, and the use of Big Data and Predictive Analysis offered by FinTech Companies. Odinet, (2018) defined Artificial Intelligence as "AI is best understood as the overarching field that seeks to create complex machines that can exhibit all characteristics of real human intelligence". AI facilitates increased revenue, reduced costs, better compliance and higher profits. A Report by Accenture (2018) has pointed out that AI has the potential to add USD 957 billion by 2035 (1.3%of GDP) to the Indian economy. Thus, an illustrative use of AI by banks operating in India is presented in the table below

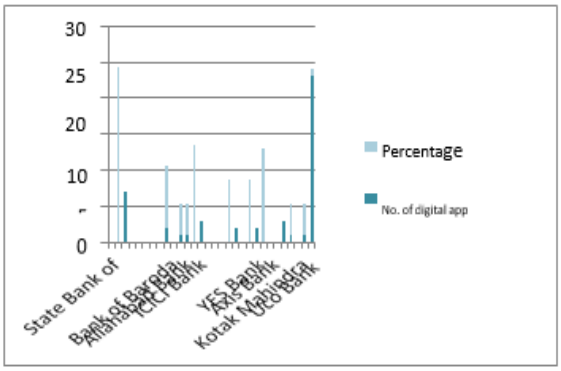

Figure 1: Application Usage in Banks

Table-3: Digital Apps in Banks

Name of Banks	No. of Digital apps using	Use of AI	Percentage
State Bank of India	07	➢ Partnered with Pay jo to launch SBI Intelligent Assistant (SIA) an AI-powered chat assistant designed to address customer enquiries ➢ Partnered with Hitachi for payment servicesthat will use the AI technology of Hitachifor SBI PaymentServices ➢ Utilizing IBM Watson to perform a variety of jobs ➢ AI-based solution presently in use developed by Chapdex. ➢ The chat assistant,known as SBI Intelligent Assistant, orSIA, will help customers witheveryday ➢ Deploying artificial intelligence (AI) in a big way to improveefficiency, detect human behaviour and reduce operational costs. ➢ Using AI and Robotic Process Automation(RPA) can help in making internal banking processes more efficient.	24.28
Bank of Baroda	02	➢ Using AI-empoweredrobot 'Baroda Brainy' ➢ Using AI solution by Quadratyx	8.70
Allahabad Bank	01	➢ Using AI-enabled app 'emPower' for e-commerce payments	4.35
Canara Bank	01	➢ Using humanoid robotMitra and Candi	4.35
ICICI Bank	03	➢ Using iPal, an AI-basedChatbot ➢ AI features such as facial and voicerecognition, bots etc are being leveraged. ➢ Deployed robotics ➢ software to ease over200 of its processes.	13.58
HDFC Bank	02	➢ Launched IRA 2.0, aninteractive humanoid ➢ 'Eva' is an AI-based Chatbot, developed by Sense forth AIResearch	8.70
YES Bank	02	➢ Using YES TAG ➢ Using AI solution byQuadratyx	8.70
Axis Bank	03	➢ Launched an AI-enabled app developed by Active AI ➢ "Thought Factory"- an Innovation Lab based on innovative AItechnology ➢ Solutions for the banking sector.	13.58
Kotak Mahindra Bank	01	➢ Using AI solution byQuadratyx	4.35
UCO Bank	01	➢ Using AI solution by Quadratyx	4.35
Total Bank-10	23		100%

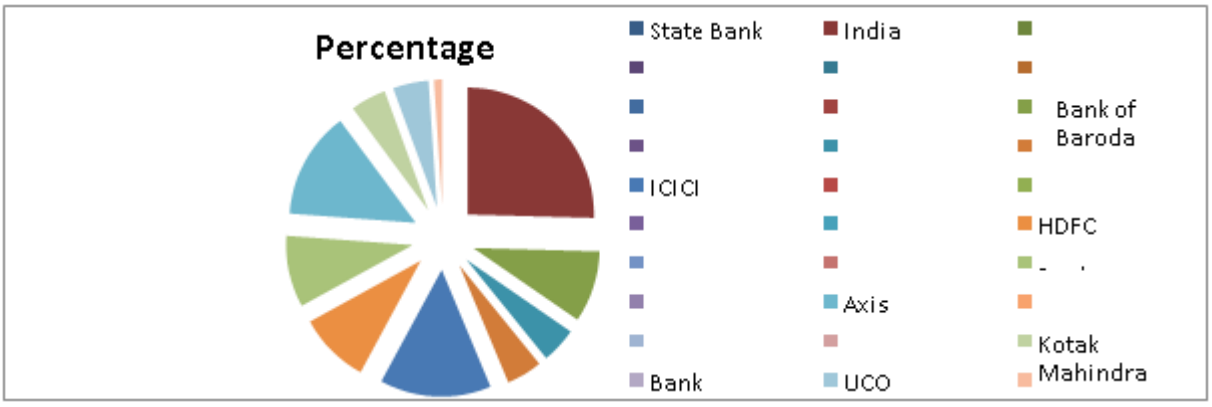

Figure 2: Semiotic models of Pie Chart for using apps by various banks and their percentage

a)

Data analytics – Data analytics techniques assist us totake raw data and uncover patterns to derive valuable insights from it. Several Indian banks like HDFC Bank, SBI, ICICI, Bank of Baroda, and Kotak Mahindra Bank have already initiated data analytics initiatives.

b) Cryptocurrency: It is a peer-to-peer (private) digitalsystem of payment with the transactions recorded in a public ledger using its unit of account.

c) Chatbots: It facilitates quicker resolution of customer-related issues. It is more effective than traditional methodslike email, phone etc.

d) Big Data: Big data technology aids in the analysis and processing of various transactions and data for extracting crucial information for sustaining competitive advantage.It helps in recognizing recent market movements andreorganizing operational issues and processes to manage risks.

e) Blockchain Technology: It holds the potential to influence various banking transactions like Trade Finance,Cross Border Payments, Digital Identities etc.Operational efficiency, simplicity, transparency and the customer experience in banking can be improved by the use of Black chain technology.

f) Cyber Security: Sometimes online transactions are susceptible to the risk of a data breach. Hence, banks need to strengthen cyber security in banking processes. Cyber security in banking transactions helps in protecting customer assets.

g) Robotic Process Automation (RPA): Robotic processautomation has streamlined back-office processes which used to be performed by Bank employees. With the shift from man to machine, banks have witnessed improvementin efficiency, cost reduction and manpower-related issues.

h) Cloud Computing: Rapid development of products and services is possible due to the adoption of Cloud Computing Technology. With the usage of Cloud Computing, services like Core banking, Net Banking,Mobile Banking, wallets and Card Management are handled properly. Productivity, performance and profitability can be improved by Cloud Computing. NASSCOM reports that the cloud market in India is also expanding and is expected to grow to $7.1 billion by 2022. State Bank of India has collaborated with Oracle and the Bank of Baroda has collaborated with IBM for an acceleration of Cloud Innovation in their respective Banks.

i) Distributed Ledger Technology (DLT): A distributed ledger is a database allowing the recording of the transaction of assets and their details in multiple places simultaneously. There is no central data store or administration functionality in Distributed Ledger Technology which is available in traditional databases.

j) Predictive analytics is used as a decision-making toolin several industries and disciplines, such as insurance, banking and marketing. Predictive analytics can provide a holistic view of the customer's journey with the bank and further help strengthen the relationship. Banks need to embrace the capabilities of data and analytics to improve risk modelling and fraud detection.

k) Machine Learning: Machine learning models can also predict which banking tools individual members might use and recommend them so that customers can make better financial decisions. These solutions can be used by banks for risk prediction, risk prevention, fraud detection, investments, investment modelling customer services, customer modelling, etc.

Artificial Intelligence (AI) Application is adopted in Machine Learning.

The emergence of New Emerging Financial Technology (Fin-Tech) & E-Collaborations a New Paradigm in the Indian Banking Industry:

According to the Financial Stability Board (FSB), of the Bankfor International Settlements (BIS), “FinTech is technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services”. All these products are having their existence in global finance, which with or without the intervention of a nodal intermediation agency, create an association between thelenders and borrowers, and share information between seekersand

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c) Digital Native, Intelligent, Social, connected (DISC)Approach - needs to be adopted by the banks today to understand customer context and provide fresh, agile and relevant digital solutions to consolidate their digital leadership. Merchant Acceptance and Infrastructure needto be increased both in rural and urban spaces.

d) Skilled Resources: Automation in the banking process through Digitalization, Artificial Intelligence (AI) andRobotic Process Automation (RPA) has brought about sociological challenges. Banks need to understand the impact on jobs and train the workforce with new IT skills,

e) Cyber Security Risks: The Centre for Software and IT Management (CSITM) in their study conducted at

IIM Bangalore has pointed out that one of the most important challenges in building trust among customers is cyber security risks. In their study, they have identified the potential risks in Digital wallets, specific bank apps for account holders, direct links with user’s banks, and basic USSD services. Other types of security risks are phishing,vishing, hacking, credit card fraud, cloning etc.

f) Lack of Technological Infrastructure: A countryrequires an adequate level of infrastructure to

adopt the appropriate technology and provide the necessary support for its growth and usage. However, theinfrastructures in India need to develop

V. OPPORTUNITIES:

a) New Innovative Product Design: Due to various initiatives taken by RBI, the Government of India and Banks in promoting digital innovations, there has been increasing adoption and usage of digital banking by customers. The new-age customers are aware of the benefits and ready for new digital solutions. Banks need to focus more on product design, service delivery, and customer support. Bharat Bill Payment, an Interbank Web-based Platform, an E-mandate part of NACH and a Digital platform for high-value electronic transactions are the proposed new launches by NPCI.

b) Better Regulatory Environment: Data Connectivity and the Spread of Smartphones have improved the digitalecosystem by providing an efficient and effective regulatory environment.

c) Leveraging the power of social media: Social MediaTechnology, Digital Assistants and third- party channels like Facebook, and Twitter for leveraging internal capabilitiesare likely to become the primary channels by 2022 apart from online and internet banking.

VI. HYPOTHESIS TESTING:

In the section of Hypothesis Testing, the researcher has taken several response models for justifying the hypothesis, therefore, they have taken 10 Banks of different branches with taken 500 Customers
from Bhubaneswar smart city, Odisha (India) (*Each having 50 respondents) with gender discrimination and different profession, Business, Cultivator, Govt, Service, Private service, Company Service etc. After obtaining the data will be presented in the appropriate data table and then classified thedata for its accurate analysis and interpretation thereon. Here, various response models are given for the reader's kind perusal and perception:
As per the aforesaid data table and mean value for female customers is 42.0 and for the male customer is 58.0 and the Meandifference between them is 16. 0, and the number of banks is10 d.f is (N-1=09).it is proved that more customers are preferred use of a Digital innovation banking system. Hence, the table contains critical values of the student's t distribution computed using the cumulative distribution function. The t distribution is symmetric so that $t_{1-\alpha,\nu} = -t_{\alpha,\nu}$.

Thus, the t table can be used for both one-sided (lower and upper) and two-sided tests using the appropriate value of α.

The significance level, α, is demonstrated in the graph below, which displays a t distribution with 10 degrees of freedom. The most commonly used significance level is $\alpha = 0.05$. For a two-sided test, we compute $1 - \alpha/2$, or $1 - 0.05/2 = 0.975$ when $\alpha = 0.05$. If the absolute value of thetest statistic is greater than the critical value (0.975), then we reject the null hypothesis. Due to the symmetry of the t distribution, we only tabulate the positive critical valuesin the table Thus the significance level at 0.1 level is 0.8186 and the 0.5 level is 0.8289, the obtained data is more than the table value, therefore the use of AI in Digital innovation in the banking sector is justified and the null hypothesis has been rejected and the alternative hypothesis is accepted due to its high significance and justified in both the levels of the significance level of 0.01 and 0.05 alpha level.

SUGGESTIONS & RECOMMENDATION

- Loss of data can be avoided by employing well-trend IT experts.
- Tough laws should be enacted for the cyber-attack.
- Workshops and seminars related to digital payments should be organized so that the common people and rural people can get the maximum benefits of bank facilities. Hence, Digital Banking Literacy programs should be runin rural and backward areas.
- Technology should be developed and expandedso that people from remote areas can also take advantage of it.

FINDINGS

- Digital innovations help in reducing operating costs and widening the customer base.
- Reports can be generated and analysed for various purposes at different points in time.
- It is the safer way to handle financial transactions and to prevent misuse of DBT under Digital Banking.
- The Indian Banking and Payment System is witnessing various new emerging technologies like Blockchain, Distributed Ledger Technology (DLT), Artificial Intelligence (AI) Machine Learning, Robotic Process Automation (RPA), Biometrics, Chatbots and the use of Big Data and Predictive.

LIMITATIONS

- The banking in India has been transforming itselfat a rapid pace, especially with the entry of FinTechcompanies and Payment Banks we can expect further changes.
- The public sector banks have been merging to create stronger entities than other Non-Banking Financial Companies (NBFCs) are also making forays into banking.
- One needs to keep an eye out by continuously examining the changing scenario over the next
few years.
- Digital Innovative banking has limited current players in banking so it will be prudent to include others also in the research.

CONCLUSION

In conclusion, we may conclude that the vision of the Digital India programme is to transform India into a digitally empowered society and knowledge economy. The above statistics and discussion show the rising trends in the adoption of digital innovations and new Fin Techemerging products. While there will always be challenges, opportunities also exist for those banks and

financial Institutions who are ready to innovate and offer more digital financial products to the customer. The Digital Payment Ecosystem with Fin Tech collaboration and global technology giants are acting as aggregators for retail transactions. Measurement of Digital Payments should be carried out at regular intervals to study and monitor the progress. The new emerging financial technologies in Indian Payment System will continue to be evolving, reaching global heights with regulatory compliance and risk management to achieve the vision ofDigital India. B y digital India Programme for ensuring better customer service thereby attaining the goal of a cashless economy. Both the Public Sector Banks and Private Sector Banks are moving towards technology-intensive customer services. With digital technology opportunities andchallenges, the banking industry is rising along with digital innovation. Digital banking has become more popular during the pandemic period of lockdown as related to the COVID- 19 effect.

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Digital Pharmacy In Industry 4.0: A Case Of Consumerbuying Behaviour Pattern Using Tam Model

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Abstract – **The research seeks to identify the elements of consumer purchase behavior to shop through digital or E pharmacy through social media influence in India: based on theoretical models such as Technology Acceptance Model. The persistent of this research is to determine the impact and relationship among the independent variables trust, perceived usefulness and perceived intention on online purchase of medicines through social media influence (dependent variables) . A structured questionnaire covered descriptive inquiries and qualitative questions to collect data from the 100 respondents from the different age groups pertaining to Indian context especially millennial using a structured, self-administered and internet mediated survey. The study is cross sectional which studies the relationship between variables and influence of the social media on the purchase of online medicines. The findings shows that there is positive relationship amongst the independent variables trust, perceived usefulness and perceived intention on the online purchase of medicines through social media influence but perceived intention comes out to be more important constructfor buying medicines online along with the trust.**

Keywords: ***Consumer, Buying, Technology,Government, Pandemic*.**

I. INTRODUCTION

After the outbreak of the unpredictable and ferocious pandemic in 2019 various verticals of ecommerce have seen an outrageous demand out of them is one excellently demanding and forthcoming online pharmacy market also known as digital or E pharmacy. Over the past decade internet has emerged as favorite market place for the consumers, distributors and retailers due to convince it provides along with it also helps incost cutting. From the perspective of an average consumer, they saw some products are suitable to sold online and some don't (Poop & Joseph; 2000) similarly it is evitable to study the consumer behavior and attitude regarding the online purchase of goods and services what motivates them, right type of advertisements etc. Researchers have focus on all type of patterns of behavior but there is a little emphasis given to the online selling of medications Rajama and Pelton (2009). Although it is due to the law which restricts and regulate the selling and purchase of medications online. Only fully legal OTC drugs, supplements and vitamins could be sold over the internet. But we saw some emerging e pharmacies like 1mg in India which is doing potentially well and have their greatest selling during the pandemic Digital marketing is the convergence of the digital revolution with pharmacy. It uses digital tools and technologies to improve business, practice andpatient care. We also use E pharmacy or online pharmacy as its synonyms. It is a platform which provides drugs in both lawful and unlawful manner. India's digital market is booming at a rapid speed with increasing number of Internet users , the total time invested by Indians is more than 17 hours in 7 days AK Jain (2020). Social media have catered a greater demand in the business market with huge number of consumers available on it. Social media marketing or SMM is a public entertaining platform which also works as great marketing tool. Social media marketing emphasis on the promotion and selling of the goods and services through various social media platforms, butit can be a time-consuming activity for businesses as one has to be consistent but it is a great place to understand consumer behavior. Advanced features like demographic of the user can helps the advertisers to segment their population and ads accordingly. Similarly social media marketing or influence could be great opportunity for the online pharmacy owners to sell drugs and reach out the potential customers with certain lawful regulations. SMM for e pharmacy helps in generating suggestions through paid promotions, as people visits moreon social media sites ads on it can increase the visibility of one's brand. It also helps in increasing customer loyalty. The best way of using the SMM is to run pilot testing where you can know about your consumer preferences at low costs. Despite the advantages of using Social Media Marketing for selling drugs online there are many rules and legal regulations which control the usage of e pharmacy. Asper the 2019 report there were approximately 8,50,000 pharmacy retailers or offline brick and mortar stores which counts for 99 % sales of drugs whereas online pharmacy contributes only 1% sale of drugs in India Sinha's (2019) . But after the outbreak of pandemic, increasing digital usage and awareness there is a potential increase seen the acceptance of online pharmacy among the government, investors as well as consumers. Unlike any e commerce store the concept of online pharmacy is very different due to the rigid rules and regulation. Healthcare is a serious concern not only in India but also globally. Moreover, the government cannot address the healthcare sector alone. Corporations should take the initiative and indulge in health-related sectors like blood donation camps, health camps, health activities, and policy implementation (Yadav, M., Singh, P., & Baral SK. (2022). In year 20005 the online pharmacy startups came together to make an IPA – Indian Pharmacy association which promises an ethical trade of medicines through online platform in India, there are other multiple laws by the government of India which regulates the online selling of drugs like Drug and Cosmetic Act 1940, Information Technology Act

2009 and the Indian Medical Act 1950. We can observe a positive shift towards online pharmacy due to the increasing chronic diseases and busy lifestyle of people. But due to the security and other reasons consumers are very slow to adopt to new online drugs but steady and slowly there will a major boost in the digital pharmacy. The preceding researcher's emphases on thevariables like trust, risk, and usefulness (Jan Savorc 2019) to study the consumer buying behavior directly on theonline purchase of medicines but with the ongoing pandemic and advancement of technology befits to study the influence of social media on digital pharmacy as increasing social media users as well as growth of social media marketing which conditionally helps to understand the consumer buying behavior.

OBJECTIVES OF THE STUDY

The study envisaged on the following objectives;

•To find the relationship and impact of trust on online purchase of medicines through social media influence

•To find the relationship and impact of perceived usefulness on online purchase of medicines through social media influence

•To find the relationship and impact of perceived intention on online purchase of medicines through social media influence

•To find the relationship and impact of social media influence on online purchase of medicines

LITERATURE REVIEW

As a consumer, all people are different from each other. One person may like a product or services which others may not like. Identification of consumer behavior and buying pattern of a product or service is an important tool to identify different factors affecting a consumer buying decision.

Researcher also confirms the connection between social media and consumer buying behaviour to purchase particular products. Ahmad Juwaini (2021) the research focused on the online transportation services through social media influence. The study aimed at finding the relationship between trust and intention to purchase services through social media marketing. Research showed the positive relationship between intention to purchase and social media influence, whereas there is no significant relationship between trust and intention to purchase online services. Dan-Cristian Dabija & Mónika-Anetta Alt (2021) Researchers shows the positive relationship between social media influencers and consumer decision making process.NASIDI, QARIBU YAHAYA and Hassan, Isyaku andFazil Ahmad, Muhamad (2021) the researchers showed the framework on meditating effect of social media with relationship between perceived usefulness, reliability on online shopping behavior. Mohamed Ibrahim, Osama & Ibrahim,Rana & Al-Tandem, Noor & RILEY, KAREN. (2020). Advanced usage of social media positively impacts the life of the pharmacists as they agreed that social media, text messages-mails used by them effectively improves patient communication, WhatsApp is the most used platform for communicating with the customers. Irshad, Madeeha & Ahmad, Muhammad Shakil & Malik, Omer. (2020). Remuneration as well as the social motivation impacts the consumer buying behavior positively and have a direct impacton their purchase decisions and indirectly mediated through trust Mekala, Rajanikanth. (2019) The study shows key factors for the success of e-commerce and social networking includes trust generated from the peers in the form of reviews and recommendations and perceived usefulness of the product andthe social networking sites. Radhakrishnan, Venkateswaran & Ugalde, Bernard & T., Rogelio. (2019) The use of social media and its tools helps the organizations in increased branding of their products and reach out the more segments of customers also increases the brand awareness. A. Chakraborty, Prabal & Satsangi lok. (2019) E pharmacy adds to the convenience for the elderly people by improving consumers experience suffering from chronic conditions who aren't able to reach the offline pharmacy or their children lives away from them. Ebrahim, Reham. (2019) SMM activities comprise only three dimensions; trendiness, customization and word-of- mouth. These attributes of social media marketing directly influence brand loyalty and indirectly influence brand equity mediated by brand trust. The study emphasis the role of trust and provide guidance toward measuring the effectiveness of social media marketing. Raina, Madhur; Srivastava, Mallika (2019) The researcher used technology acceptance model (TAM) and Self Determination theory (SDT) to study the intention of the consumers towards electronic healthcare. The research shows the poster relationship between intention to use internet and e healthcare. M. Rakibul Hoque, Yukun Bao & Golam Sorwar (2017) The researchers used the technology acceptance model, the study determined that perceived ease ofuse and perceived usefulness and trust ($p < 0.05$) were significant factors influencing the intention to adopt e-Health in developing countries. Kumar, Davinder & Kumar, Virender & Savarna,. (2016). Online pharmacy leads to minor financial losses with considerable legal and health hazards which changes consumers behavior towards purchase of medications online. Lack of personal touch, quality check and illegal traders also marks up to the dangerous and contaminated online pharmacy. Crilly, Philip & Kayyali, Reem. (2016). Pharmacists uses social media platforms especially Facebook to interact with the patience by providing them links to various health resources and giving compliance with tips of using the drugs and other products which promotes the meaningful health and consumer behavior changes Hoong Fong, Ng & Yazdanifard, Assc. Prof. Dr. Rashad. (2014) With the advancement oftechnology it is inevitable to separate the online World from social media and consumer behavior; there is no escape route from social media these days for both the individuals and the companies. In the digital stores where the consumers couldn't sense the products they purchase, due the lack of face-to-face communication and personal touch consumers usually develops low trust and perceived highlyelevated risk. Bell M, Douglas J, Cutts C (2014) It

isapparent that most of the social media users falls into the younger age bracket whereas the people with long term health conditions typically doesn't active on social media which is major drawback for the online health platforms. Bell, Maria & Douglas, Janet & Cutts, Chris. (2014)Disciplines like medicine information

,safer usage, usage in chronic diseases , evidence based guidelines in area there is an uptake and use of social media platforms used by the health care industry for increasing and improving thepatience outcomes Jeff Cain (2010) The familiarity of social media to public and its economical nature along withthe ability to distribute information rapidly creates an opportunity for the pharmacists who wanted to provide innovative heath care facilities both at individual and publiclevel.

RESEARCH METHODOLOGY

A structured questionnaire covered descriptive inquiries and qualitative questions to collect data from the 100 respondents from the different age groups pertaining to Indian context especially millennial using a structured, self- administered and internet mediated survey. The study is cross sectional which studies the relationship between variables and influence of the social media on the purchase of online medicines. Sample was selected

based on convenience sampling, sampling the frame was difficult dueto time and financial constraints. Internet is used to distribute the survey seems to be sensible for the research during the pandemic. The research potentially covers the social media users who are online consumers, reduces the uninformed occurrence of responses. There are defined hypothesis prominent to 4 variables which are defined under the table-1. The hypothesis is framed based on technology acceptance model (Figure-1). It aims to examine the relationship between independent variables online trust, perceived usefulness and perceived intention on the online purchase behavior of buying medicines online through social media influence (dependent variables). These variables are defined based on TAM and existing theories applied to the specific situations. (TAM; Davis, 1989) known as technology acceptance model is considered to be themost influential model of technology acceptance despite of the criticism it faces, it focuses on two factors which influences the individual's intention to use new technology: perceived ease of use and perceived usefulness. TAM forecasts individual adoption of technology and its voluntary use (Rupak Rauniar,2012). It focuses on the technology users and how theycan adopt to the new technology.

The main objective of this model is to emphasis on the potential of the users. The two major constructs use in the model are perceived usefulness and perceived ease of use. The TAM has been continuously studied and also has been expanded and upgraded (Venkatesh & Davis2000) it has also been used in the ecommerce context with inclusion of trust and perceived risk. (Venkatesh & Bala 2008). Reliability is checked by Cronbach's Alpha using Microsoft Excel 2010 further regression analysis is used to determine the relationship between variables.

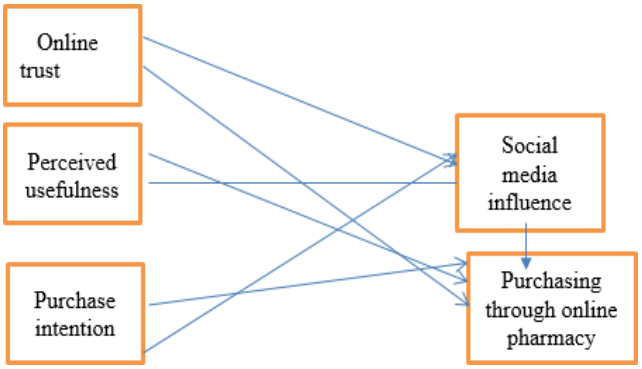

Fig.1. Technology Acceptance Model

Table 1: About the Key Constructs

CONSTRUCTS	DEFINATIONS	REFERENCES
Online Trust (TRUST)	A significant factor determining successful online interaction predicting the behavior of an entity and selection of anentity	(Mark Perry ,2010)
Perceived Usefulness (PU)	Consumer behavior is determined by their attitudes towards the Adoption of technology i.e., perceived usefulness andperceived ease of use while interacting during the online transactions	(Barki, 2007 Renko, 2015) (Eagly and Chaiken
Purchase intention(INT)	Aperson's commitment, decisionsandplans to carry out	

Hypothesis Development

Rajković 2021 shows that social media can help in building trust among consumers and towards the business. The researcher showed the positive relationship between trust and an intention to purchase. Researcher also confirmsthe connection between social media and consumer buyingbehaviour to purchase particular products.

H1 There is a positive effect of trust on social media influence

H1A There is positive relationship between trust and online purchase of medicines

Nasidi, Qaribu Yahaya and Hassan, Isyaku and Fazil Ahmad, Muhamad (2021) the researchers showed the framework on meditating effect of social media with

relationship between perceived usefulness, reliability on online shopping behaviour. M. Rakibul Hoque, Yukun Bao& Golam Sorwar (2017) The researchers used the technology acceptance model, the study determined that perceived ease of use and perceived usefulness and trust($p < 0.05$) were significant factors influencing the intentionto adopt e-Health in developing countries.

H2 There is positive effect of perceived usefulness on social media influence

H2B There is positive relationship between perceivedusefulness and online purchase of medicines

Irshad, Madeeha & Ahmad, Muhammad Shakil & Malik, Omer. (2020). Remuneration as well as the social motivation impacts the consumer buying behavior postiviley and have a direct impact on their purchase decisions and indirectly mediated through trust

H3 There is a positive effect of purchase intention on social media influence

H3C There is a positive relationship between purchase intention and online purchase of medicines

Crilly, Philip & Kayyali, Reem. (2016). Pharmacists uses social media platforms especially Facebook to interact with the patience by providing them links to various health resources and giving compliance with tips of using the drugs and other products which promotes the meaningful health andconsumer behavior changes Hoong Fong, Ng & Yazdanifard.

H4 There is positive effect of social media influence ononline purchase of medicines

More than one item is defined for some variable. All the variables are opinion variables measured on 5-point likert scale(1 strongly disagree to 5 strongly agree). Demographic information like age and income has multiple choice options to categorize from whereas gender category follows simple scale(dichotomous male/female). The ethical issues are taken care of at all stages of research by keeping anonymity and confidentiality with the volunteering nature. Due to social media influence the more emphasis is given to the social media users and millennial with no information.

RESULT & ANALYSIS

More than one item is defined for some variable. All the variables are opinion variables measured on 5-point likert scale (1 strongly disagree to 5 strongly agree). Demographic information like age and income has multiple choice options to categorize from whereas gender category follows simple scale (dichotomous male/female). The ethical issues are taken care of at all stages of research by keeping anonymity and confidentiality with the volunteering nature. Due to social media influence the more emphasis is given to the social media users and millennial with no information harmful is asked to fill in the questionnaire, there was no financial reward given tothe respondents. Since the Cronbach's alpha value of the whole questionnaire comes out to be 0.879 i.e., 88% which comes outto be very good and the data stands reliable because the benchmark is 0.70 i.e., 70%. Therefore, we can move forward with our data collected from 100 respondents. The resultsbelow were derived from reliably test or Cronbach's Alpha testwhich was applied on the data using Microsoft Excel 2010. Thevalue of alpha in each case was reliable as it was above 0.70 0r70% and can be further used for the study

Male respondents are higher than the female respondents, more respondents are between the age 18-24 and are

active social media users. The income is distributed evenly and 23% of the respondents prefer not to disclose their income. correlation of single determination shows 0.681293 which is 69% of variation in trust on the social media influence can be explained by the regression similarly 40% of variation in perceived usefulness on social media influence and 52% of variation in perceived intention on social media influence can be explained the simple regression analysis. Whereas social media has direct and positive relationship or impact on trust ($p<0.05$), perceived usefulness ($p<0.05$) and perceived intention ($p<0.05$) thus H1, H2 and H3 are supported. Due to less variation the data doesn't shows much higher correlation between the variables. Similarly, there 85% of variation in trust on the online purchase of medicines can be explained by the regression analysis, 79% of variation in perceived usefulness, 88% of variation in perceived intention and 76% of variation social media influence on online purchase of medicines can be explained by the regression analysis. Online purchase of medicines has direct and positive impact on trust ($p<0.05$), perceived usefulness ($0.05>p$), perceived intention ($p<0.05$) and social media influence ($p<0.05$) thus H1A, H2B, H3C and H4 stands supported.

CONCLUSION AND RECOMMENDATIONS

Correlation analysis shows the relationship between all the variables and hence found the six-hypothesis supported. Regression analysis also supported and found out all the constructs statistically significant predictors to know the impact of social media influence on purchase of medicines online or the use of digital pharmacy. Purchase intentions of the consumers towards online pharmacy has a larger effect along with the trust. But it is significantly true that with widespread of social media users SMM have great impact and opportunity for the digital pharmacy to study their consumer behavior, needs and wants. The research also contributes to the existing studies as it uses the researchers' patterns through internet toolsto know the consumer behavior towards the smaller segmentation of pharmaceutical products. The research applied Technology Acceptance Model a theoretical model with general validation. The research is unique under the online shopping of medicines through social media influence can be knowledgeable and resourceful for the existing literature contributing to study different constructs towards the digital pharmacy and consumer behavior. Our discoveries give a few important experiences to the buyers to acknowledge thee- drug store by utilizing online media impact. E-retailers and administrators completely comprehend the significance of web-based media impact during the time spent

presentinge-drug store; such firms ought to promote their meds and grandstand the utilization of meds on various online media which can fulfill the buyers' requirements. Findings of the research suggests that more people are becoming aware of the social media and Millennial are the active users of different social media platforms and Trust is one of the importance factors impacting the online purchase of medicines along with the intention to purchase due to the pandemic. Most importantly it is recommended to the e- sellers to focus on the factors which authentically shapes and attracts online consumers like the type of advertising, benefits, loyalty programs etc. Trust can become one of the major factors which hinders the online purchase process, e-pharmacy should focus on the authenticity of the consumer data and also following all the norms, rules and regulations provided by the Government and medical authorities. Perceived usefulness and socioeconomics are the progression forward towards internet purchasing conduct through online media impact, so the perceived usefulness and socioeconomics are impacted by the web-based media input posted across various societies which sway internet purchasing conduct of medication (e-drug store). The impact of perceived usefulness on goal in past investigations have been differed, either with huge (Chen and Tan, 2004; Pavlou, 2003) or immaterial (Chen et al., 2002; Shan et al., 2005) effects on purchasing behavior.

LIMITATIONS OF THE STUDY AND FUTURE SCOPE

The findings of the research should be taken with some limitations. First of all, only Indian residents were surveyed,which means that the results can be applied in India, but care must be taken in application anywhere else due to the cultural background. Other issue is that respondents came mostly from Delhi, capital and Delhi NCR, which is more cosmopolitan that the rest of the state. This may affect the obtained responses as city residents tend to adopt more quickly new trends. The study doesn't cover the true rural population, which may bias the results.

There are several recommendations for the future researchers to study the consumer behavior and pattern towards purchase of medicines online not only by the social media influence but other influences like EWOM and more. Researchers can study different variables or constructs to determine the consumer behavior towards digital pharmacy. Also, other variables like perceived ease of use, innovations, shopping attitude of the consumers along with the risk should also be studied as proposed by different theoretical models. Last but not the least population outside Delhi should be studied with the probability sampling covering the rural population also.

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Mobile Security Operation Centre (mSOC)

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Abstract – **Attacks on the internet are becoming increasingly threatening. For naïve home users, who are poorly protected, there is always an imminent danger of getting cyber attacked.**

This paper is aimed to design and build an IoT-based Network Security device that would run as an access point for users to connect to the Internet in a home setting. The paper discusses a standalone perimeter security solution with Incident Response (IR) life cycle management and controls through an IoT device – Raspberry PI. Enterprise-level features such as Next Generation Firewall (NGFW), Network Intrusion Detection System (NIDS), Domain Control for Ad/Spam blocking, Security Information and Event Management (SIEM) for Log Co-ran System on Chip (SoC), which can be installed anywhere and carried for mobile operations. Hence, the name, Mobile Security Operation Centre (mSOC).

This solution intends to protect the user when browsing the internet and blocking or providing visibility to the malicious connections being made to or from users. The mSOC can perform domain filtering based on whitelist/blacklist and Regex Pattern. It can also identify the domains that are blocked or allowed. It also provides visibility to traffic, application statistics, and IP reputation. IP reputation and Malicious Domains then can act as input to the iptables for L3/L4 blocking. A Software User Interface is developed to integrate and manage multiple Open-Sourced applications like dnsmasq/ elk/ graylog/ SQlite3/ Iptables/ adminlte as a single product that could serve as a complete security solution for a home or Small Medium Business (SMB). Thus the proposed solution secures naïve users from security exploitations.

*Keywords**: Internet, NIDS, IoT, NGFW, Raspberry Pi, SIEM.***

I. INTRODUCTION

The number of Internet users worldwide had increased to 5.95 billion in 2022, with the internet penetration rate reaching to 62.5% of the world's total population [1]. The num- bers provide a valuable context for digital adoption and growth. With this digital growth, new cybersecurity issues are constantly emerging, with new viruses and mal- ware being discovered daily. To prevent future attacks, it is important to know the most common types of attacks and their causes.

While organizations have the budget and resources to protect users from cyber threats, individual users lack the resources and skills to protect themselves. Among the top at- tacks on home internet users, 9% of malware were emails and more than 80% of re- ported security incidents were phishing attacks. Spam accounts for 14.5 billion mes- sages globally per day. In other words, spam/phishing makes up for 45% of all emails, of which at least 20% of home users fall victim to [2]. The most common attacks are phishing, whaling, malware, social engineering, ransomware, and Distributed Denial of Service (DDoS) attacks

Most of the technology deployment involves the protection of assets in an organisation. However, the studies show that it is not just the organisations that are prone to cyber- attacks, but everyone connected to the internet is vulnerable.

There is limited literature available on the implementation of IoT-based security solu- tions for Small Offices/Home offices (SOHOs) and Small and Medium Enterprises (SMEs). Feasibility studies of implementing Raspberry Pi-based Domain Filtering, SIEM, and IP reputation for SOHOs and SMEs are hardly available in the extant liter- ature.

The need for security is at the forefront today for all. Constructing a smart home brings convenience yet it comes with the demands of securing sensitive areas that contain a wide range of IoT devices. With the increase in cybercrimes, network security is a must-have for businesses and SOHOs. For users to work from home, employees must constantly be linked to the home network to work. As a result, home network security must be updated, vulnerabilities minimised, and additional security implemented. The number of IoT devices that may connect to the home network is also considered to boost security since the network is the primary entrance point for hacking IoT. In a study done for RPi as a packet analyzer and honeypots [3], RPi has been utilised as a low-cost, power-efficient, and practical home network security system, including IDS Suricata, several honeypots, and a tshark packet analyzer. When the system is running, the device performance is also measured. The ELK stack is used to display log data from the four sensors.

RPi-based security solutions can take on the event of a data breach [4]. It is the hard- ware that supports Debian based OS which provides utility features like Vulnerability Analysis, Network Analysis, Security Policy measures, Firewall, DNS and DHCP Server, and a proxy to route and filter the traffic. The main priority of small companies is to protect the data. However, making a one-touch security solution is extremely dif- ficult with a restricted budget. The company's credibility and reputation are in danger if they disregard security. This cannot be solved with a mostly one-touch i.e., an expen- sive system that is costly for a small business. The intended solution considers the needs of such an organization. This cost-effective solution can be viable for a small organism- tion.

RPi-based Invasion Detection Systems use open-source code to detect intrusions on SOHO networks [5]. Some of the malware looks for fields such as port numbers and packets that are encoded especially, but snort IDS can detect files that contain Malware embedded codes. Small Office Home Office (SOHO) networks, use some Intrusion Detection Systems (IDS) that can be activated to monitor possible attacks. Intrusion Detection Methods (IDM) are a convenient, in-home, inexpensive form of network se- curity. Visible IDMs use software and hardware implementations to packet filter, sig- nature-based detection programs, to detect cyber-attacks in real-time, or to record in- formation and then send it to 24 hours online reporting service.

Senior management must always be aware that the security specialist at the company is useful in implementing a virtual security stack; however, the basic premise of their se- curity service must be economically developed since the budget is limited and RPi can be used as a low-cost option [6].

There is an ever-increasing need to make our networks more secure and to ensure against breaches, leaks, and risks from bad Internet actors. Adding security features to homes connected to the cloud can make it more stable, with minimal downtime. Mod- ern-day insecurity has many risks; cybercrime, hacking, network attacks, and Distrib- uted Denial of Service (DDoS) [7]. Therefore, the authors have produced this guide for a secure home network. It provides an overview of using an Intrusion Detection System IDS, network security system, network intrusion prevention system, or IT security de- vice. The hand-held device is used by a guardian to check an area and to keep an eye.

Another study tested the performance of Raspberry Pi in context to network perfor- mance, latency, throughput, and CPU and memory usage. The study presents a design for a Snort-based IDS device that was implemented on the RPi 3. Sniffer Protocol is also utilised to examine network traffic, and the SHA3 technique is employed to gen- erate the hash value regularly [8]. There are five types of assaults implemented in this paper: RDP Brute Force, ICMP flooding, SMTP Brute Force, SYN Flood, and Web Phishing. 'htop' utility was used to do performance testing, and 'sha-sum' program was used to run the test vector method. The Raspberry Pi detected 100 per cent of threats with less than 50 per cent CPU and 10 per cent RAM. As a result, the system may be used on home networks as a viable and low-cost alternative for implementing cyber-crime security.

A novel solution like mSOC – Mobile Security Operation Center based on IoT devices like Raspberry Pi can provide a Web-based user interface to configure domain filtering, IP reputation, traffic filtering, and Data Visualization.

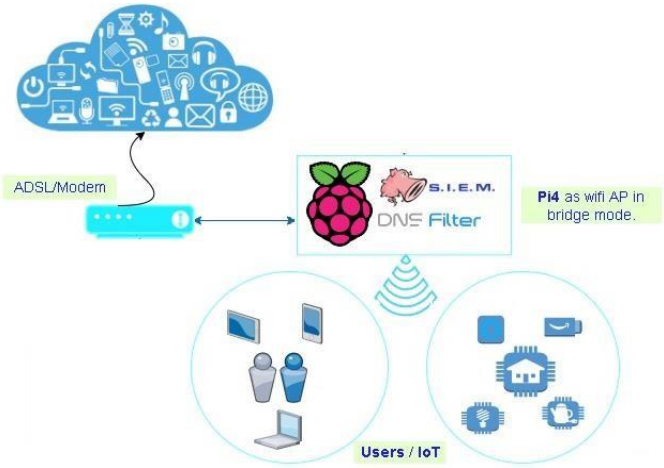
1 Solution Phases

The objective of the study is to secure home users with IoT devices like a Raspberry Pi, customised to provide a security solution. This study mimics the basic SOC – Security Operational Centre functionalities at the home level and controls at the fingertips of the user.

At its core, mSOC will be a small, portable device, pre-packaged with the functionality of mSOC. The device could be seamlessly deployed anywhere (called as Plug & Protect): As shown in Fig. 1users in a smart home could use it to protect their smart objects. It is effectively a portable, on-demand, device that protects users from attacks or suspicious activities.

Fig. 1. mSOC Solution

This solution involves developing a complex system with the following requirements in mind:



a. Portability: It is small enough to be able to carry the device and secure them wherever required.

b. Minimum configuration: The device should require limited configuration and default protection enabled.

c. Frontend Software Application Development: Develop a user interface to manage and control SOC functionalities.

d. UX and Data Analytics.

2.1 MSOC – Tools Integration

In the primary stage, open-source applications were selected and scoped for mSOC solutions. The scoped application modules are studied to be supported on the ARM CPU architecture and compatible with Raspberry PI Hardware limitations. Based on the research and tests, Open-Source modules in Fig. 2, SNORT- as NIDS, dnsmasq – as Domina Filter, Graylog – as ELK for SIEM, Linux IP Tables – as Unified FW con- trols, SQLite – as DB, were concluded.

Fig. 2. Modular Stages

mSOC is developed with the following features:

a.Domain Filtering: Filter domains based on a blacklist, and whitelist. Support Regex-based filtering

b.NIDS: Snort IDS for traffic visibility, app identification, and IP Reputation check.

c.SIEM: Analytics and Data Visualization of Domain/IDS logs. Geo-Location information of CPE

d.IPtables: To block traffic based on L3 and L4 filters.

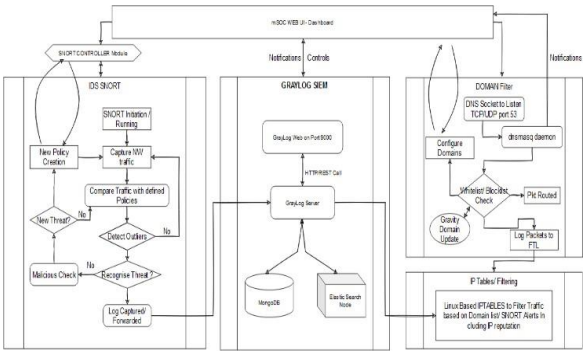


Fig. 3. Software Architecture

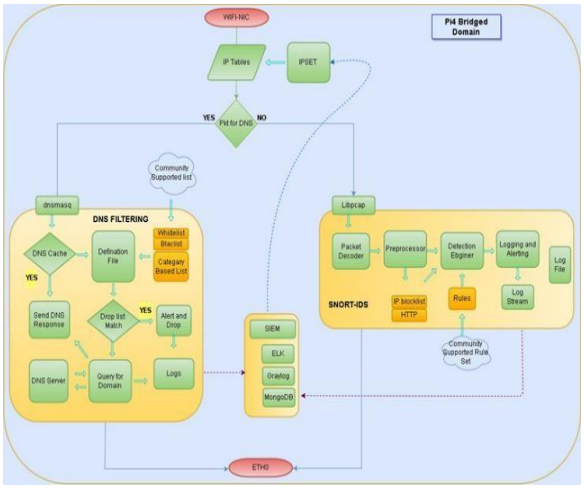


Fig. 4. Modules and Packet Flow

2.2 MSOC – Control

The second stage was a development of a Web-based Graphical User-interface that co-relates all the available data and showcases these raw data into useful information on a single dashboard – Operation view, as shown in Fig. 3. Web UI also helps integrate and manage all modules as one entity.

a. Domain Filtering Configuration and Management

b. SNORT rules management

c. Domain Filtering log correlation and Analytics

d. System Management and Monitoring

Each module in Table 1 is developed on a PHP framework to edit and manage individual applications.

Module Name	Module Function
Message.php	Manage Notifications
Adlist.php/ domains.php	Manage ad list & domains to filter.
Networks.php	Showcase real-time network mapping ofclients
Debug.php	Helps to display debugs logs on web UI
snort_rule_manager.php	To manage snort rules and controls.

3.3 Iptables & Ipset: Stateful Firewall.

The Linux kernel has a packet filtering capability to control inbound/outbound and transit traffic using the iptables utility. Iptables provide L3 and L4 firewall filtering solutions that can be easily managed and configured.

Iptables is particularly well-suited for Linux-based firewalls. It can filter traffic based on L3 and L4 information, it can also check if there is an existing connection bypass for further filtering to reduce the processing overhead. We can use IOC feeds to apply to iptables, but the feed can have thousands of IPs, which can affect system per- formance. In combination with iptables, we can use an ipset list that can have thousands of IP or port combinations, and this single ipset list is called in iptables. Lockup with ipset is very fast as IP address and port pairs as saved in the hash. This provides the ability to block thousands of IPs with one iptables rules without much impact on per- formance. Iptables rules are saved in /etc/iptables/rules.v4. There are four ipset lists are created, which are further mapped to the main ipset list called in the iptables drop rule.

3.4 Web UI /Dashboard

Front-End web page design and structure were developed to enhance the users' experience. Striking a balance between functional and aesthetic design with seamless smartphone capability.

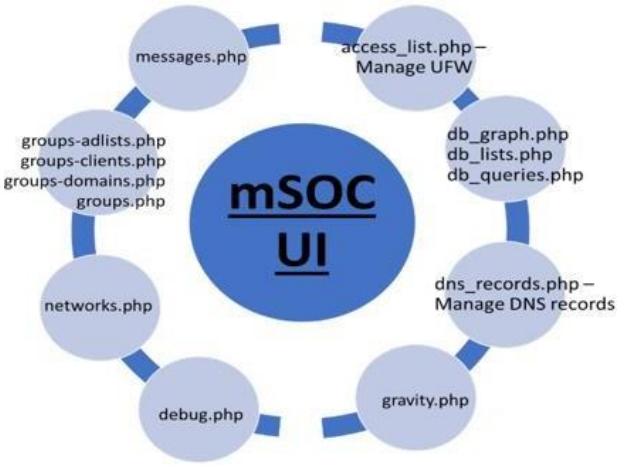


Fig. 6. UI Interactions

Open-Source Code Adminlte [10] was re-used to achieve a better user experience in the dashboard showcasing Timeline, Pie charts and Bar charts etc., Web pages are opti- mised for best speed and scalability by employing a diverse selection of markup languages to design web pages including HTML, CSS, JavaScript, and jQuery.

Back-End development is done on PHP; all the web pages are directly called on click this helps us to reduce overhead by eliminating pre-defined frameworks. For Web Hosting lighttpd daemon is used to handle HTTP requests. All the associated PHP files are shown in Fig. 6.

access_list.php, auditlog.php, cname_records.php,

db_graph.php, db_lists.php, db_queries.php, debug.php, dns_records.php, groups.php, network.php, queries.php, queryads.php, settings.php, taillog-FTL.php, taillog.php

Lighttpd (pronounced /lighty/) is a secure, fast, compliant, and very flexible web server that has been optimized for high-performance environments. lighttpd uses memory and CPU efficiently and has lower resource use than other popular web servers. Its advanced feature set (FastCGI, CGI, Auth, Output-Compression, URL-Rewriting and much more) make lighttpd the perfect web server for all systems, small and large. lighttpd is released under the Open Source revised BSD license

AdminLTE is a fully responsive administration template based on the Bootstrap 4.6 framework and also the JS/jQuery plugin. This is a highly customisable and easy-to- use template and fits many screen resolutions from small mobile devices to large desktops. Table II captures all the possible plugins that are being used to develop the frontend web application.

Table 2. Open-Source Plugin

Used For	Plugins
Charts	ChartJS, Flot, Sparkline, uPlot
Editors	Summernote, CodeMirror
Form Elements	Bootstrap Colorpicker, Bootstrap Slider, Boot- strap Switch, Date Range Picker, Dropzone JS, iCheck Bootstrap
Icon Packs	FontAwesome 5, flag-icon-css
Table Grids	DataTables, jsGrid

4. Conclusion and Recommendations for Future Work

At the core of our proposal stands a Raspberry Pi equipped with DNS filtering, Snort IDS, IP-Filtering, Data Analytics, and a Single pane of glass to manage the solution. This study argues, that our architecture, based on a commodity device such as the Raspberry Pi, can perform as a security operation centre, dashboard, single window control management, and integration of multiple open-source applications.

To support our claims, we carried out tests involving Raspberry Pi acting as an Access Point, analysing and filtering different types of network traffic from connected devices and users. Additionally, this study experimented with a different configuration, namely an App Detection engine, DNS filtering-based opensource database, and the number of rules loaded.

Our experiments' results show that the Raspberry Pi is capable of hosting all modules of mSOC, making RPiDS a feasible solution. Surprisingly, RPi4 can handle the demanding resource requirements of the mSOC module without overwhelming CPU and RAM. In the further scenario of testing, a family of 4 with multiple IoT devices connected to mSOC with high data rates, and memory never reached 100% utilisation. Still, experiments with networks bigger than a smart home are needed to better grasp the true limits of the Pi4+mSOC, for application in SME use cases.

In the future, this study plans to evolve User Interface, Data Correlation, and Data Analytics and move them to the cloud. RPi4 will run as an edge device managed centrally from the cloud or mobile app.

Additionally, this study intends to add features like Zero Touch Provisioning, IoT devices detection & Segmentation, and URL filtering.

5. Acknowledgment

This study would not have been possible without Dr. Shinu A, Mr. Sandeep Vijaya Raghavan, and Dr. Rashmi Agarwal, whose guidance from the initial step of research enabled us to develop an understanding of the subject. I am thankful for the extraordinary

experiences she arranged for me and for providing opportunities for me to grow professionally. It is an honour to learn from Mr. Sandeep Vijaya Raghavan and Dr. Shinu Abhi.

I am extremely thankful to all my faculties Associated with REVA University for their noble guidance, support with full encouragement and enthusiasm.

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Mental Health Analysis using Deep Learning on Social Media Data gathered using Chrome Extension

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Abstract – Recently the topic of 'mental health' has gained high awareness, especially among younger generations. The age group that mostly gets affected by mental disorders is between 15-49 years of age. Research conducted on different social media data has found that a person with mental disorders (such as depres- sion, anxiety, etc) tends to use social media more as compared to a mentally healthy person. Most users convey their emotional states through posting on public platforms, tweeting and accordingly watching related videos on YouTube that best describes their current mental state. It is also found that there is a difference in users' social media activities (on Facebook, Twitter, and YouTube) with a healthy mind and one with an unhealthy mind. A study conducted in 2018 found that 45% of teenagers worldwide are constantly using the internet. According to research, teenagers use the internet on average for about nine hours each day. The internet can prove to be the easiest medium to monitor a person's online activities (such as posting on social media, writing emails, watching or liking YouTube videos, commenting on YouTube videos, etc). The aforementioned activities and the internet usage time of a person can help to understand his/her mental state. The user's social media activity can be analysed for finding potential patterns in his emotions/mood. These patterns can be helpful in uncovering underlying mental health issues such as depression, stress disorders, PTSD, schizophrenia etc. These findings can be reported to the user's therapist for their monitoring record. To predict the mental state of the user by analysing their social media activities, an initiative was taken to develop an application with the objective to forewarn its users of any negative patterns regarding the state of mind that they exhibit. This application makes use of the Bidirectional LSTM algorithm, a deep learning method to identify a user's emotions (one among the 6 defined emotions) and stores it for further usage. This application feeds the user's data retrieved by the Chrome extension from 4 sources i.e. Twitter, YouTube, Gmail and Journal, to the trained model and stored the output. This output is displayed in a graphical format as well as in detail to the user. This application can become a personal companion to users by keeping track of their emotions and identifying any decline in their mental state and hence improving their emotional well-being.

Keywords: **Index Terms—mood, mental health, social media, gmail, chrome extension, deep learning, lstm**

1. INTRODUCTION

The World Health Organization (WHO) reported in September 2021 [1] that 3.8 percent of the world's population experiences depression, with 5.0 percent of adults and 5.7 percent of those over 60 years old being affected. Around the world, 280 million people suffer from depression. Apart from depression, there are many

more mental disorders such as anxiety disorders, personality disorders, panic disorders, bipolar disorders, eating disorders, Obsessive-compulsive disorder (OCD), schizophrenia, post-traumatic stress disorder (PTSD), and other conditions that have an impact on people's daily life. Since 2012, the rate of youth depression has increased from 5.9% to 8.2% [2]. The symptoms of depression can affect academic achievement and tamper with personal relationships.

Mental illness prevails among people of all age groups but teenagers form the most vulnerable crowd among all the groups. Mental illness affects or will affect 1 in 5 young individuals (ages 13 to 18) throughout their lifetime [3]. The majority of teenagers feel a level of discomfort in sharing or expressing their feelings in front of their family members. People who have jobs or run businesses often experience tremendous stress which if not managed properly may lead to serious emotional issues. Senior citizens tend to experience feelings of loneliness, anger, irritation, emptiness etc. which if not addressed can contribute to the aforementioned disorders. Even if people recognise the fact that they are struggling mentally, not all of them are financially sound to be able to afford professional medical help for the same. Folks often overlook any mental issue and give more attention and priority to their physical illnesses. Hence, looking at the concerns stated above, there is a need for a solution that is accessible to the public for free and at their fingertips.

Today's world is being ruled by technology and no human can avoid it. We, as people living in the internet era, have two worlds - the online world and the offline world. We spend a lot of time in our day on the internet. A person's online presence says a lot about them, particularly about their mental well-being. The kind of social media activities they engage in viz - posting updates on public platforms, tweeting, watching YouTube videos and commenting under them etc., can be helpful in getting to know the users' mood. An application that can keep track of these social media activities and gauge the user's mood can aid in the early identification of potential mental health issues. Early detection of such issues can be very useful for treating the disorder at an early stage for faster recovery. This can only be possible if there is any medium through which a person's mental state can be known daily. This can be achieved by developing an application that will monitor its users' social media engagement and will predict their moods on a day-to-day basis. If a person is experiencing a negative range of moods (for eg. sadness, anger, irritation, emptiness etc) very frequently then that can alarm for a potential mental disorder.

The structure of this paper is as follows: The literature review that was done to research the current products and strategies on the market is described in Section 2. The proposed system design is discussed in Section 3. The produced application's tech stack, dataset, and implementation are all described in Section 4, which

illustrates how the application functions in its entirety. Section 5 consists of the results that were obtained on the development of the application. The paper is concluded in Section 6, which also includes the future scope, acknowledgements, and references.

II. LITERATURE SURVEY

Our emotional, psychological, and social well being — which impacts how we feel, think, and behave — is referred to as mental health. Our mental health influences how we respond to stress in various contexts and how we make decisions in life. Mental and physical health are equally important for our well being and overall health. Taking care of or mental well being is very necessary in every parts of our life including adolescence, adulthood and old age. Considering the changing lifestyles of people, mental health is being compromised and many people find it difficult to cope up with it. The massive use of social media during these decades has made this worse. A survey found out that around 95% of teens have access to a mobile phone and over 45% of them indulge in social media almost constantly [4]. In the data proposed by WHO [1], around 75% of people belonging to low- and middle-income countries do not obtain therapy due to a lack of finances, qualified specialists, and associated stigma.While neglecting the notion that depression may explain increased social media use, several academics have previously blamed social media for rising rates of depression. According to academics, experimental techniques that allow us to investigate temporality and causality show less evidence that social media precipitates depression symptoms and more evidence that baseline levels of depressive-related symptoms forecast future social media use [5]. The University of Pennsylvania performed study on 143 students' use of social media. The study found that individuals' feelings of loneliness and unhappiness decreased as they used social media less and less. For the first time in scientific research, the study showed a causal association between these traits, according to the researchers. It also stated that limited access to social media might result in lower feelings of loneliness and melancholy than unlimited access [6]. A study on people with an without psychosis observed that when people vent on social media or indulge in emotional posting, these signs are predictive of low mood, low self-esteem and excessive paranoia. Despite the fact that the effect of social media use as a whole was not moderated by psychosis, but the drops in mood that follow social media use are probably more harmful to those who already suffer from psychosis because they initially reported lower levels of mood [7]. For those who are depressed, prompt identification and treatment of unpleasant feelings are essential. The use of mobile phones and concurrent emotional states have been linked. Technological advancements have introduced the possibility of predictions through Machine Learning and AI. A combined assessment of 48 studies was proposed in a research. The study of people's mental health was discussed by examining their social media usage. It gives an overview of most recent developments in ML Models for mental health prediction [8]. In one of these studies [9], it is discussed how to alter machine learning methods to look at such patterns for the prediction of bad moods. The research looked at data from 68 participants. The overall rate of negative emotion prediction accuracy was 86.17%. Based on mobile phone usage trends, the created system was capable of forecasting unfavourable feelings. By automatically identifying negative feelings and offering individuals preventative therapies before they progress to clinical depression, this technology has the potential to provide ecological momentary intervention (EMI) for depressive illnesses.

YouTube is a largely used social media mostly among youngsters. A study [10] was conducted about users YouTube watching patterns. Sentiment analysis model was executed over keywords and titles to predict negative emotions in the text for the user. One such set of Authors [11] carried out analysis of the comments under personal vlogs on YouTube about living with BPD (Borderline Personality Disorder) and found out the different themes in these comments. An individual's negative mood polarity is typically characterised by emotions of sorrow and insignificance. Major signs of depression include a pessimistic outlook and gloomy emotions [12]. The initial symptoms are more of a mood's negative polarity. It has been discovered that people between the ages of 15 and 49 are the most affected. This age group uses social media the most and expresses their opinions there. According to a study's findings, people who are unhappy often linger and watch depressing videos in an effort to feel validated or find companionship [13]. The mental condition of a spectator can be inferred from this behavioural pattern. Another study

[14] conducted on data from Twitter and Weibo for mental disorders stress and depression highlights an analysis of online behaviour of users for people suffering from these mental health disorders. Observations stated that stressed and depressed users use more negative words from categories like death, biology, anger and anxiety while posting on Twitter, showing that are more emotional online. Depressed users tend to use more first-person singular pronouns indicating more self-awareness and their posting behaviour shows they are more likely to post between 23:00 and 6:00 indicating possible symptoms of insomnia. Depressed users also show a lack of social engagement with others.

Researchers now have access to a wealth of Web-based social and health-related data thanks to the widely used social media platform Twitter. Emotional research often makes use of sentiment analysis of social media text. A study [15] was conducted to see whether self-reported moods and Twitter data were related. The observations pointed towards the success of using Twitter data for prediction emotions for a user. A research [16] extracted 9300 tweets to find out if tweets can be categorised into depression related just by using keywords. It was observed that to categorise whether a tweet relates to depression or stress or none of those, Natural Language Processing is necessary. Recent splurge was seen in Tweets regarding Mental health, Depression and other such mental disorders when a strong influence or celebrity provokes the topics or when deaths of such huge influences comes into limelight [17]. In one such Twitter study [18], the authors sought to understand why people

tweet about their mental health. A sense of community and promoting mental health awareness and eradicating stigma were two of the factors identified. According to a research [19], people with mental health disorders are increasingly using social media to share their experiences with their illnesses or seek guidance. Making the decision to interact with like-minded others online when one is mentally ill marks a turning point in their sickness. This era is the start of a time where stigma against mental health and illnesses is challenged, seeking help and support is increased, physical and mental well-being is promoted. There are challenges involving finding appropriate methods for analysing social media data. It was found that people suffering with mental illnesses are more likely to move towards social media for information and support from their peer network because they feel a sense of belongingness. Hence, social media is a ripe platform for analysing a users mental health issues and for retrieving such data.

Despite many studies focusing on the direction that increased social media use can lead to depression, only a few studies have looked at the possibility that depression may really explain greater social media usage [5]. Exploration in this directions can open up many possibilities in Mental health treatments. Even though research has established that a person's mental health can be predicted by analysing his activity and interaction on social media, there are not many products in the market that helps one achieve that.

[8] Furthermore, no study has suggested a possibility for a solution that simultaneously analyses data from several social media platforms, including Twitter and YouTube, to forecast a user's emotions. Research has not been conducted in detecting mood and later on analysing the trends for detecting various mental illnesses beforehand. There are no methods that provide necessary interventions and remedies or care along with detection to affected users, in an personalised way [14].

III. PROPOSED SYSTEM DESIGN

The proposed system achieves the data collection of the user's social media data through a chrome extension. The data is gathered by doing web-scraping of the websites of Gmail, YouTube and Twitter. For Gmail, the body of the email is collected. For Twitter, the tweet is collected and for YouTube, the title of the video is gathered. For the people who are not active on any of these three platforms, a separate functionality of "Diary Writing" is inculcated, where the user will briefly describe his/her day. This collected data will be the input to the machine learning model and will predict the sentiment attached to the text. The six emotions that can be predicted by the system are joy, love, surprise, fear, anger and sadness. The predicted emotions are stored in the database and are analysed further. A person's mood must be observed for a minimum of 7 to 12 days to be able to detect any potential mental concern. After this analysis is done the results of the week are summarised and are displayed to the user. The diagram of the proposed system is given below along with the detailed description of its individual modules.

Fig. 1. Proposed System Design

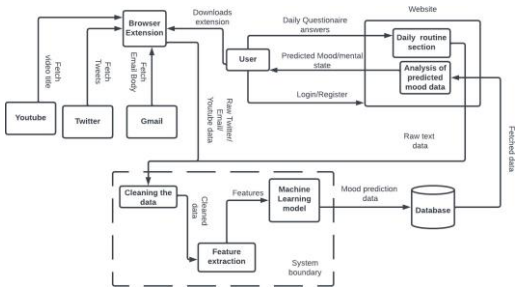

Figure 1 depicts the working of the proposed system. The system diagram for our proposed system here shows the input/output for the system, the flow of data and other processes taking place in various parts the system.

A. User

The end user is a person who is interacting or initiating the interaction with the system. The user directly interacts with the browser extension by downloading it and accepting its terms and conditions. Then the user interacts with the website by logging in /registering with the system.

B.Database

The Database is a collection of entries which can be created, retrieved, updated and/or deleted. The proposed system uses a Database to store different entries for the user. This Database will store the authorisation information for various users. For each user, it will store retrieved data for analysis, the source of the data and its corresponding predicted emotion.

C. Sentiment Analysis Machine Learning model

The Machine Learning model for Sentiment analysis forms the main system. The model takes users sentences as raw input for prediction. This raw data is of String datatype. This model is trained only once initially using a train data set. Before the result can be predicted, some pre-processing must be done on the data.

1) Data cleaning: The raw data received is then passed to the data cleaning module where the sentences are cleaned to remove any punctuation, symbols, emojis and other un-necessary characters. This helps to keep only the necessary parts in a sentence i.e. words. Then stop-words are removed to eliminate any unnecessary words and keep only those which are necessary for the algorithm.

2) Feature extraction: Then this cleaned data is passed to the Natural language processing module where the cleaned data is further processed into tokens and vectors. These vectors act as features for the algorithm.

3) Machine Learning model: The processed data then passes to the actual ML algorithm where the algorithm per- forms Multiple class prediction on it based on 6 distinct emotions - Joy, Love, Surprise, Anger, Sadness, Fear. The ML algorithm proposed here is Bidirectional Long-Short-Term Memory (BiLSTM) algorithm used in Deep Learning. This algorithm gives one among the 6 emotions as output. This output is then stored in the Database for the corresponding user along with the output

emotion.

D. Browser Extension The browser extension is a software that interacts with certain contents on your web browser. This extension, along with the consent of the user, targets 3 websites - Gmail, YouTube and Twitter. The browser extension receives data from these 3 websites when the user prompts it to and feeds the data to the Machine Learning model in the form of raw data. The Ml model then uses this data to gain predictions for its associated emotion. This data is then stored in the Database along with predicted output.

E. Website User send the Login/registration data to the Database via the Website for authorisation. The Website for the system acts as a platform for the end user to view the data and its analysis such as the trend in emotion for the past 7 days. The data is retrieved from the Database for the corresponding user and displayed on the website for the logged in user. The Website also uses this retrieved data for analysis of the user's history of emotions and displays it on the website for useful insights. Another module where the user can interact is the Journal input. The user's input in the Journal is passed though the ML model for analysis and is stored in the Database along with its predicted emotion.

IV. IMPLEMENTATION

The application's actual implementation is presented in this section. This web application is built using the python framework Django and MYSQL database. This application uses a machine learning model to detect users' emotions. This model is trained using Bi-direction LSTM (Long Short- Term Memory) algorithm. To train this model, the dataset was used from Kaggle. The dataset has 2 columns- text and emotion. The text column contains the input text and the emotion column contains the actual emotion associated with the text. Based on the proposed system flow diagram, we have implemented and created a web desktop application.

A.Home Page

Fig 2 represents the 'Home' page of the application. This is the website's landing page, consisting of a navigation bar with 'About us' and 'Contact us' pages. This page also contains the register and login options for users.

Fig. 2. Home Page

B. About Us page

Fig. 3 represents the 'About Us' page which gives detailed information about how this application works in simple terms and what are the offerings of application.

C. Contact Us Page

Fig 4 shows the 'Contact Us' page of the application. Anyone can get in touch with the owners and get their queries clear.

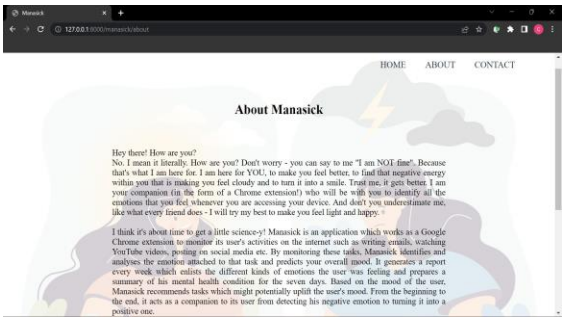

Fig. 3. About Page

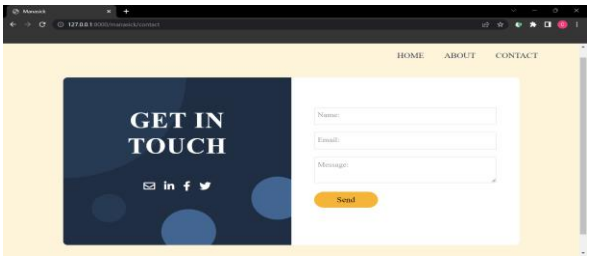

Fig. 4. Contact Page

A. *Terms and Conditions*

Fig 5 represents the 'Terms and Conditions' page. This page informs users that the application will be collecting their social media data through Twitter and YouTube and emails from the Gmail platform. Initially, the 'Confirm' button is disabled as user has not yet agreed with the terms and conditions. Fig 5 shows the same case.

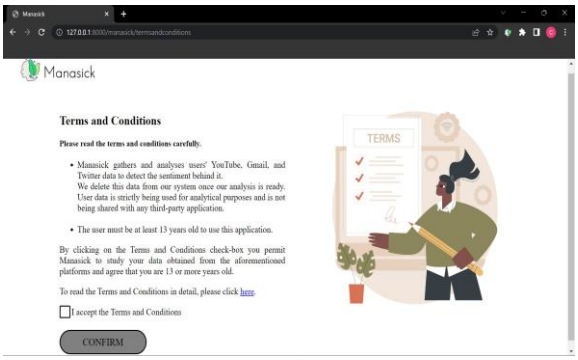

Fig. 5. Terms and Conditions Unchecked

Fig 6 represents the case when the user agrees with all terms and conditions. Once the user accepts the terms, the 'Confirm' button enables and the user can proceed with creating a new account.

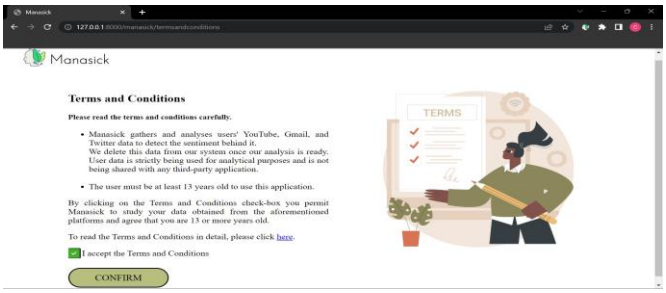

Fig. 6. Terms and Conditions Checked

E. Register Page

Fig 7 represents the 'Register' page of the application. The new user has to create an account before starting to use the features provided by the application. The user will create a unique username, enter the first name, and last name and create a password. On clicking the 'Register' button, the user gets registered to the system.

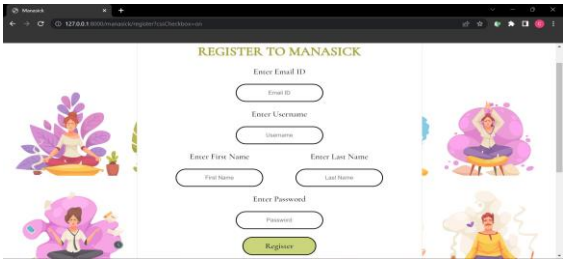

Fig. 7. Register Page

F. Login Page

Fig 8 represents the 'Login' page of the application where the user can get logged in to the system using the uniquely created username and password during registration.

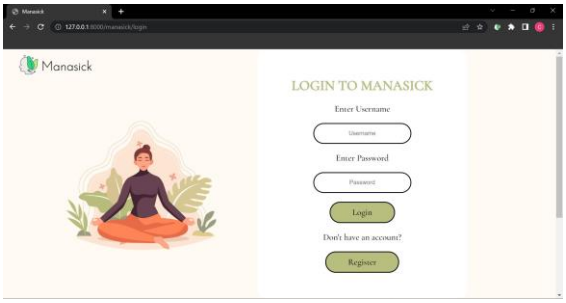

Fig. 8. Login Page

G. User Dashboard

Fig 9, represents the 'User Dashboard' page of the applica- tion. This page is only visible to users who are logged into the system. This page consists of two options: 1. Describe your day, 2. View your analysis.

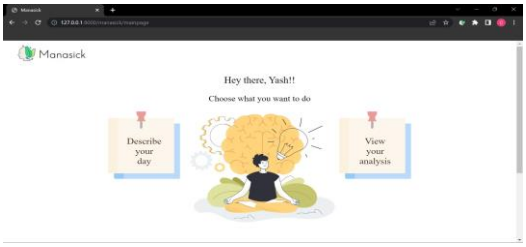

Fig. 9. User Dashboard Page

H. Daily Journal Writing

On clicking on 'Describe your day' on the 'Dashboard' page (fig. 9), the 'Daily Journal Writing' page opens, and fig 10 represents the same. This page describes what actually journal writing means and what is the motivation of this section. It contains a 'Start Writing' button which redirects users to a page where user can describe their day (fig 11).

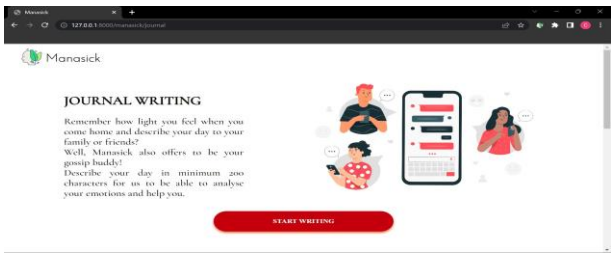

Fig. 10. 'Start Writing' button for the diary

Fig 11 represents the page where user can describe their day in at least 200 words. Users can write anything about 'how was their day?', 'how are they feeling right now?', 'is anything bothering them?', etc. This text is then analyzed and sentimental analysis is performed on the input given by the user to predict their mood.

Fig. 11. Diary for the user input

I. Extension

This application uses the chrome extension 'Manasick' to collect users' social media data from YouTube and Twitter and through the Gmail platform. The extension scraps the data whenever user is watching any youtube video, writing emails, or posting something on Twitter. This scrapped data is then sent to the application and sentimental analysis is performed on it to predict their mood.

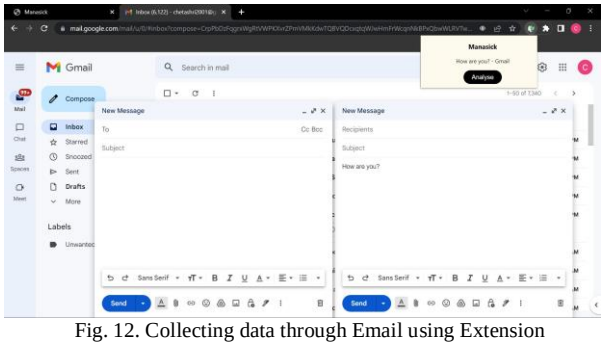

Fig. 12. Collecting data through Email using Extension

Fig 12 represents the case where the chrome extension identifies the mail written by the user. The written mail can also be seen when clicking on the extension icon.

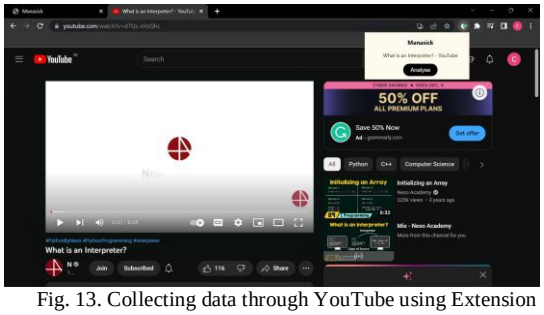

Fig. 13. Collecting data through YouTube using Extension

Fig 13 represents the case where the chrome extension collects the title of the YouTube video that the user watches. This title can also be seen when clicking on the extension icon.

Fig 14 represents the case where the chrome extension collects the text of the Twitter post that the user posts. This text can also be seen when clicking on the extension icon.

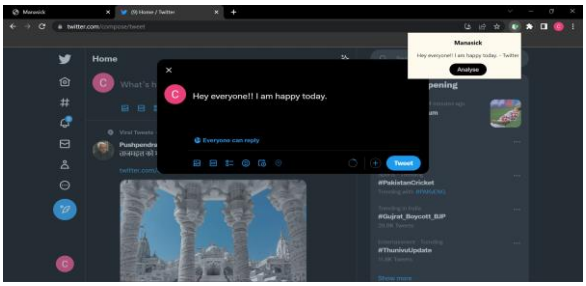

Fig. 14. Collecting data through Twitter using Extension

J. Analysis

On clicking on 'View your analysis' on the 'Dashboard' page (fig.9), the user gets directed to the analysis page, fig. 15 and fig 16 represents the same.

Fig. 15 represents the summarized mood analysis of the user for latest 7 days in graphical order. The maximum emotion of the day is considered the overall mood of the day.

Fig. 15. Summarized Mood Analysis

Fig. 16 represents the user's analysis overtime the period. Users can see their complete analysis done by the application for the entire period the user was active, for the last 3 days, for the last 7 days, and for the last 14 days. According to the suggestion, received from the counselor, it has been noted that the person needs to take more care of their mental state if negative emotions last for more than 12 to 15 days. If the user experiences negative emotions for more than 14 days then an alert is sent to the user about the same.

Fig. 16. Analysis Page

K. Detail Analysis

Fig 17 and fig 18 represents the detailed analysis of both daily journal writing and analysis of social media activities.

Fig. 17. Detailed Analysis Page

Users can see the inputted data and social media activities along with predicted emotions and timestamps. For analysis of social media activities, every entry also displays the source of the data.

User can also filter the data based on timestamp (such as 7 days, 14 days, and 21 days). and platform (Gmail, Twitter, YouTube). Fig. 18 represents the same. By default, all data is displayed on the page

Fig. 18. Detailed Analysis Page with Filter

V. RESULTS

After the development of the application, it was tested across 18 users and a total of 187 entries were collected from them over the time span of 7 days. 47.49% of the data gathered comprised of diary entries, 2.67% of the data consisted of emails, 42.24% of data consisted of YouTube videos and 7.48% of data comprised of tweets. For the collected data, we were able to predict the emotion associated with the input text with accuracy of 93%.

The table I summarizes the results achieved by the ap- plication in terms of the accuracy obtained by successfully predicting the accurate sentiment behind each text input

Sr. No.	Source	No. of Entries	Accuracy
1	Diary Writing	89	91%
2	Gmail	5	95%
3	YouTube	79	87%
4	Twitter	14	92%

TABLE

ABLE SHOWING THE ACCURACY OBTAINED FROM EACH SOURCE OF DATA

The table II presents a comparison of the developed application with a few other applications already available in the market considering a number of features. The table compares the proposed system features and also specifies what alterna- tive features are present in rest of the applications mentioned in the table.

Features	MoodSmart (Depression detection app)	Mind Alcoe (Jour-naling app)	MindDoc (Mental health trackig app)	Manasick (our proposed application)
Input for user's mood	Text	Emoji selection	Emoji selection	Text
Data collection From Social media	Twitter	No	No	YouTube, Twitter
Data collection from Gmail	No	No	No	Yes
Journal writing For mood prediction	No	Yes	Yes	Yes
Method for data Extraction and display	Mobile appli ca-tion	Website	Website	Website and Chrome extension
Mental state analysis from mood history	Analysis (7 days)	Graph	Graph	Analysis (7 to 12 days)

TABLE II

TABLE SHOWING A COMPARISON BETWEEN THE PROPOSED APPLICATION AND 3 APPLICATIONS AVAILABLE IN THE MARKET

In the table II, the first feature for comparison is the way in which the input is taken through the applications for finding out user's mood. For two of the considered applications, the user's mood is directly input as an emoji selection i.e. selecting one among the 6 given emotions. but for our developed application, the user does not need to select his/her mood, it will be predicted using a text input itself. The second feature is the social media used in data collection for predicting user's mood. Our developed application uses data from both YouTube as well as Twitter whereas the rest of the applications don't use a social media application or use only Twitter for this purpose. The third feature is whether data is being collected from the user's Gmail or not. Except our developed application,

no other application is using Gmail for data gathering. The fourth feature is the use of Journal writing for taking input for user's mood prediction. Along with our developed application, other two applications employ a journal writing feature. The fifth feature is the mode used for extracting and displaying the user's mood data and associated analysis. Our developed application makes use of a Google chrome extension as well as a Website for this purpose while other applications use common modes like Websites and Mobile applications. The sixth feature is whether the mood history of a user is used for further analysis of mental state or not. Two of the considered applications don't provide a particular analysis as such, but just display the trend in user's mood in a graphical format on the Website/application. Whereas our developed application and one other application analyse user's mood history and present an analysis from than on the website/application. The other application presents an analysis for the data from past 7 days whereas our developed application not only presents an analysis for the past 7 days but also for for the past 14 days and the past 21 days.

VI. CONCLUSION

In this project, primarily we devised a method of analysing a user's social media data and predicting the emotion attached to it with the help of sentiment analysis. As stated earlier, there are many people to neglect their mental health and any concerning symptoms that might indicate mental illness. The proposed system gathers the data for the analysis in a very less intrusive way.

The application is successfully able to collect user's social media data from Twitter and YouTube as well as from the user's Gmail by web scraping through the chrome extension. It also takes the user input in the form of diary writing for those users who do not engage on any of the aforementioned platforms. The application is also successfully able to run the machine learning model on it to predict the associated emotion.

The system identifies 6 emotions namely - joy, love, surprise, fear anger and sadness. After monitoring the mood of the user for at least 7 days it produces a summary which tells the user whether or not he/she needs to pay more attention to his/her mental health. The application is also able produce an analysis of the stored user emotion data for the past 14 and 21 days. Hence, both the objectives of our project were achieved

i.e. Scrapping the user's data and training and implementing a Sentiment analysis model on the input data.

The future scope for the web application Manasick includes providing personalized interventions to users whose behaviour exhibits negative emotions.

VII. ACKNOWLEDGEMENT

Under the direction of Dr. Nataasha Raul and Prof. Meghana Naik, all authors have significantly contributed to the work described in the publication (e.g., developing the application, providing technical assistance, assisting with writing and edit- ing, general support).

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Android Application for Online Advertising of Products and Services

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Abstract – In this paper we study the concept of Advertising, we have developed a mobile application in which various companies and users can advertise their products in our mobile application. and the viewers can see those ads and go through a survey on those products and services related questions. In this application we have designed two interfaces for the viewer and the ads- publisher. As we know now a days online marketing plays a vital role in increasing sales and revenue, so we developed an application on that domain to users to advertise their products and services , as we said in start that there are two interfaces in the application ,the second interface and the most important interface where the viewer review the product and service of the advertiser by answering the survey about the ads image or video which they seen in the application, with this the viewer can ignite interest on the product and can try its service or buy those products ,for viewing those content in this application the viewer gets coins in return ,for viewing every ads in the application it increases the count of the views of the viewer and here one view is equal to one point and here viewer can see only few number of ads per-day , when the views reaches the prescribed number of views ,the views can be converted in to rupees and the viewer can withdraw those money from the wallet by adding bank account or purchase a coupon related to the product or service in the list provided.so It is an application where the viewer views the ads for gaining points and with those points they can either withdraw money or purchase coupons and gift-cards, with this application the advertisers gains popularity to their products and services,the viewer if the products more familiar to the interest of the viewer ,the viewer may purchase or try the service or product. In this way the application works, which mostly benefits both party's interests and can be mostly used to increase the sales of the products and services, which in turn leads to profits and betterment of the company or industry.

Keywords: Index Terms—print, direct mail, television, radio, mobile, social media.

1. INTRODUCTION

Nowadays, Advertising plays a major role in increasing in selling of products or services to the company, As these they are many products are coming to the market everyday but users doesn't have much awareness about the product quality or features and usage about it, In this case advertising plays an impact role of selling those products and gives a proper explanation about the product usage and verification of the selling company , It leaves a positive feedback to the customers towards company. Most companies prefer advertising their products and services and investing more money in adver- tisements. If suppose some new product came into market, which customers doesn't know about the product at that time advertisement paves a way to customers to identify the product which they may buy it according to their needs. As in today world, there are many products are coming to our daily life, as there is a huge competition among the sellers to increase their revenue but due to the less influence about the name of company and proper description the product popularity may decrease and may affect on the annual revenue on the product and cause company a huge loss in the selling of the product. To overcome the problem of how to attract customers to purchase the products, companies try to advertise their products in social media, articles, websites, videos which help them to gain the attraction of the customers and purchase them.

Advertising is classified in to among the following types like print, direct mail, television, radio, mobile. Print advertising, it is a type of advertising which is advertised using newspapers or templates, or other printed materials. It is mostly in the form of printed materials. Most of the companies advertise their products in magazines and journals which are mostly read by specific people, they always try to publish their ads or description about the products in mostly popular magazines which is read by many people. Direct mail advertising, it is a type of advertising in which companies advertise their products through mail to the customers. It involves sending mail to customers. In this advertising, it sends mail to the existing customers who were once purchased products from the company and to the customers who subscribed their mail for updates, they send to those people which increase the awareness in the customers about the products. Television advertising in this advertising the company tries to promote its product by making a 20- or 30- or 60-second video and telecasting it on TV. It costs more compared to the other advertisements. It is telecasted daily on the TV channels during some shows. Radio advertising It is a type of advertising in which a company promotes its product over the radio. They sponsor it through radio during breaks. It is also a form of advertising which may not be much effective over Television advertising. Mobile advertising is a type of advertising in which a company promotes their products in mobile devices with the internet. These advertisements appear in webpages, apps, or social media. It has an upper hand over other advertising forms as most people have mobile devices and have good internet connections, which they are more known about the products and services offered by the companies.

II. EXISTING METHODOLOGIES AND SYSTEMS.

As they are many existing sources are available for adver- tisement of products and services. Each model has its own functionality, In the sense they are specific for showcasing a particular company product and some are particular at promot- ing specific products and services. One of the existing model Google ads, which is quite popular in promoting services or products of the companies. Nowadays google ads pays a major role in advertising the details of products in the websites in the form of photos or videos or random description, the readers or viewers who view the site will get popped up

the ads of so on company and in the right or left side of website they will see the different types of ads on different products according previous feed of the particular reader or viewer.

As we know nowadays social media marketing is tremendously increased many companies hiring social influencers to promote their products over online by making video of the ads and they promote those ads in the social media applications like Instagram , Facebook , Snapchat and many more which helps companies to advertise the listing of products in online. Another application is ad-wallet which gathers ads from many companies in the form of videos or images and promote in there application where the viewer get rewards for the watching the ads, google survey which is also an application by google it instead of promoting content it asks questions to the user according to the recent search feed and collects feed back from them like asking the experience about the search and ask to give reviews on their personal experience.

III. PROPOSED METHOD

With the increasing of many products and services in the market which makes the low popular companies or newly established companies hard to sell their products or services to the customers, as customers are purchasing from the well settled companies, who has a good experience and are oldest in selling goods but due to this affect the new companies cannot able to resist or hold their position in the market which leads to huge losses and cannot able to attract the customers to purchase the goods, there is solution which can increase their sales that is advertising of their products so that in that advertisement they can say the total details of the product, price ,quality and the usage of the products in a proper description , so we created an application on the domain of advertisement to help the small scale industry and retailer to promote their products and services so that viewers of the application can able to look in to the product and may look interest in it and they can recommend or refer someone to purchase or go through the product, and viewers in the application may get rewards and coupons for viewing the ads and answering the survey ,which is related to the product ad which the viewer had viewed in this we have made an application which is used for promoting the products and services of the company in the form of picture and videos in the application.

IV.PROPOSED OBJECTIVES AND OUTCOMES

We have developed an application which overcomes the problem for companies to advertise their products and services, in this application they can publish there ads in form of videos or pictures which are viewed by the users of the application and answer the survey related to the product they viewed in the application, as in this application we have built two interfaces one is for the ads publisher and other is for the ads viewer here the publisher posts the ads and viewer who watches those ads for watching ads , the viewer get coupons or gift cards or coins for the views. The user can convert those coins in to currency and withdraw those amount by adding bank account in the profile , as we said there is a view count for the viewer so the viewer counts get increased for watching ads, in this application we are attracting users to view the ads to gain coin , so the user view the ads and after viewing the ads they need to answer the survey question related to the ads they have watched then only coins will upgraded in wallet, so by implementing this we are making the viewer to concentrate on the ads and understand the products what it is meant for , where to use and price of the product, this makes the user to go through the product , which can ignite interest to purchase them or suggest or recommend to others.

A. User Data Protection

The major thing here to remember before implementing the application is having an proper Authentication, which allows users to log in via an credentials. Let's see how a typical authentication system works

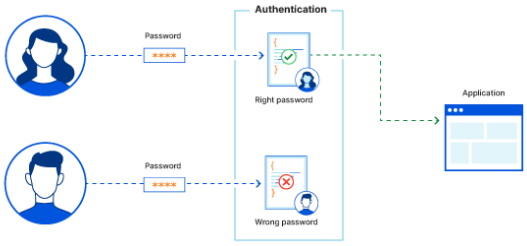


Fig. 1. Authentication

So, when the user open the application, him/her need to lo- gin with the credentials which are stored in the database while registering or creating the new account in the application. If the the user logged-in with the correct credentials the session time saved in the database and cache data stored in the local storage of the device for preventing to logging multiple times

,when user open the application it directly open the content rather again asking the login as the data of previous session stored in the local storage of the device.

V.DATA STORAGE AND COMPUTING

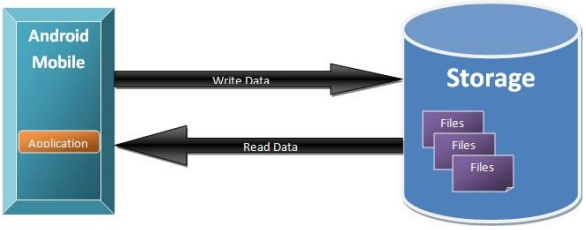


Fig. 2. Data Storage

While creating any application , the major concern arises here where the data of the application is stored , so we need a storage for the application as they are two types of the storage available their are physical storage and virtual storage.

A.Physical Storage

Fig. 3. Physical Storage

As the name represents ,it is storage unit which stores the data in the SD cards, USB drives and Hard disks, it is also present in the devices as a inbuilt storage like RAM and ROM, which in that RAM is used for accessing the data and ROM stores the data , more the RAM the data computing and accessing is fast and satisfies the user. Here physical storage plays a vital role as it stores the application data of the user in the device storage as their are two types RAM and ROM where one is used for accessing the cache data and the other is used for storing the the activities which are performed on the application by the user.

B.Virtual Storage

In this storage the data related to the application is stored in a data server which is managed by the database admins, it stores all the data of the users who are using the application and any updates related to the application is shared in the database server which reflects in the application which are used by the users, suppose if the user deletes the application and he wants to install it again but the user doesn't looses his data as the users data is stored in the database, when the user logins according to the credentials the application fetches the data of the user when last he/she used the application.

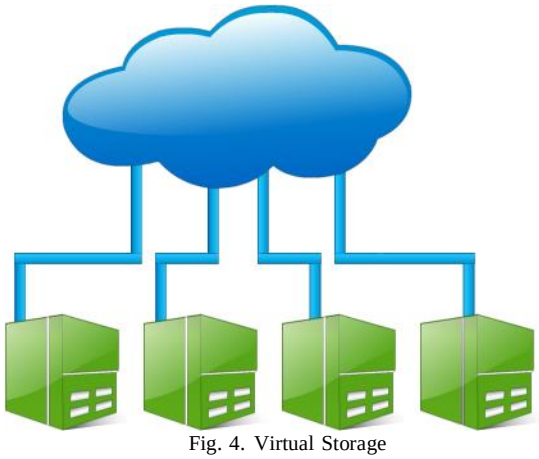
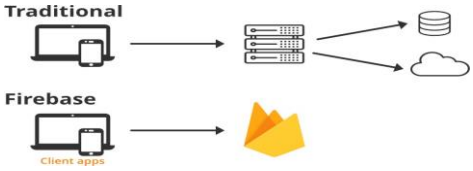


Fig. 4. Virtual Storage

Here for the virtual storage, we used Firebase which is a cloud database maintained by the google, it is opensource cloud storage. we have used firebase as a database storage for our application , as all the details related to application are stored in the cloud storage, as we used cloud storage so we can upload all the data over internet and extract data over internet which can be accessible all over the world. The main advantage of using the firebase is we care least about the maintaining the data , as firebase is a built-in cloud storage which has many bulit-in functions which maintains the data automatically without any database admin as admin no need to worry about the security of the users data as it is stored in buckets each bucket has its own unique key which prevents collisions and other problems, it is a combination of cloud and database.



I. PROPOSED MODEL

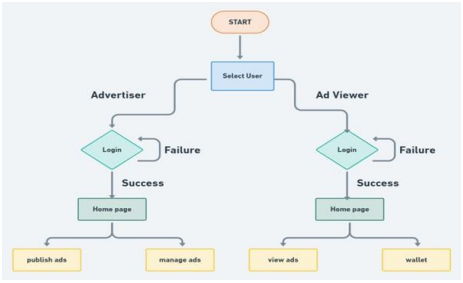


Fig. 5. Proposed Model

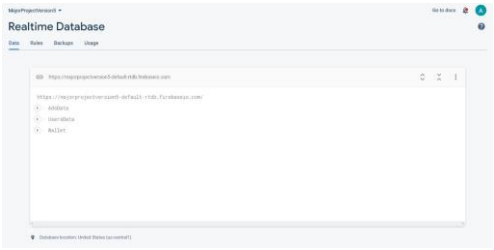


Fig. 6. Realtime Database

As the above model and the figure describes the working procedure of the application and number of objects involved in the application, we implemented three interfaces publishingads, viewing ads and wallet to check coins after logging in to the application.

VI RESULTS:-

A. Overview of the Application Process

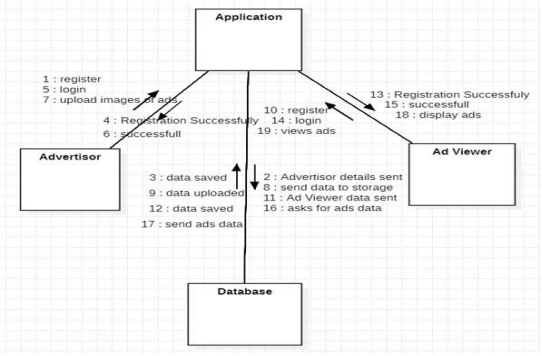


Fig. 7. The procedure of Application Work.

A. Security and Authentication:

To demonstrate the use of authentication we used a email account, in below figures show the clear procedure of how the process works. Starting from opening a registration page, then redirecting to the login page, auto-typing the credentials retrieved from the database, caching the session data.

Fig. 8. The Procedure To Register Account.

Fig. 9. The Procedure To Login Account.

The above pics shows the procedure of registration and login to the application. while during registration user registers with email id which is unique for each user and after registration is done successfully the user credentials stored in the firebase database and allocates a bucket for the user activities.after user login to application , if the credentials matches with the existing users in the database it gives permission to view the application data.

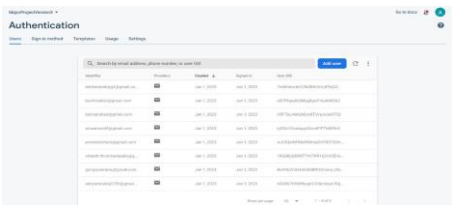


Fig. 10. Users Data In The Database

A. Proposed Application:

In this section we give the main working of the applica- tion, as we know the application is majorly focused on the advertising domain,we here focused on the publishing ads and viewing ads in our application.After registration and logintasks finished , we move to the next task where they are three tabs there are for publishing ads, viewing ads and wallet ofthe user.

Fig. 11. Home Page

1) Publishing Ads Tab: It is present bottom of the home page to the left corner. As the name represents it is used for publishing ads in the application and the ads published in the application are stored in the database along with the survey related to the ad which is published.

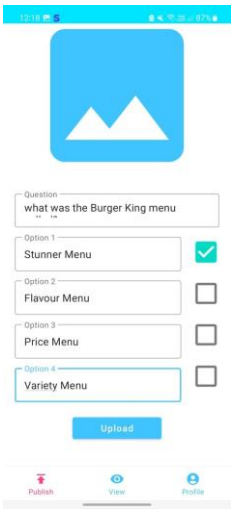


Fig. 12. Publish Tab

viewing Ads Tab: It is present bottom of the home page to the right of the publish tab. As the name representsit is used for viewing ads in the application and the ads published in the application are stored in the database which is published are displayed in this tab ,it contains all the ads which are associated with the application, when user clicks on the specific ads it opens a image of the ads and information regarding the

ads which are displayed and after 10secs and survey prompt appears which asks the question related to the previous ad viewed by the user and after correctly answering the survey question the response stored in the database.

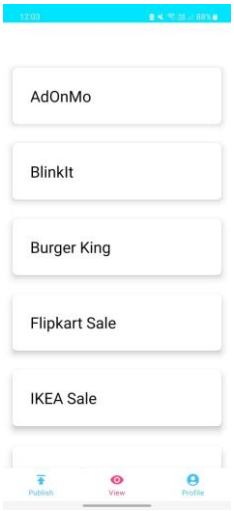


Fig. 13. Ads Tab

Fig. 14. Test Ad

2) Wallet Tab: After viewing the ads , a survey prompt appears which asks the question related to the previous ad viewed by the user and after correct answering the question , for every correct response user get rewarded with the wallet coins which can be used for buying the coupons or offerto the products and services of the ads associated with the application. As in the below pictures we have shown the work flow of the application.

Fig. 15. Survey-Prompt Page

Fig. 16. Wallet Tab

VII. Conclusion

The increase in the number of products and services launched every day has contributed to the increase in needfor marketing and promoting their services. But there isa lack of platforms for advertising products for small andmid-scale companies. For any company, marketing is very important because that's what influences the overall growth of a company. The proposed and developed android application will act as a medium for those companies which can attract new users by promoting their services. This app will allow companies to publish their ads and allow users to watch them and answer surveys about those ads, which may also lead to a user purchasing the product or service or it can also increase the popularity of the product among users. In future, the app could also allow its users to convert the coins into real cash and withdraw the money into bank accounts. In a way, it is useful for a publisher who wants to publish and an ad-viewer who wants to earn some rewards. This application could be the newest way of marketing products and services in the near future

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Serverless Computing: Opportunities, Applicationsand Challenges

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Abstract – **The emerging serverless computing paradigm has attracted attention from both academia and industry. This paradigm brings benefits such as less operational complexity, a pay-as-you-go pricing model, and an autoscaling feature. The paradigm opens up new opportunities and challenges for cloud application developers. In this paper, we present a comprehensive overview of the past development as well as the recent advances in research areas related to serverless computing. First, we survey serverless applications introduced in the literature and summarize the challenges they have faced. We categorize applications in eight domains and separately discuss the objectives and the viability of the serverless paradigm in each of those domains. We then classify those challenges into nine topics and survey the proposed solutions for each of them. Finally, we present the areas that need further attention from the research community and identify open problems.**

1. INTRODUCTION

Large technology companies such as Amazon, Google, and Microsoft offer serverless platforms under various brand names. Although the specifics of the services may differ the essential idea behind the offered services is almost the same

i.e. by rendering computation to the pay-as-you-go model, serverless computing tries to achieve auto-scaling while providing affordable computation services.

There are successful commercial implementations of this model. Amazon introduced Lambda in 2014 and later Google Cloud Functions, Microsoft Azure Functions and IBM Open Whisk were launched in 2016. Since then, many studies have focused on the challenges and open problems of this concept. Some of the previous studies are skeptical about the potentials of serverless computing due to the poor performance of their case studies. In contrast, others believe that serverless computing will become the face of cloud computing and the performance issues will be addressed eventually. The aim of the serverless services is threefold: (1) relieve the users of cloud services from dealing with the infrastructures or the platforms, (2) convert the billing model to the pay-as-you-go model, 3 auto-scale the service per customers' demand. As a result in a truly serverless application, the execution infrastructure is hidden from the customer and the customer only pays for the resources they actually use. The service is designed such that it can handle request surges rapidly by scaling automatically. The basic entities in serverless computing are functions. The customer registers their functions in the service provider. Then, those functions can be invoked either by an event or per users' request. The execution results are sent back to the customer. The invocation of the functions is delegated to one of the available computation nodes inside the service provider. Usually, these nodes are cloud containers such as Docker or an isolated runtime environment.

In this paper, we also discuss the opportunities presented by serverless computing. We emphasize that serverless services are more customer-friendly as they relieve customers from the intricacies of deployment. They are also more affordable in some cloud computing scenarios that we will discuss later in this paper. We argue that new market places are emerging around these services, which implies new business opportunities

II. OPPORTUNITIES

In this section, we discuss the opportunities that serverless computing offers.

3.1No deployment and maintenance complexity: The very first and foremost opportunity that serverless computing offers is to relieve users from managing the infrastructure, which is now already accomplished in Infrastructure-as-a- Service (IaaS), however, users still have to manage their virtual resources i.e, installing and configuring related packages and libraries. Certainly, Platform-as-a-Service (PaaS) providers such as Herokuhave made the management slightly easier, although, users still have to configure the applicationto match the PaaS requirements which is not a trivial task. Serverless computing takes a big step inthis manner. Users only have to register their functions and then receive the credentials to invoke the functions.

3.2Affordable scalability: Another promise of the cloud computing is the ability for customers to deploy the functionalities of their applications without worrying about the scalability of the execution infrastructure or platform. The scalability is a direct result of the auto-scaling nature of these services i.e. per request the service invokes a copy of the requested function and there is virtually no bound for the number of concurrent requests. Each invocation is assigned to the most feasible and available resource for execution.

3.3New market places: With the advent of modern operating systems for mobile devices such as Android or iOS, various market places for applications, that are specifically designed for those operating systems, have emerged such as Google Play Store and Apple's App Store . Such a scenario is already appearing for serverless paradigm i.e. with the growth in the popularity of serverless computing, new market places for functions has emerged. In these types of markets, developers can sell their developed functions to others. Every generalized or domain-specific functionality can be bought or offered in those markets.

III.APPLICATIONS

Many real-world serverless applications have been proposed in the literature during the past few years. We categorize these applications into six domains., the main reason for migration stated in the papers, and assessments based on the arguments made by the authors, the obtained results, and the challenges they reported. In what follows, we survey these application domains, in detail.

4.1Real-time collaboration and analytics: The stateless nature of serverless services makes them an attractive platform for real-time collaboration tools such as instant messaging and chatbots. Yan et.al., proposed an architecture for chatbot on Open Whisk. An XMPP-based serverless approach for instant messaging is also introduced in . Real- time tracking is another example of collaboration tools that are very suitable for serverless services as these applications are not heavily dependant on the system's state. Anand et.al., proposed two real-time GPS tracking methods on low-power processors. Serverless services are also utilized for data analytics applications]. In these applications, various sources stream real-time data to a serverless service. The service gathers, analyses, and then represents the data analytics. The auto-scaling feature of serverless computing makes the handling of concurrent massive data streams, possible. Müller etc. proposed Lambada which is a serverless data analytics approach that is one order of magnitude faster and two orders of magnitude cheaper compared to commercial Query-as-a- Service systems.

4.2 Urban and industrial management systems: The pay-as-you-go model of serverless services paved the way for the introduction and implementation of various budget- restricted urban and industrial management systems. Al-Masri et.al., presented an urban smart waste management system. Hussain et.al., proposed a serverless service for oil and gas field management system. An implementation of a serverless GIS platform for land valuation is presented in . The distributed nature and auto-scaling feature of serverless services make it an apt choice for smart grids. Zhang et. al,] proposed event-driven serverless services to handle SCADA/EMS failure events. A distributed data aggregation and analytics approach for smart grids is proposed in . Serverless services have been also utilized for urban disaster recovery applications. Franz et.al., proposed a community formation method after disasters using serverless services. Another similar approach is also proposed in . The migration toward serverless paradigm seems a reasonable choice for this domain of applications, especially, for public sector services or for developing countries due to its lower deployment overheads and also its pay-as-you-go pricing model.

4.3 Scientific computing: It has been debated in that serverless computing is not an attractive alternative for scientific computing applications, albeit, many studies have focused their attention toward serverless services for those applications. We believe disagreement liesin the fact that the range ofscientific computing and its applications are vast and there are certainly some areas in this domain for which the utilization of serverless services is feasible. Scientific applications that require extensive finegrained communication are difficult to supportwith a serverless approach, whereas those that have limited or coarse-grained communication are good candidates. Also, note that scientific computations with time-varying resource demands will benefit from migrating to a serverless paradigm.

4.4 Artificial intelligence and machine learning: Machine learning in general and neural network-based learning, in particular, are currently one of the most attractive research trends. The suitability of the serverless paradigm for this domain has received mixed reactions both from research and industrial communities. For example, it has been argued that deep learning functions are tightly coupled (they require extensive communication between functions), and also these functions are usually compute and memory intensive, as such, the paradigm is not promising for these applications . Nevertheless, it has been discussed that deep neural networks can benefit from serverless paradigms as they allow users to decompose complex model training into several functions without managing virtual machines or servers. As such, various such approaches have been proposed in the literature. A case of serverless machine learning is discussed in. Ishakian et al., discussed various deep learning models for serverless platforms.

4.5 System and software security: The power of serverless computing has been leveraged for providing security for various software systems and infrastructures. A mechanism for securing Linux containers has been proposed in . Serverless services have also been utilized for intrusion detection. Stream Alert is a serverless ,real time intrusion detection engine built upon Amazon Lambda. Birman et al. presented a serverless malware detection approach using deep learning. Serverless approaches have been also used for ensuring data security. A method for automatically securing sensitive data in the public cloud using serverless architectures has been introduced in . Hong et al. presented six different serverless design patterns to build security services in the cloud.

IV.CHALLENGES

In this section, we summarize and discuss the challenges faced by the application domains. We categorize those challenges into nine topics and survey the existing solutions for each of them. We also present the areas that need further attention from the research community and identify open problems.

5.1Programming, modelling, testing, and debugging: As the topic of serverless computing is relatively new, its development tools, concepts, and models are not rich enough. This poses a great challenge for software developers. The lack of proper modelling paradigms leads to non-unified development approaches which will reduce the quality of the code and also complicate collaborations of developers in long term. To remedy this shortcoming, Perez propose a programming model and middleware for serverless computing applications. The focus of the paper is limited to file processing applications.

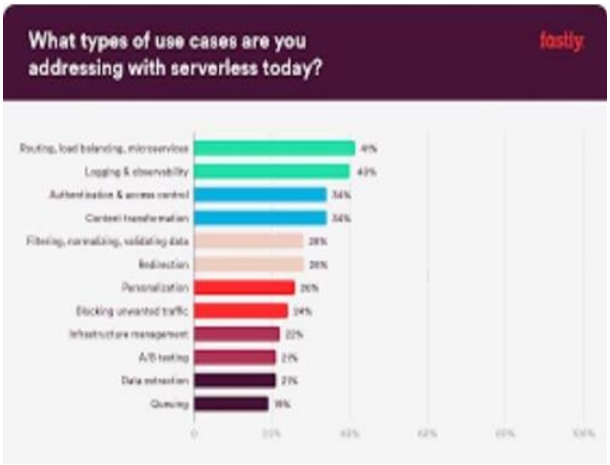
5.2 Pricing and cost prediction: Many big technology companies now offer serverless computing services with different specifications and prices. As the popularity of serverless services increases, the number of companies and their options for pricing will grow. Many factors affect the price offered by each company. These factors range from the company's revenue strategy to the platform it uses and the energy prices (based on the region or the time of day during which the function execution occurs). For example, a request that gets to a server at 2 a.m. in winter typically costs lower compared to that of the same request with the same resource consumption at 2 p.m. workday in the summer. Another factor is the load level that is imposed on the provider at that moment i.e. whether the provider nearing its peak power demand or not.

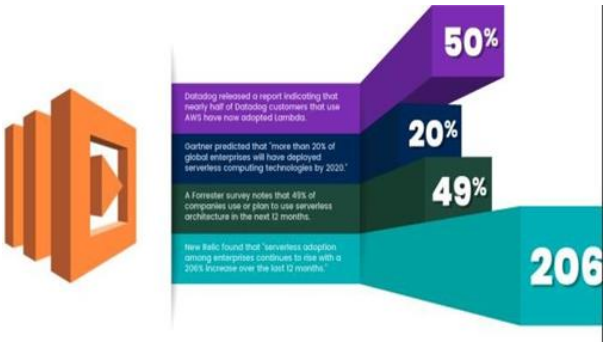
5.3 Networking, sharing and intra-communications: A serverless software is typically a composition of many functions that work together to provide the desired functionality. To attain this, the functions need to somehow communicate with each other and share their data or their state. In other cloud services, this is attained through network addressing. For example in IaaS, each virtual machine can send and receive data through point-to point networking using network addresses. Functions intra-communication and network-level function addressing in serverless platforms are challenging. Functions in serverless services have characteristics that must be considered to be able to introduce some kind of addressing scheme for them: Due to the auto- scaling nature of serverless computing, at any given time there may be several running invocations of the same function inside various computation nodes around the world. This rules out the possibility of addressing based on function name or location. The functions are often short-lived. The short life span of the functions means that any addressing scheme should be fast enough to track the rapid changes of the system's entire state.

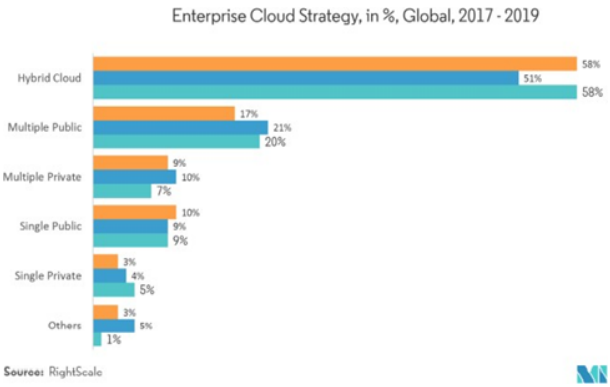
5.4 Serverless workflows: As discussed earlier in this paper, a serverless application is a composition of various functions working in coordination with each other to accomplish the desired tasks. Rarely, we have applications that are composed of a single function, instead, usually, there are many interdependent functions, processing and passing data to each other and send back the result to the application. For example, real-world implementation of an online social network (with functionalities similar to Facebook) on Amazon's Lambda infrastructure has around 170 functions. These small functions are orchestrated into high-level workflows to form serverless applications. In each application, functions are executed in various sequences. For example, users sign up in the application, view latest products, click on the add-to-cart button and check out. These 4 functions are executed in a sequence. Obviously, this is not the only execution sequence in the application since the user may have already signed up and just needs to sign in. There are many other possibilities for the sequences of functions. As we discuss in this paper, knowledge of these sequences (or chains) plays a key role in improving the performance of serverless services. Providers can use this knowledge to pre- fetch, prepare and optimize functions to reduce costs and serve customers with better performance.

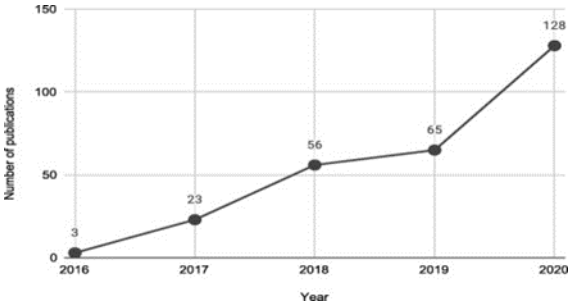
5.5 Security and Privacy: Security is an indispensable concern in any computation service, be it serverless or not. Various security challenges are common between serverless and other cloud services. Precht et al. reviewed some of those challenges. Here, we survey the security issues that specifically threaten the normal operation of serverless service. We also consider the privacy of users in such environments. Authentication and authorization. The foremost security challenge in any serverless scheme is how to authenticate applications so that only legitimate ones can use the available functions. Without authentication, a freeloader can use the available resources of the victims. A common approach to counter these attacks is the usage of authentication tokens in the header of requests. JWT is an example of such tokens.

SURVEY:









V.CONCLUSION

In this paper, we surveyed some of the new opportunities that the vast adoption of serverless computing model will present. Then, we surveyed and categorized various serverless application domains. For each domain, we summarized the objectives for migrating to serverless services and assessed the aptness of the paradigm. We listed challenges that those applications faced and discussed existing solutions for them. We presented the areas that need further research investigations and identified open problems.

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Personalized Recommender for Social Media Advertisement

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Abstract— Many of the world's major e-commerce websites already use recommender systems to assist their customers in finding things to buy. The products can be recommended based on the site's best sellers, the customer's demographics, and a review of the customer's previous purchasing activity. The suggested system will employ mined knowledge gleaned from consumer behaviour and relevant persons to help consumers through the often-difficult chore of finding things they will enjoy. The project aims to build a machine learning model to predict the Click-through-rate of an advertisement displayed on social media. The system will be used by the advertiser to determine the probability of the user clicking the advertisement and then make a decision of whether publishing the advertisement on social media. Furthermore, the project will recommend the demographics of users whose predicted click rate is higher than one certain threshold to the advertiser. This operation not only can let the advertiser get the profit maximization but also make optimal investment on marketing and advertising.

Key words : **Social Media Advertisement, Click-through Rate, Customer Purchase Pattern**

I. .INTRODUCTION

Digital advertising that reaches your target audience through social media sites like Facebook, Twitter, Instagram, LinkedIn, and Pinterest is known as social media advertising. Popular social media platforms may be used by marketers and advertisers to advertise their products and drive sales. In essence, social media is a platform for communication and sharing that is supported by tools like those stated above. Social media is used to interact with friends and family that are spread out around the globe, but it is also a platform for businesses to connect with clients, investors, and staff. This is where social media marketing, a massive and rapidly expanding sector, comes into play.

Recommender systems are a powerful new technology that allows businesses to extract more value from their customer datasets. Customers can use these systems to locate things they wish to buy from a company. Customers gain from recommender systems since they can locate things they like. They, on the other hand, benefit the company by increasing sales. Recommender systems are quickly becoming a critical element in online E-commerce. The massive number of consumer data in existing corporate databases puts recommender systems under strain, and the rising volume of customer data available on the Web will put them even more under strain. New technologies are required to enhance the scalability of recommender systems considerably.

Here are some of the potential benefits of using personalization technology in social media marketing.

- Generate more leads and try to convert more users into customers.
- Improve customer engagement. Encourage
- promotions.
- Increase Facebook relevance score and ad spend.
- Increase brand loyalty.
- Increase brand awareness.

Figure 2: Users engaged in Social Media

A consumer engagement application for social media, the recommender system solution. It connects to a variety of social media data sources electronically, processes large amounts of unstructured social media communications, rates each message for brand relevance, and offers topic-specific messages for engaging customers on social media. A web-based dashboard offers the following features:

1.Visibility to relevant social media communications,

2.The option to filter suggestions by brand and hotwords (key words in the product catalog), and

3.The ability to message potential consumers and track customer reactions.

Figure 3: Importance of Social Media Marketing

II. LITERATURE SURVEY

The first step in developing a digital presence for any company is reaching potential audiences. Advertising has altered as the world moves towards more digitalization in all spheres of society. In order to reach their target customers based on keywords, advertisers invest a considerable amount of money. However, not every keyword performs as well as the others do.

Every advertiser wants to spend their cash on the most effective keywords possible, and machine learning may be used to analyze each phrase from among the many that are accessible. [1] Industry leaders have declared that organizations must use social media, such as Facebook, Twitter, Instagram, and others, in order to flourish in online settings due to social media's significantly higher level of efficiency compared to other traditional communication methods. As a result, more industries attempt to gain from social media because it may be used to develop strategy, accept management responsibilities in the plan of others, or follow instructions. [2]

In today's business environment, where customer loyalty can disappear at the slightest misstep and can also have online propagation of their unfortunate encounter with a particular product, service, or brand, social media websites offer businesses the chance to engage and interact with potential and current consumers, to encourage an increased sense of intimacy of the customer relationship, and to build all-important meaningful relationships with consumers. [3]

We have limited our options to the following techniques to estimate that:

(a)Linear regression (b)Random Forest (c)Gradient boosting

The outcome of each of the methods is the percentage of the amount that has optimal CTR and CPC. A statistical technique for determining links between dependent and independent variables is linear regression. In Predictive Analysis, Linear regression has also been found to perform better. [4] In our proposed solution it will be used for estimating CTR(Click Through Rate).

III. PROBLEM STATEMENT

The following difficulties are addressed by the work suggested in this paper:

1)To enable businesses to get a road map building brand loyalty through cost effective means of advertising which in turn will help them to expand their footholds in the world of globalization.

2)To help businesses to expand their footholds in globalization.

3)To maximize the sales with optimal investment on advertisement

IV.PROPOSED SYSTEM

The entire process of the proposed system has been classified into phases for ease of operations.

A) Social Media Data Analysis

B) Model for mapping Social Media with business requirements

C) Future Predictions (Analytics)

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The entire process of the proposed system has been classified into phases for ease of operations.

A)Social Media Data Analysis

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C)Future Predictions (Analytics)

The Proposed solution starts with a comprehensive analysis of social media data for various platforms like Facebook, Instagram, Twitter, Snapchat and Twitter. Datasets for the analysis purpose will be referred from trusted sources of Kaggle, or UCI Repository. Kaggle is a subsidiary of Google which is a popular platform for searching datasets. The machine learning community uses the UCI Machine Learning Repository, a collection of datasets, domain theories, and data generators, to empirically examine machine learning algorithms. David Aha and other graduate students from the University of California, Irvine started the archive in 1987 as an ftp archive. Since then, students, teachers, and researchers from all around the world have utilised it extensively as a key source for machine learning datasets. One of the top 100 "publications" in all of computer science, it has received over 1,000 citations as a measure of the archive's influence.

Numerous Features will be examined to determine whether they are correlated with the intended variable. This will benefit to narrow down the unwanted features and select only the important ones. These features will be

preprocessed with scaling, or performing feature engineering to increase their effectiveness with the target variable. One of the target variables is click-through rate which categorizes whether the customer has clicked on the advertisement or not. The category of customers who have clicked on the advertisement will be broken down into demographic details like Age, Gender, Time spent on social media, geographic area and pattern will be observed on social media platforms.

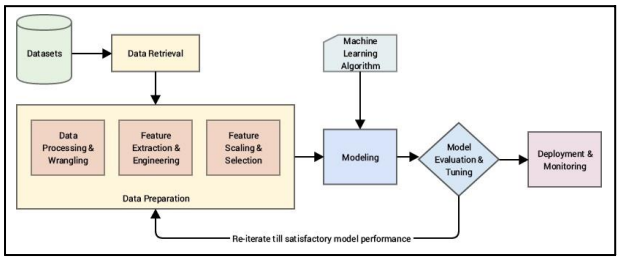

Figure 4: Feature Engineering

The Machine Learning Model will consider all the above parameters for studying and learning the dataset. Then, it will be feeded with a Test dataset and predict the optimal results for the given set of inputs. The model evaluation metrics like Accuracy, Recall, True Positive Rate, False Negative Rate, ROC Curve will be examined. Then, the best suitable model with the most effective evaluation metric will be considered and taken for hyperparameter tuning. The hyperparameters of the models will be tuned using GRID Search Technique to further enhance the efficiency of the model. Then, the model will be saved using the Pickle library.

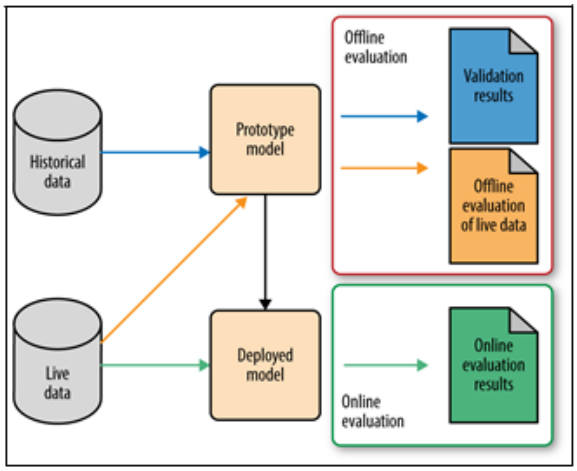

Figure 5: Architecture Diagram for the proposed model

Serialization is a way to write Python objects to disk so they can be moved anywhere and deserialized (read) using a Python script. Then, we converted the model which is in the form of a python object into a character stream using pickling.The idea is that this stream of characters contains all the information needed to restore the object from another Python script. This pickle file will be uploaded in the Flask environment.

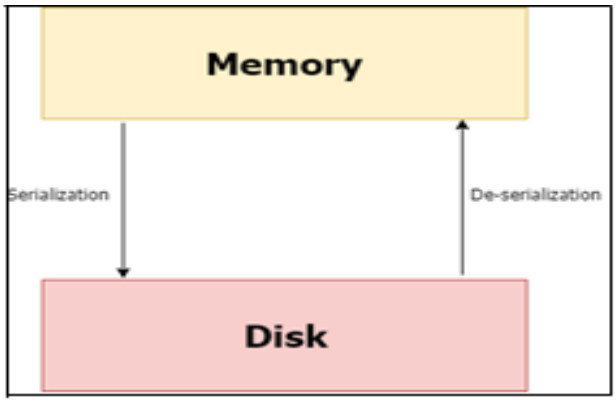

Figure 6: Pickle Module in Python

In the last phase of the project, a web-application will be built to make the software services easily available and accessible for the end-users. The user can just enter the project url and access the services. They need to provide their business details and target audience characteristics. The input will be fed to the Machine Learning Model and the output will be displayed.

Figure 7: Prototype of Prediction Web Page

Figure 8: Prototype of Report Web Page.

V.RESULT AND DISCUSSION

We begin with data cleaning of massive data files to highlight and identify the crucial features. The whole raw data contains advertising information, user profile information, user behaviour logs and advertising clicking information. Before we use them as the input data of the training model, we analyze the data in details and perform a lot of clean work for them The features of the social media data is used to record the attributes of the platform, such as domain name, device type, device connection, location, date and time, user demographics such as age, gender, interests. Similarly, we keep some main features for the advertisement, including the advertiser name, category and brand and pricing of the product.

Most of the features are categorical in nature, therefore we can perform column standardization as the 1st model is Logistic regression which assumes that features in the dataset follow gaussian distribution. The binary log-loss obtained for Logistic Regression with hyper-parameter tuning is 0.40037. The model is incorrectly projecting a lot of class 1 data points as class 0 data points, but this is predicted given the problem's class imbalance, as shown by the precision and recall matrices. The binary log-loss for Gradient Boosted Decision trees with hyper-parameter tuning is 0.39475 which is a very good improvement from the previous loss. So this implies that non-linear models work well when compared to linear models for the given data. Then, we apply the XGBoost Algorithm to the trained data, and evaluate the model performance metrics. The binary log-loss for the XGBoost model is 0.39065.

Table : Model Comparison

Model	Log Loss
Logistic Regression	0.40037
Gradient Boosted Decision Tree	0.39475
XGBoost Classifier	0.39065

To enable the stakeholders for ease-of-usage of the project, a front-end will be deployed through which users can generate predictions without installation of any softwares. They can simply navigate to the website and enter the advertisement and company data. The prediction results will be displayed on the webpage and recommendation graphs will be presented.

VI. CONCLUSION

In this Paper, various recommendation approaches are proposed to achieve maximum accuracy in user interests. The project successfully achieved the objective of an advertisement CTR prediction and recommendation system with a relatively decent accuracy. The system is beneficial to companies, brands, advertisers and also to the advertising platform as they can decrease their advertisement pollution on social media. We will see many marketing spaces and new methods being used to spread brand awareness. We think the future scope of digital marketing is very bright because people are using the digital platform at a large scale to interact with each other and pursue other activities. This means that the audience range will increase in the near future, helping several companies find potential customers.

VII. ACKNOWLEDGMENT

We express our profound sense of gratitude to the mentor, Mrs. Ashwini Patil, Assistant Professor, Computer Engineering Department, for systematic guidance and valuable advice. We would also like to thank TCET, for including this course in the curriculum. We take this opportunity to thank all my friends who helped me through their discussions and suggestions and for their help at various stages in the completion of this work.

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App Based on Removing DuplicateMultimedia (Image)

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Abstract – **: In today's day and age where amount of dataflow is astronomical. we receive many**
copies of the same multimedia, which leads to inefficient use of storage, low performance of CPU, RAM, and increasing consumption of battery. Duplicate file deduction is incredibly necessary to cut back consumption at runtime, to boost storage capability with larger accuracy and to provide a lag free/clutter free experience to the user.

Keywords: Detecting multimedia, storage management, optimization, performance.

I. INTRODUCTION

The planet is being full of varied types of transmission data within the previous couple of years. We've practiced the explosion of video content over the net in recent years as billions of videos on hold on and changed within the cloud, a large portion of that consists of near- duplicate video copies. Rapid advances in transmission technologies fuelled this growth. So, deduplication is required to eliminate the occupied cupboard space that would be used with efficiency for some other purpose. Deduplication has been usually used in backup and deposit systems to considerably increase storage use. There are differing types of deduplication techniques like data deduplication, image deduplication, and video deduplication. There are several strategies to manage file deduplication out of the higher than forms. however, removing image and video duplicates may be a troublesome task. that's as a result of the data is precisely replicated just in case of file deduplication. But just in case of a picture or video, one ought to conjointly deem

different formats within which an equivalent image or video may be stored. So, handling pictures and videos may be a quite difficult task

1.1 Image Deduplication

Image deduplication acknowledges duplicate pictures, removes all pictures however maintains one copy to form native references to the knowledge that users will access while not any drawback. the most construct within the deduplication of images is to delete duplicate pictures by 5 stages [1]comprising feature extraction, high-dimensional categorization(scaling, dynamical storage format), accuracy optimisation by extracting image edge info, centre of mass choice mistreatment cluster formation, and fixing the centre of mass image and deduplication analysis followed by comparison. When a new image comes in, the shopper 1st extracts the finger printer and sends the fingerprint to the perimeters of the storage. once the storage

aspect cannot find the corresponding finger printer in index tables, consequent image will be processed and therefore the image finger printer enraptured to index tables. as an alternative, the aspect of the storage can maintain the higher image perception-quality because the centre of mass image, and create some extent inform to the centre of mass image.

1.2 Video Deduplication

Video knowledge is a vital a part of the today's web data and it creates tons of flexibility in storage and distribution. Video deduplication is that the repetition of scenes or frames inside the video and conjointly among different videos. Consider 2 similar videos, for instance, wherever the action performed within the 1st frame of the primary video is replicated in the last frame of the second video. Then the last frame of the second video is redundant and may get replaced with a pointer. This not solely saves cupboard space effectively, but also greatly will increase the accuracy of duplicate pictures to be retrieved. the first videos got to be chunked into frames for additional process to perform video deduplication. within the case of variable-sized frames the frames are of an equivalent fastened size (in fixed-sized frames) or different sizes. almost like the technique of image deduplication, fingerprints are created for every frame and compared with the opposite ones of same or totally different videos. It can be indexed mistreatment knowledge structures like inverted index, B+ tree etc to keep up the order of the frames. so, the videos can be recovered in order and viewed by the users without any inconvenience.

II. Literature Review

Researchers are projected sure applications for image and video deduplication in real time. allow us to discuss a few of these applications' mistreatment differing types of strategies that would deliver an improved lead to day-after- day activities. Ashish Kumar Laitek al [2] projected a completely unique methodology for distinguishing and grouping near- duplicates from image streams announce on on-line social media. This is viewed because the drawback of clump the pictures

within the stream, such that every cluster consists of a series of near-duplicate images. [3] The projected technique could be a ranked one consisting of 2 levels – a worldwide feature descriptor-based similarity check at the highest level to attenuate search house, followed by neighbourhood Sensitive Hashing (LSH)-based similarity checking at ensuing level to discover similarity with solely many images, so maximising each exactness and interval. The technique consists of 2 distinct stages. The first stage is that the coaching method within which a good set of random images shared on social media sites are accustomed produce a training dataset. This method conjointly involves clump the collection of random pictures mistreatment moment-based options as they are invariant to translation, rotation and scaling and generation of visual vocabulary generation. The second stage is a web near- duplicate method of detection. Here, some candidate pictures are to be found specified every candidate image could be a illustration of a definite set (cluster) of near duplicate pictures then LSH-based similarity check between the take a look at image and therefore the known candidate pictures is performed. D wen et al [4] designed a face spoof detection system that finds the identical pictures on numerous styles of pictures for the same person. The person's face is known during this system, and is normalized. this can be cantered on an Study of Image Distortion Analysis (IDA).Four styles of ida options (specular reflection, blurriness, colour moments and variation of colour) were designed to catch image distortion in the spoof face pictures . The normalized image options area unit extracted and compared with the classifiers learned from completely different training information teams. Ultimately, if the image matches all of the images within the classifier, then the program determines that the picture could be a spoof or faux image. Zhili zhou et al [5]presented an effective a good} and efficient global context verification theme for image copy detection. The framework consists of 3 main parts, namely Scale Invariant Feature rework (SIFT) feature matching, OR- GCD extraction, and verification of SIFT matches. To obtain initial SIFT matches, the primary one matches the SIFT features between pictures supported the Bag of Words (BOW) quantization. the world context of each matched SIFT function is outlined within the OR-GCD extraction. Then, by comparing their corresponding OR-GCDs, the matched SIFT features area unit checked by extracting and concatenating 2 kinds of binary vectors — one supported intensity and therefore the other supported gradients, so the verification result will be more accustomed calculate image similarities for copy detection. The approach prompt is expanded to hide the function of partial-duplicate image detection. Potential duplicated region location could be a crucial stage for partial duplicate image detection. SGV strategy is recommended that takes under consideration not solely the relative positions of native features however conjointly their characteristic relationships to filter geometrically inconsistent matches for potential duplicated region location. Z Zhou et al [6]designed to eliminate the near-duplicate image quickly and accurately for visual sensing element networks. This is as a result of visual sensing element nodes, that's the camera nodes, produces heaps of visual information, like digital pictures and videos, that gets transmitted on visual sensing element networks. Among those, there area unit several near-duplicate pictures, which cause a heavy wastage in storage. Here the pictures area unit split into a 3*3 matrix and converted to hash code. Near-duplicate clustering is the 1st and crucial step towards the removal of near duplicates. Next, they counsel a unique seed image selection technique supported the PageRank rule, which can choose the foremost applicable pictures accurately as seed images and delete the opposite redundant pictures to complete the near-duplicate elimination. neighbourhood Sensitive Hashing (LSH) could be a known inverted index file building technique for matching high-dimensional options. The hash values of a given question operate area unit researched from inverted index file entries, so a further comparison is applied between the initial two to more validate whether or not or not features options are a match.

III. Related Work

Remo Duplicate Photo Remover is an easy-to- use application which saves a lot of time by minimizing the tedious efforts used for searching your entire device for duplicate photos. It has the potential to find and list all similar looking photos in sets taken in burst mode, resized or HDR photos, similar photos send by multiple contacts via What's App or any other instant messaging application. Remo's proprietary intelligent De-Dupe Algorithm scans for identical or similar photos on your Phone. this duplicate image finder tool searches entire drive and displays them in sets, serving you with the option to delete the identical photos.

Duplicate Photo Finder helps you free up space in your hard drive by finding and removing duplicate images in just a couple of clicks. The duplicate images will be listed at the bottom of the interface. You can then go over them one by one, and use the preview function to decide which one to keep, and which one to erase. A third option is moving the selected picture to a different folder.

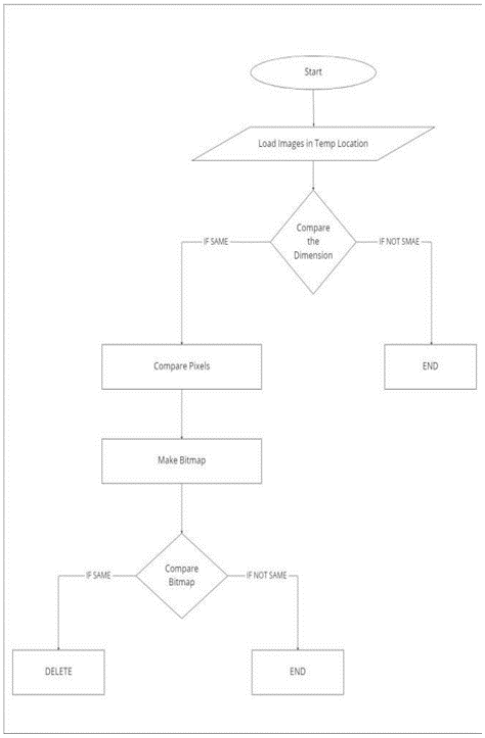
Gallery Doctor is designed to eliminate all your poor quality, blurred, duplicated and even just dull photos. It has a few tricks that can help you find photos you probably don't want any more. First of all, there's the analysis. Gallery Doctor automatically analyses all the photos on your device, and puts them into three categories: Bad photos, Similar Photos and Photos for Review. Bad photos can be categorized as such for being too dark, blurry or even boring. When you use the app, you also train it to recognize what youthink is 'bad' or not. MD 5 Hash Collision Algorithm is also widelyused for image and video deduplication.

IV. Problem Statement

Have you been bombarded with never-ending stream of images? have you felt overwhelmed when thinking of clearing your phone storage? Due to which you never delete anything from the camera's SD card until it is full? We have a solution for you.

V. Proposed Plan

The proposed system is focused on finding the duplicated image in the folder, by using image pixel processing. The process goes like: -



VI. CONCLUSION

The conclusion of this is that a robust solution was given to image deduplication, which can be used for small databases.

VII. . FUTURE ENHANCEMENTS

The process of pixel processing is slow for large databases. Also, it can't handle image of different sizes. The computation required to do such calculation also makes it unavailable for low-end devices.

VIII. ACKNOWLEDGEMENTS

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On Demand Home Services (Servizio)

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Abstract – **Home appliances are electrical/mechanical machines which accomplish some household functions, such as cooking or cleaning. The maintenance and repair of these kinds of products. Brown goods usually require high technical knowledge and skills (which get more complex with time, such as going from a soldering iron to a hot-air soldering station), while white goods may need more practical skills and "brute force" to manipulate the devices and heavy wools required to repair them. Today in digital world which makes user easy to get services online on single click. The online platform serves both the buyers and sellers' community by establishing effective communication. To design and develop a system that provides variety of services like plumbers, movers and packers, repair persons services at your doorstep in just one click. A generic platform providing owo-way communications between service provider and service receiver can eliminate the exhausting efforts of searching the suitable service provider and also ensures the intended job for the service provider. Feedback. based rating system can improve the skills of any service provider and service receiver can eventually get better service.**
over prices. Several aspects like painting, pest control, home cleaning, plumbing, electrical works and carpentry services are involved in a system to provide happy and healthy home atmosphere in order to satisfy consumers. The primary objective of the online system for household services is about delivering the home services at the doorstep just by one click. This paper discusses about main theme of the online home services, numerous services provided and how the ordering and delivery of services takes place. Online system for household services can be used by any authorized user intending to seek for household services through an ingenious web-based system or a mobile application. To provide an authenticated and authorized logia module for the users such as service seekers, service providers and the admin, by providing appropriate credentials at the time of registration. To develop a web based online system for opting household services and to develop an identical mobile application for opting the services. To design an interactive User Interface for seeking services on the go. To provide a secured online payment gateway for service seekers. To acknowledge the conformation of services opted by the users.

I. PROBLEM DEFINITION

When someone need aid with small but major household tasks, the trouble arises when service skilled persons are unavailable, or the trusted providers are impossible to find who delivers consistently flawless service on instance. Our online system for household services provides the most expedient and annoys free way to get your domestic work done. Keeping that in sense our proposed system is basically a marketplace for household services, and it is the platform where the rates were standardized and there is no necessitate
To provide Realtime tracking of technician based on geo location to provide faster service.

II. INTRODUCTION

When someone need aid with small but major household tasks, R). the trouble arises when service skilled persons are unavailable or the trusted providers are impossible to find, who delivers consistently flawless service on instance. Our online system for get household services provides the most expedient and annoys free way to get your domestic work done. We aim to help in providing optimal solutions to all your household troubles with more efficiency, ease and majorly, a delicate touch. A single click system describes booking highly skilled in-house professionals rich and gets your service done on time. Customers' overall willingness to pay is significantly and positively correlated with ting the expectation that fee-based services would be better, and with - the belief that "pay for what you get" is the right thing to do. Keeping that in sense our proposed system is basically a marketplace for household services, and it is the platform where wice. the rates were standardized and there is no necessitate haggling".
haggling over prices. Several aspects like painting, pest control, home cleaning, plumbing, electrical works and carpentry services are involved in a system to provide happy and healthy home atmosphere in order to satisfy consumers We aim to help is providing optimal solutions to all your household troubles with more efficacy, ease and majorly, a delicate touch. A single click system describes booking
highly skilled in-house professionals and gets your service done in time. Customers' overall willingness to pay is significantly and positively correlated with the expectation that fee-based services would be better and with the belief that “pay for that you get” is the right thing to do.

III. OBJECTIVE

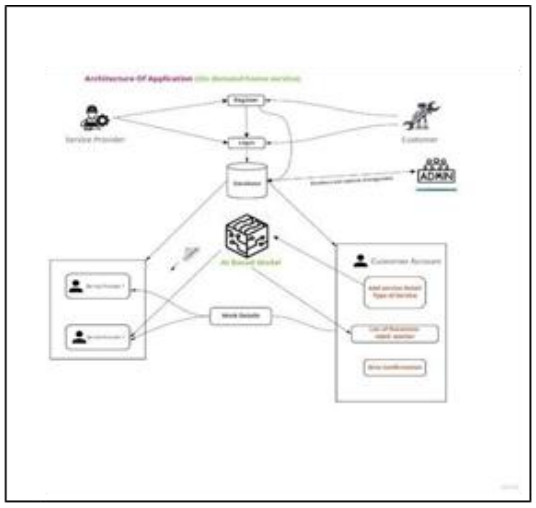
- To reduce time
- Easily available best Vendors on one click
- Easy to use
- Reduce Barden of Fining service provider

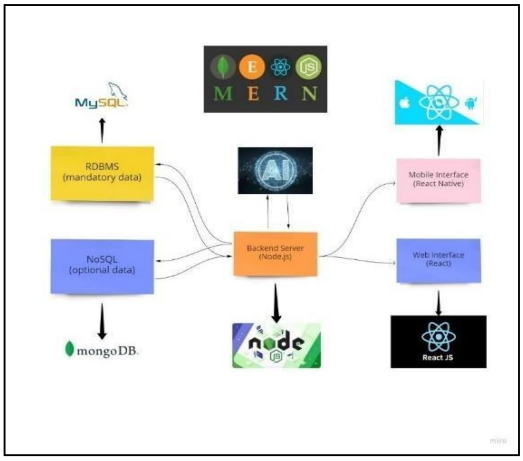
IV. HARDWARE REQUIREMENTS

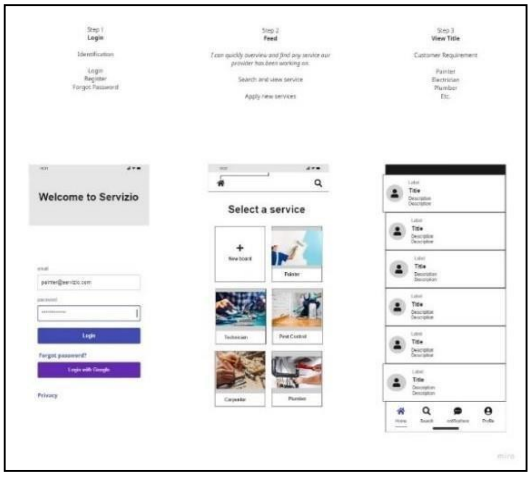
- Smart Phone
- Computer / Laptop

V. SOFTWARE REQUIREMENTS

a. Language: Java
b. Database: MySQL
c. Operating System: Windows 10 XP/7
d. Android Studio
e. Web Browse





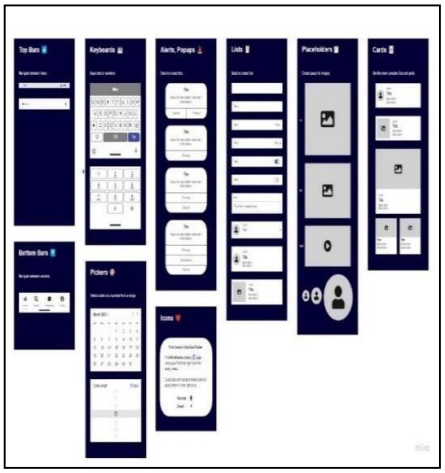


VI. RESULT & DISCUSSION

We intend to provide smooth flow of services to the user and have them updated about each step of the process. Customer relationships will be our core focus as customer experience is what defines a business. The purpose of this system is to streamline and improve the user experience. In our business "Customer is the KING".

VII. CONCLUSIONS

To reduce burden in finding in-house solutions for the services, the proposed system provides several services by providing service specialists at your doorstep in one click. A systematic mobile environment to system clients offers ease in accessing our services in a more comfortable way. With well qualified and background demonstrated professionals we make all your home cleaning. plumbing, furniture maintenance, electrical works, appliance repair, house painting, vehicle



service and many other services to be done in a click anytime from anywhere as easy as available. In Future the system can have prolonged by adding the services such as mobile and computer repair, laundry services, catering services and many more.

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A review on routing protocols in wireless sensor networks

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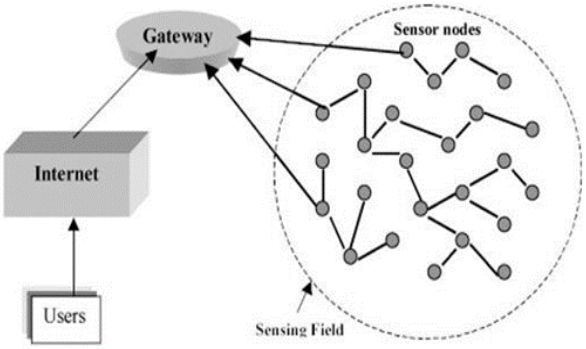
Abstract – **Now a days small size and economical sensor nodes advancement with sensing capability in wireless sensor network (WSN) technology is used in different types of physical and environmental conditions, data processing and wireless communication. Advancement in protocols designed in wireless sensor network results in use of energy efficient mechanism. To maintain the efficient route in wireless sensor network and low energy consumptions to ensure reliable multi-hop communication, routing protocols are designed in wireless sensor network. This paper presents network design objective and data centric, hierarchical, and location-based routing protocols are explained.**

Keywords: sensor nodes, design issues, routing protocols, applications..

I. INTRODUCTION

Wireless sensor networks (WSN) is specified for monitoring of an environment. data collected on wireless sensor node is processed and transmitted after sensing. this data is transmitted to sink where the application exists. in the direct communication between a sensor and the sink forces nodes to emit their messages with such a high power that their resource power could be easily depleted. there is a distant communication of the nodes with the sink so collaboration is required in the nodes. here, messages are communicated by intervening nodes so that a route with multiple links or hops to the sink is established.



II. COMPONENTS OF WSN

The sensor nodes, the sink (Base Station), and the events being monitored are the primary components of a general WSN. Where the communication among the nodes is low-power wireless link while the communication between the base stations low latency and higher bandwidth link, as shown in the fig 2

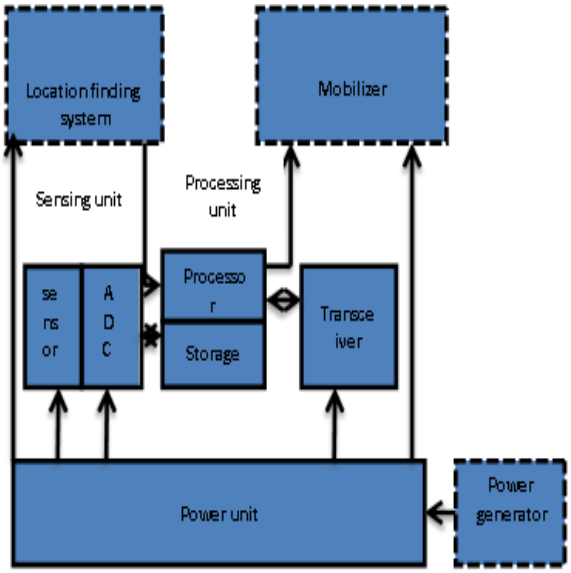


Fig 1: Components of sensing unit

A. Base Station (Sink) (BS)

The sink (some time cluster head) is an interface between the external (management center) world and computational world (sensor network). It is usually a resourceful node with unrestricted computing capability and an abundant supply of energy. In a network, there can be one or more base stations. In practice, having many base stations reduces network latency and improves data collection performance.

B. The Sensor Nodes

As shown in the Fig. 2, a sensor node is composed of four basic components: sensing unit, processing unit, transceiver unit and a power unit [3]. The sensing units are usually composed of two sub-units: Sensors and analogy-to-digital converters (ADCs). The ADC converts the analogue signals sensed by the sensor that are based on the observed occurrence into digital signals, which are subsequently fed to the processing unit.The process unit, that is generally associated a little storage device, manages / handles the procedures which make the sensor node collaborates with the others nodes in order to carry out the assigned sensor task.

III NETWORK DESIGN OBJECTIVES

Most sensor networks are application-specific, with differing needs for each application. Thus, all or part of the following main design objectives is considered in the design of sensor networks [2]

QOS support: In sensor networks, exclusive applications may additionally have specific satisfactory-of provider (QOS) requirements in terms of shipping latency and

packet loss. therefore, network protocol layout must take into account the QOS requirements

Small node size: When you consider that sensor nodes are usually deployed in tough and rigid surroundings in big numbers, lowering node length can facilitate node deployment. It will also reduce the strength consumption and cost of sensor nodes.

Low node cost: Considering sensor nodes are commonly deployed in a harsh or hostile environment in massive numbers and cannot be reused, reducing fee of sensor nodes is critical and could end result into the value discount of entire community.

Energy consumption: Considering that sensor nodes are powered by battery and it's far frequently very tough or maybe not possible to price or recharge their batteries, it is crucial to lessen the energy consumption of sensor nodes so that the lifetime of the sensor nodes, in addition to the entire community is extended.

Scalability: Since the variety sensor nodes in sensor networks are inside the order of tens, loads, or heaps, network protocols designed for sensor networks should be scalable to extraordinary network sizes.

Reliability: Community protocols designed for sensor networks must offer mistakes manage and correction mechanisms to make certain reliable information delivery over noisy, blunders-prone, and time-various wireless channels.

Self-Configurability: In sensor networks, as soon as deployed, sensor nodes must be capable of autonomously prepare themselves right into a communication network and reconfigure their connectivity within the event of topology adjustments and node failures.

Adaptability: In sensor networks, a node may additionally fail, be a part of, or move, which would bring about modifications in node density and network topology. As a consequence, network protocols designed for sensor networks must be adaptive to such density and topology changes.

Channel usage: Given that sensor networks have restrained bandwidth resources, verbal exchange protocols designed for sensor networks ought to efficaciously employ the bandwidth to improve channel usage.

Fault tolerance: Sensor nodes are liable to disasters because of harsh deployment environments and unattended operations. therefore, sensor nodes should be fault tolerant and have the abilities of self-testing, self-calibrating, self-repairing, and self-recuperating.

IV LOCATION BASED PROTOCOLS

The positions of sensor nodes are used to address them. Location information for sensor nodes is required for sensor networks by most of the routing protocols to calculate the space between two particular nodes in order that energy consumption are often estimated[5].

A. Trajectory-based forwarding (TBF):

TBF could be a routing system that requires a dense network and, as a result, the presence of a frame of reference, such as a GPS, so that sensors can locate themselves and estimate distances to their neighbors. The source specifies the trajectory during a packet but does not explicitly indicate the trail on a hop-by-hop basis. supported the situation information of its neighbors, a forwarding sensor makes a greedy decision to work out subsequent hop that is the closest to the trajectory fixed by the source sensor. route maintenance in TBF is unaffected by sensor mobility if a source route may be a trajectory that does not include the names of the forwarding sensors. to extend the reliability and capacity of the network, it is also possible to implement multipath routing in TBF where an alternate path is simply another trajectory. TBF are often used for implementing networking functions, for instance, flooding, discovery, and network management. TBF also can be used for resource discovery. another interesting application of TBF is securing the perimeter of the network.

B. Bounded Voronoi Greedy Forwarding [BVGF]:

BVGF as the only form of geographic routing, geographic routing is especially attractive in sensor networks. on this paper, greedy geographic routing refers to a simple routing scheme in which a routing node always forwards a packet to the neighbor that has the shortest distance to the vacation spot.

C. Small Minimum-Energy Communication Network (SMECN):

SMECN is a routing protocol proposed to enhance MECN, wherein a minimum graph is characterized in regard to the minimum power belongings. This asset implies that for any pair of sensors in a graph related to a network, there is a minimal energy-green path between them; That is, a route that hasthe smallest cost in terms of power intake overall feasible paths among this pair of sensors.Their characterization of a graph with appreciate to the minimal energy assets is intuitive. In SMECN protocol, each sensor discovers its instantaneous buddies by means of broadcasting a neighbor discovery message using some initial strength that is updated incrementally. In particular, the on-the-spot associates of a given sensor are computed analytically After that, a sensor broadcasts a neighbour discovery message with some initial energy p and evaluates if the theoretical set of instantaneous friends is a subset of the set of sensors that responded to that neighbour discovery message.If that is the case, the sensor will use the corresponding energy p to talk with it’s on the spot neighbors. Otherwise, it increments p and rebroadcasts its neighbor discovery message.

V DATA CENTRIC BASED PROTOCOLS

Data centric protocols differ from traditional address-centric protocols within the manner that the information is shipped from source sensors to the sink[4]. In address-centric protocols, each source sensor that has the acceptable data responds by sending its data to the sink independently of all other sensors. When source sensors submit data to the sink in data-centric protocols, intermediary sensors can perform some sort of

aggregation on the information coming from numerous source sensors and send the aggregated data to the sink. This process may result in energy savings due to less transmission required to send the information from the sources to the sink. During this section, we review a number of the data centric routing protocols for WSNs[7].

A SPIN :

Protocol turned into designed to improve conventional flooding protocols and conquer the troubles they will motive, as an instance, implosion and overlap. The spin protocols are primarily based on two key mechanisms particularly negotiation and resource edition. spin enables the sensors to negotiate with every different before any data dissemination can arise so one can keep away from injecting non- beneficial and redundant information in the network.spin uses meta-facts because the descriptors of the information that the sensors want to disseminate. spin is a three-stage protocol as sensor nodes use 3 forms of messages, adv, req,and facts, to talk. adv is used to advertise new statistics, req to request facts, and statistics is the actual message itself [8]. 4 specific spin protocols were simulated and analyzed: SPIN- PP and SPINEC. which might be optimized for a point-to- point community, and SPIN-BC and SPIN-RL, that are optimized for a broadcast community. in factor-to- point networks, the sender declares that it has new facts with an advertisement message to each neighbor. when the neighbor gets the message, the node checks the metadata to recognize if it already stores the records object. if the neighbor is interested by the statistics, it responds with a request message. upon receiving it, the sender transmits the records in a facts message.The neighbor that receives the information, tell approximately its availability to its personal buddies with an advertisement message. the three-handshake protocol is then repeated. the defined process is known as spin-pp. the set of rules SPIN-EC introduces a way within the nodes so when their present-day strength resources do not exceed a predetermined threshold that allows them to complete the 3 hand-shake protocols, they do no longer participate in the technique. the spin-bc and spin-rl editions increase the algorithm to aid broadcast transmissions. on this way, one commercial message can reach all of the buddies.

B Directed diffusion

Directed diffusion is facts-centric and all nodes in a directed diffusion-based network are application-conscious.This enables diffusion to achieve power savings via deciding on empirically true paths and by means of caching and processing records in community (e.g., data aggregation).Dire cted diffusion consists of several factors: pursuits, information messages, gradients, and reinforcements. A hobby message is a query which specifies what a person wishes and contains a summary of a sensing undertaking which is supported through a sensor community for acquiring records. Generally, facts in sensor networks are the gathered information of a physical phenomenon. such data may be an occasion that is a quick description of the sensed phenomenon. in directed diffusion, facts are known as the use of characteristic- cost pairs. The nodes replace an internal hobby cache with the hobby messages obtained.The nodes also hold an information cache in which the current information messages are stored. This structure facilitates on figuring out the information rate. On receiving this message, the nodes set up a reply link to the originator of the hobby.This link is called gradient and it's miles characterized through the records charge, duration and expiration time.

C Cougar

Beneath this technique, the network is foreseen as an allotted database in which a few nodes containing the records are temporary unreachable. given that node stores historical values, the community behaves as statistics warehouse.additionally, it's miles well worth noting that terrible propagation situations may result in the garage of erroneous information inside the nodes.Deliberating this situation,cougar presents a SQL-like interface prolonged to include a few clauses to model the possibility distribution. the sink is answerable for producing a question plan which provides the hints to choose a special node called the leader.The community leaders perform aggregation and transmit the consequences to the sink.

VI HIERARCHICAL BASED PROTOCOLS

Many research projects within the previous couple of years have explored hierarchical clustering in WSN from different perspectives. Clustering is an energy-efficient communication protocol which will be employed by the sensors to report their sensed data to the sink. During this section, we describe a sample of layered protocols during which a network consist of several clumps(or clusters)of sensors. Each clump is managed by a special node called cluster head, which is liable for coordinating the information transmission activities of all sensors in its clumps[6].

A Low-energy adaptive clustering hierarchy (leach):

it's far very strength green routing protocol. On this protocol each WSNS are divided into cluster, and each cluster includes a cluster head (CH) and variety of cluster courting, more than one cluster heads form the excessive-stage network. in terms of operation, a HRP consists of two stages: within the first stage is the set-up, whilst the sensor nodes are prepared to shape hierarchical structural design either in a cluster based totally or chain based way or, within the second degree is the steady state, whilst data are routed from sensor nodes to the base station. the hierarchical structural layout of a cluster-primarily based can be installation by means of the usage of allotted set of rules or centralized set of rules[9].

B Power-efficient gathering in sensor information systems (PEGASIS):

it's far an extension of leach protocol, that kind of a sequence from sensor nodes in order that each node transmits and gets from a neighbor and handiest single node is selected from that chain to transmit to the bottom station (sink). data is moved from node to node, combined and finally ship to the bottom station. In PEGASIS routing protocol,the development segment assumes that all the sensors have global knowledge about the community, mainly, the positions of

the sensors, and use a greedy method. whilst a sensor fails or dies due to low battery power, the chain is constructed the use of the same grasping technique through bypassing the failed sensor. in each spherical, a randomly selected sensor node from the chain will transmit the aggregated data to the Base station, accordingly decreasing the in keeping with round energy expenditure as compared to leach.

C Hybrid, energy-efficient distributed clustering (HEED):

HEED widens the leach protocol with balance energy and node degree as a metric for cluster choice to achieve energy balancing. It executes in multi-hop networks, the use of an adaptive transmission strength within the inter-clustering conversation.HEED became planned with 4 goals which can be

(i)Prolonging network lifetime with the aid of spreading energy intake,
(ii)Finishing the clustering process within a stable quantity of iterations,
(iii)Insignificant manipulate and control overhead, and
(iv) Generating properly dispensed CHS and compact clusters. in this protocol, the prevailing set of rules randomly chooses CHS to a mixture of two clustering arguments.
D threshold sensitive energy efficient sensor network protocol (TEEN):

TEEN is a hierarchical clustering protocol, which organizations sensors into clusters with every led via a CH. the sensors within a cluster document their sensed data to their CH. the CH sends aggregated statistics to better stage CH till the information reaches the sink. as a result, the sensor community in teen is based on a hierarchical grouping in which closer nodes form clusters and this method goes on the second one level until the base station (sink) is reached. TEEN is beneficial for programs in which the users can control a change-off among energy efficiency, records accuracy, and response time dynamically. TEEN uses a data- centric technique with hierarchical method. Vital functions of TEEN encompass its suitability for time critical sensing applications. Also, considering message transmission consumes extra energy than information sensing, So the power intake on this scheme is much less than the proactive networks.

But, teen is not suitable for sensing applications in which periodic reviews are wanted for the reason that person might not get any data in any respect if the thresholds aren't reached.

VII CONCLUSION

We looked at the hierarchical routing protocols leach

,PEGASIS, HEED, and TEEN in this study. Protocols are also evaluated in terms of certain factors, and their benefits and drawbacks are presented. The protocols are all based on a static network. The maximum strength of the leach is greater than the other. When it comes to scalability, the most effective HEED is there, and it's as simple as using multi-hope remember. Routing in sensor networks is a very young research area, with a limited but rapidly expanding range of effects. In this work, routing protocols are classified into three groups depending on community structure: flat-based routing, hierarchical-based totally routing, and location-based totally routing. They all have the same goal in mind: to extend the sensor network's lifetime.

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Battery Operated and Wi-Fi Enabled Sensor Data Transmission Firmware Using ESP-IDF For HVAC Devices

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Abstract—**The heating, ventilation, and air conditioning (HVAC) system is an essential part of a building's infrastructure, and it needs to operate efficiently to maintain a comfortable indoor environment. The increasing demand for energy-efficient systems has resulted in the development of smart HVAC devices that use sensors to collect data and adjust system settings accordingly. This research paper presents a battery-operated and Wi-Fi enabled sensor data transmission firmware using ESP-IDF for HVAC devices. The firmware is designed to collect data from temperature and humidity sensors and transmit it wirelessly to a central hub for processing and analysis. The system is based on the ESP32 microcontroller and is programmed using the ESP-IDF framework. The firmware's energy-efficient design ensures extended battery life, making it suitable for use in battery-powered devices. In many businesses that store and produce consumable items, temperature and humidity are crucial factors. Additionally, it is now required in organizations to measure temperature and humidity for analytical purposes, perform diagnostic and prescriptive data analysis, and provide results of reduced power consumption, assisting corporate organizations in maximizing their profit by lowering a significant portion of their expenses, namely, energy costs. bills for electricity. During a predetermined period, the temperature is continually measured, and the measurement results are saved before being computed for preventive maintenance procedures. F&B enterprises may properly carry out preventative maintenance, preserve food quality, and increase staff productivity by using this Smart Temperature Monitoring System**
.

Keywords— Battery operated, ESP32, Temperature, Humidity, FREE RTOS

I. INTRODUCTION

The heating, ventilation, and air conditioning (HVAC) systems are critical components of a building's infrastructure, and they are responsible for maintaining a comfortable indoor environment. HVAC systems account for a significant portion of a building's energy consumption, and their inefficiencies can lead to increased energy costs and environmental impact. To optimize HVAC system performance and reduce energy consumption, sensors can be used to collect data on temperature, humidity, and air quality.Traditionally, HVAC systems have been controlled using thermostats and mechanical controls, which are often not energy-efficient and do not provide the fine-tuned control required to optimize system performance. The advent of the Internet of Things (IoT) has provided an opportunity to develop smart HVAC devices that can monitor and control HVAC systems more effectively.Smart HVAC devices use sensors to collect data on temperature, humidity, and air quality and transmit this data wirelessly to a central hub for processing and analysis. The central hub can then use this data to adjust HVAC system settings, optimizing performance and reducing energy consumption. Additionally, remote access to HVAC system data allows building managers to monitor and control HVAC systems from anywhere, enabling more efficient operation and reducing energy costs.However, developing smart HVAC devices that are energy-efficient and able to operate for extended periods without the need for frequent battery replacement is a significant challenge. Battery-powered sensors must be designed to consume as little power as possible to extend battery life, and firmware must be optimized to minimize energy consumption during data collection and transmission.In this research paper, we present a firmware solution for collecting data from temperature and humidity sensors and transmitting it wirelessly to a central hub using Wi-Fi. The firmware is developed using the ESP-IDF framework and is designed to be energy-efficient, with features such as sleep modes and duty cycling to minimize power consumption. The firmware is tested on a prototype device consisting of an ESP32 microcontroller, temperature and humidity sensors, and a battery, and the energy consumption and battery life of the device are measured.

A. Objective

- To develop a plug and play device for acquiring sensor data Remotely.
- To develop a device that is battery operated with extended life
- To develop a device that is operated on a AA/AAA battery
- To develop a firmware that makes the device wireless.

B. Formula

In the Project the major research component involves increasing the life of the battery thereby making the firmware technically and economically viable. The major factors to be considered in calculating the life of the battery are the battery capacity i.e., 42 power rating in mAh of the battery and the power drained by the device connected to it per hour.

Battery Life = Battery Capacity in mAh/Power drained through it.

II. LITERATURE SURVEY

The building of an asynchronous ESP32 web server estimating the DHT22 sensor integrated ESP32 web server's high-power consumption was put out by Macheso Paul, Chisale Sylvester, Daka Chisomo, Dzupire Nelson, Mlatho J.s.P. & Mukanyiligira, Didacienne [1]. Here, a web client can read the temperature and relative humidity from a DHT22 sensor creating a flexible online dashboard with a user-friendly interface to display the sensor data. Components used were: ESP32, DHT22, NodeMCU-32S, Arduino IDE. The temperature and humidity sensor data are displayed on the web browser.

Budijono Santoso & Felita [2] developed a temperature monitoring system using ESP32 and DS18B20 temperature sensor. The DS18B20 temperature sensor will provide data to the microcontroller. The microcontroller will then transmit temperature information to the OLED SSD1306, buzzer, and system cloud for storage. The components used were: ESP32, DS18B20 temperature sensor, OLED SSD1306, buzzer, and cloud. The average temperature results between the temperature of the system and the digital thermometer, measured per degree from 0 to 5 C, were gathered and then entered the linear regression line equation.Babalola Toju, Babalola Abayomi & Olokun Mayowa [3] developed an ESP32 microcontroller Based Weather Reporting Device. After processing readings from environmental sensors, an ESP32 microcontroller displays the results on the ESP serial monitor. The display device displayed data from the sensor on the LCD panel. The LCD and the rest of the system are powered by the voltage from the solar power pack. Here, components used were: ESP32, DHT22, Tipping Bucket, light sensor, resistor, lcd. Precipitation graphs were made after the gadget was tested in public areas both within and outside of the neighborhood. Balaji, Lakshmipraba, Sagar Bawane, Ganesh Pise, and Akanksha Singh [4] developed an Efficient Multi-Protocol Gateway Design Using ESP32 for Industry 4.0 and Electric Vehicle. The components used were: ESP32, CAN module, temperature sensor, moisture sensor, vibration sensor and cloud. The CAN Module, which is attached to the car and receives signals, provides information on the engine's many properties, including the battery, engine, speed, etc. For instance, it will indicate how long the battery will last, or how long the automobile will run on this level of electricity. It will continuously find these characteristics and transmit them to the ESP32. This data will be obtained from the CAN Module and sent via the ESP32 Module, a Wi-Fi module. Along with the data from the CAN Module, the ESP32 will primarily receive data from three sensors: the temperature sensor, humidity sensor, and vibration sensor, which will provide information on the battery's exterior properties. They created a gateway utilizing ESP32 that can be utilized with Industry 4.0 and electric vehicles. This gateway would serve as a communication tool between the point of data collection and data transmission. In Industry 4.0, a gateway's job is to transfer data from a source to a device that can process it before transmitting it to a destination. Depending on the application, a separate protocol may be used between the data collection and reception processes. Souri, Kamran & Makinwa K [5] developed a 0.12mm2 7.4μW micropower temperature sensor with an inaccuracy of ±0.2°C (3σ) from −30°C to 125°C. The zoom ADC is just a 1st-order SC -ADC that has been upgraded with 24-unit sampling capacitors. The integrator is reset at the beginning of each comparison step of the coarse conversion and so acts as a sample-and-hold device. Five metal layers and a typical 0.16 m CMOS process were used to create the temperature sensor. The chip uses 8.2 W from a 1.8 V supply at 25 C and has an active area of 0.12 mm. For flexibility, the control logic, decimation filter, and digital back end were all developed off-chip.

Gaps Identified:

- Power Consumption too high.
- Requires power connection using cable send a notification using other messaging systems like SMS, Email or WhatsApp.
- Hardware size is not optimum for small places. Cabled power connection required.
- The amount power consumption is too high because the device works consistently and sends the data to cloud continuously It requires continuous power supply and internet connectivity.

III. METHODOLOGY

The device will initially connect to Wi-Fi before starting to measure the temperature and humidity. The measured temperature and humidity will then be communicated to the server utilizing ESP32's Wi-Fi and MQTT concept. Once data transmission is complete, the ESP32 microcontroller enters a deep sleep state. The device will awaken after 15 minutes. This will keep doing this until the device's battery is completely depleted. It would have a battery life of at least a year. The key component of the hardware is the HDC1080 via 12C protocol sensor, which is described below along with the methodologies used to construct it. The HDC1080 via 12C protocol sensor interfaces with the microcontroller and transmits data to the server. Once engaged, the microcontroller is programmed to receive signals from the used sensors.Power Supply Unit the ESP32 microcontroller will be supplied with power from a reliable source of voltage. The battery can offer the system's required minimum input voltage. All electrical circuits rely on their power supply unit, which is crucial.Microcontroller Unit Because it interacts with all the parts and sensors of the weather reporting system, the microcontroller unit is also referred to as the processing unit of the system. The microcontroller now has 36 GPIO pins instead of 17, and each pin is given a distinct task to complete. By Proteus, the ESP32 microcontroller is created. Sets of digital and analogue input/output (I/O) pins are included on the board.Sensing Unit A digital humidity sensor with an integrated temperature sensor, the HDC1080 delivers outstanding measurement accuracy at very little power. The HDC1080 is a low-cost, low-power alternative to competing solutions in a variety of widely used applications and 43 operates across a broad supply range. The temperature and humidity sensors are calibrated by the manufacturer.Station mode in ESP32 Station mode (aka STA mode or Wi-Fi client mode). ESP32 connects to an access point. AP mode (aka Soft-AP mode or Access Point mode). Stations connect to the ESP32.MQTT in ESP32 MQTT is a lightweight and flexible IoT message exchange and data transmission protocol, which is dedicated to achieving the balance between flexibility and hardware/network resources for IoT developers. The firmware is designed to run on an ESP32-based microcontroller and collect data from temperature and humidity sensors. The collected data is transmitted wirelessly to a central hub using Wi-Fi. The firmware is programmed using the ESP-IDF framework, which provides a comprehensive set of tools and libraries for developing firmware for ESP32-based devices.The firmware's energy-efficient design is achieved through several techniques, including sleep modes and duty cycling. The microcontroller is put into sleep mode when it is not actively collecting or transmitting data. Duty cycling is used to minimize the time the Wi-Fi module is active, reducing power consumption.The firmware is tested using a prototype device consisting of an ESP32 microcontroller, a temperature sensor, a humidity sensor, and a battery. The device is configured to transmit data to a central hub using Wi-Fi. The firmware's energy consumption is measured using a

power meter, and the battery life is calculated based on the measured power consumption and battery capacity.

- Firmware Development

The firmware is developed using the ESP-IDF framework, which provides a range of tools and libraries for developing firmware for ESP32-based devices. The firmware is designed to collect data from temperature and humidity sensors and transmit it wirelessly to a central hub using Wi-Fi. The firmware's energy-efficient design is achieved through several techniques, including sleep modes and duty cycling.

- Prototype Device Construction

A prototype device is constructed to test the firmware's performance. The device consists of an ESP32 microcontroller, temperature and humidity sensors, and a battery. The sensors are connected to the ESP32 microcontroller, which is programmed with the firmware developed in step 1. The battery is used to power the device.

- Testing of Energy Consumption and Battery Life

The energy consumption and battery life of the prototype device are measured to test the firmware's performance. The device is configured to transmit data to a central hub using Wi-Fi. The firmware's energy consumption is measured using a power meter, and the battery life is calculated based on the measured power consumption and battery capacity. The device is left running for several days to test its battery life.

- Data Analysis

The data collected during testing is analyzed to evaluate the firmware's energy consumption and battery life. The firmware's performance is compared to other existing solutions, and the results are discussed.

IV. Result and discussion

By the series of multiple experiments performed in the due course with the objective to reduce time spent in active mode by ESP32 which was required to send data to the central server via Wi-Fi. The device will be able to collect data from the temperature and humidity sensors and transmit it wirelessly to a central hub using Wi-Fi. The firmware's energy-efficient design ensured extended battery life, with the device able to operate for several months on a single pair battery. The results of the testing indicate that the firmware developed in this research paper has the potential to be used in smart HVAC devices to optimize system performance and reduce energy consumption. The ability to remotely monitor and control HVAC systems using smart devices enables more efficient operation and reduced energy costs. The firmware's energy-efficient design is a significant advantage, as it enables extended battery life and reduces the need for frequent battery replacement.The research presented in this paper provides a foundation for developing energy-efficient smart devices for other applications, further advancing the field of IoT. Future research could explore the use of additional sensors and data analysis techniques to improve the performance of smart HVAC devices. Additionally, the firmware developed in this research could be modified or optimized for use in other types of devices or applications.

V. Conclusion

As a result of experiments, it was found that it was necessary to bring ESP in active mode to send data to the central Server With the help of Wi-fi but Keeping ESP in Active mode reduces battery life drastically. So, it was required to reduce the time taken by ESP 32 to connect to Wi-Fi and send data to central server. It was evident from Figure 3.1 that if ESP remains in active mode for 5 seconds and in deep sleep mode for 15 minutes, the battery will last for merely 75 days which is approx. 2.5 months while if it takes 2 seconds it would last for 167.5 days which is approximately equal to 5.5 months. While in 1 second it would last for 375 Days which is near about or greater than our estimated target. The theoretical values of the power consumption of ESP 32 in its full working condition is 230mA while experimental value in condition required by our ESP i.e., only Wi-Fi and required peripherals is merely 70mA which gives the battery life as 585.9375 days when the round time required by the ESP 32 to awake from deep sleep mode connect to Wi-Fi, send data, and return to deep sleep mode is 2 seconds. Thus, our System could survive for more than a year and we managed to Manage the time in active to be less than 2 seconds by developing a firmware for it. The use of sensors to collect data on temperature, humidity, and air quality can help optimize HVAC system performance and reduce energy consumption. The ESP32 microcontroller and ESP-IDF framework provide a powerful and versatile platform for developing firmware for IoT devices. The firmware presented in this research paper is designed to be energy efficient, ensuring extended battery life for battery-powered devices. The firmware's ability to collect and transmit data wirelessly makes it suitable for use in smart HVAC devices, enabling remote monitoring and control of HVAC systems. Further development of this firmware could lead to the development of more energy efficient.

Acknowledgment

A sincere gratitude to Agile Connects Pvt. Ltd. for providing support for this study. We acknowledge the faculty of Thakur College of Engineering and Technology, whose knowledge and experience were invaluable in helping us finish the project. We appreciate the help with project development provided by Mr. Jimit Damania, Solution Architect of Agile Connects Pvt. Ltd. and the comments made by Mr. Dayal Nigam of Agile connects Pvt. Ltd. that significantly enhanced the manuscript. Although any inaccuracies are our own and shouldn't reflect negatively on the reputations of these great individuals, we are also extremely thankful to all the stakeholders who provided feedback on an earlier draft of the manuscript during the project's development and the writing of the article.

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Node Prediction using Graphical Neural Networks (GNN)

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Abstract – **Over the past few years, node classification issues on graphs have been handled much better by Graph Neural Networks (GNN) and label propagation-based algorithms. But in addition to their reliance on complex designs and algorithms, there are a number of important technical issues that are occasionally disregarded but may still be necessary for achieving appropriate performance. This article provides an example of a straightforward Graph Neural Network (GNN) model application. On the basis of a publication's words and citation network, the model is used for a node prediction job on the Cora dataset to determine its topic. Two components make up the suggested system, and each one makes use of Graph Neural Networks in some way.**

Keywords: Graph Neural Networks, Node Classification, baseline model..

I. INTRODUCTION

Node classification is one of the most notable examples of the growing attention recently given to machine learning tasks involving graphs. Since graph convolutional networks (GCN) had such remarkable success, a number of high-performance GNN designs have been put out to address the node categorization issue. There are structural linkages between the items in many datasets used in different machine learning (ML) applications, and these interactions can be shown as graphs. Analysis of social and communication networks, traffic forecasting, and fraud detection are some of these applications. Graph illustration Building and training models for graph datasets to be used for a range of ML purposes is the goal of learning.

The proposed work shows a straightforward application of a Graph Neural Network (GNN) model. On the Cora dataset, the model is employed for a node prediction job to identify a paper's topic based on its words and network of citations.

The creation of novel medications (molecules) can be quite expensive and time-consuming. Applying deep learning models to predict the characteristics of known compounds helps speed up the search for effective medication candidates like solubility, toxicity, affinity to the target protein, etc. The space in which we look for and study molecules are only a small portion of the total space due to the astronomically large number of potential molecules.

II. LITERATURE SURVEY

[1]. The proposed system by Wang and others published in December 2021 suggests a new framework for merging feature and label propagation, we analyze several training techniques for deep GNNs, and we propose a robust loss function. These methods can be used with a variety of GNN models, typically requiring only minor adjustments to the architecture, loss function, and data processing.

[2]. The proposed system by Zhang and others focuses on Natural language processing (NLP) and relies heavily on text classification, a task to which Graph Neural Networks (GNN) has lately been put to use. However, neither the existing graph-based works nor the inductive learning of new words can fully capture the contextual word associations within each page. In this paper, we suggest using a GNN for inductive text categorization to solve such issues. The fine-grained word representations are then learned using a GNN based on the local structures of each text's unique graph. This technique can also successfully create embeddings for words that haven't been seen before in the new document. The document embedding is then completed using the word nodes. Extensive tests on four benchmark datasets demonstrate that our solution performs better than cutting-edge text classification techniques.

[3]. The proposed system by Ryu and others tells us that in numerous molecular applications, deep neural networks have outperformed current machine learning algorithms. Because of the uncertainty in predictions caused by inadequate training data in terms of quality and quantity, it is still challenging to make decisions confidently in practical applications. Here, using three numerical experiments, we demonstrate how Bayesian neural networks may be used to measure the uncertainty associated with predicting molecular properties. In particular, it allows us to break down the predicted variance into uncertainty produced by models and data, which clarifies where errors are coming from. We demonstrate that data noise had a more significant impact on the data-driven uncertainty compared to the model-driven uncertainties in the logP forecasts.

[4]. What Situations Require GNN for Node Classification? Instead of seeing the nodes as a collection of randomly distributed samples, Graph Neural Networks (GNNs) enhance basic Neural Networks by using graph structure based on the relational inductive bias. Through GNNs are thought to perform better than basic NNs at real-world tasks, it is known that in some situations, GNNs perform as poorly as graph-agnostic NNs. Two metrics that examine the situations in which the edge bias in features and labels does not offer advantages were presented by the authors to help identify these scenarios. So here basically the measures mentioned are based on the signal processing of graphs and also the hypothesis testing. Also for forecasting the performance advantages it may be based upon the metrics to determine the graph models and also the threshold value.

[5] This paper shows the significance of the estimation of nodes in a knowledge graph in GENI, a

technique for handling the issue of evaluating node importance in KGs, which is presented in this study.GENI enables applications of several downstream applications Several solutions have been created to deal with this issue for generic graphs, but they either don't properly make use of the data in KGs or don't have the flexibility needed to depict complicated relationships between entities and their importance. This paper investigates supervised machine-learning strategies to overcome these constraints.

III. FLOWCHART

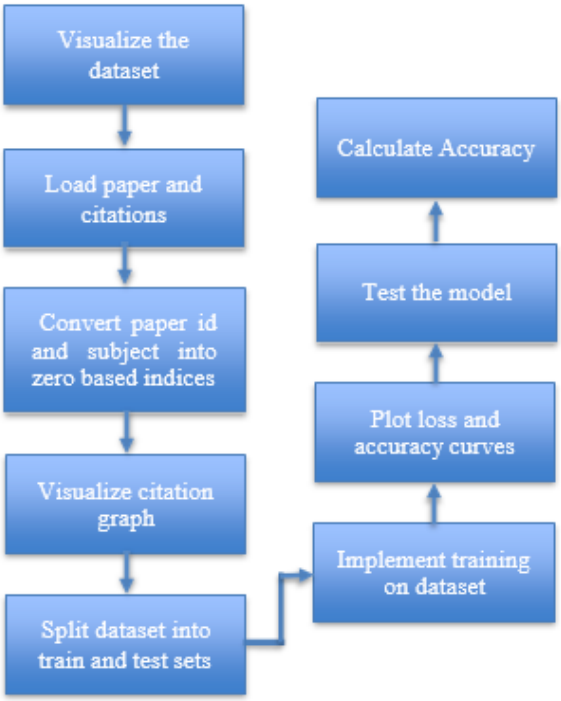


Fig.1: Flowchart of the proposed model

IV. METHODOLOGY

Dataset: So the dataset which we have chosen to train our model is the Cora dataset. The Cora dataset contains papers on 7 different subjects namely Rule Learning, Neural Networks, Probabilistic learning, Theory, Code based, Genetic Algorithm, and Reinforcement Learning. These 7 subjects are 7 classes of the dataset. The dataset in total contains 2708 scientific papersThe dataset also contains citations which have a total of 5429 links and also each paper has 1433 words. The cora dataset is being divided into two separate files namely cora.cites and cora.content. The cora.cites has the citations records and include records in two different columns of citing_paper_id which is the source and cited_paper_is which is the target. The cora.content has all the records of the paper with a total of 1435 columns. 1433 columns are of the words and the extra two columns are of the subject and paper_id respectively.

Algorithms:

1) GNN: Graph Neural Networks (GNNs) is a type of deep learning method that performs inference on graph-described data.They can be used in graphs to perform nodes, edge, graph level prediction tasks.GNNs is an advanced version of Convolutional neural network(CNNs) and can perform lot of application which are not possible with CNN. Nodes are defined by their neighbors and connection this is an assumption in GNN. Basically the connection and neighbors of a node is important information source in GNN. If any of this information was removed GNN won't be possible on such graph.As a result,the complete definition of nodes lies on both neighbors and connection.
Consider this, To represent the characteristic of the node we give a state (X) to the node.This state (X) of node can be used to predict a output(O). The Last state of node (X N) is known as"node embedding." Hence, GNN is used to determine nodes of a particular node.

2) GCN: So basically GCN is a type of Convolutional neural network that can work on graphs directly and takes advantage of their structural information. Most of the GNNs are GCNs. Convolutional in GCN is no different than convolution in convolutional neural networks. To learn form features from its neighboring cells it acts as sliding windows on the whole images. The filter uses weight sharing to learn different facial features in systems(image recognition) nad bring the same functionality to Graph Convolutional networks, where the model learns features from neighboring nodes. It is developed to work on non-euclidean data structures where the order of node edges varies, this is the major difference between GCN and CNN.

Types of GCNs:

i) Spatial GCNs: To learn from graphs it uses spatial features which are located in spatial space.

ii) Spectral GCNs: For information propagation along nodes, it uses the Eigen-decomposition of graph Laplacian matrix. The inspiration for these networks is taken from wave propagation in signals and systems.

The proposed system is an application of a Graph Neural Network. The application is Node classification using Graph Neural Networks in which the nodes are being classified using the GNNs. There are many proposed systems existing in which nodes were being classified using various algorithms and models like GCN etc but here in our proposed system, we make use of GNN to classify the nodes from the data provided.
Node Classification is basically composed of predicting the given information on the basis of given input by classifying the nodes. The dataset which we have used here is the dataset named 'Cora'. This dataset basically consists of 2708 papers on different subjects classified into seven classes. These classes are nothing but the subjects namely Neural networks, Rule learning, Genetic Algorithm, Reinforcement learning, CodeBased, Theory, and Probabilistic methods. The citation comprises 5429 links which is nothing but the edges. Each paper in the dataset has a vector size of 1433 which basically corresponds to words in the dataset. The dataset named Cora which we are using here in our proposed system has 2 separate files: 1)Cora. cites which include the citation record of the target and the source.

2)Cora. content which includes the records of the paper which has 1435 columns.

The first step to start the implementation of the model was to search for a relevant dataset which I found Cora to be. The system basically starts with downloading the dataset in our environment using the URL of the dataset. So after this, the next thing to do is to load the data and visualize the data and its contents present in the dataset. Here the citations are being loaded in the panda framework. Next, we display the citations in the Dataframe. The citations table basically includes the target and the source. The target column contains the paper ids that are being cited by the paper ids which are present in the source column of the citations table. The next thing to be done is to load the data of papers in the data frame. Similarly, as for citations the sample of papers also needs to be displayed in the data frame which includes the paper id and also the subject columns and also displays whether a term exists or not in the respective papers.

```
[ ]              1416     227              769                  929  \
    paper_id  1108363   30895          1128959               105899
    term_0          0       0                0                    0
    term_1          1       0                0                    0
    term_2          0       0                0                    1
    term_3          0       0                0                    0
    ...           ...     ...              ...                  ...
    term_1429       0       0                0                    0
    term_1430       0       0                0                    0
    term_1431       0       0                0                    0
    term_1432       0       0                0                    0
    subject   Case_Based  Theory  Genetic_Algorithms  Probabilistic_Methods

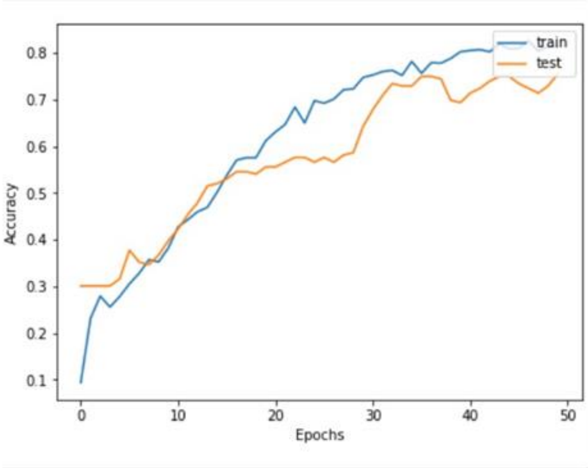
                 2644
    paper_id  1108570
    term_0          0
    term_1          0
    term_2          0
    term_3          0
    ...           ...
    term_1429       0
    term_1430       0
    term_1431       0
    term_1432       0
    subject    Theory
```

Fig.2: Sample of paper Dataframe

Next is to count the number of papers for each subject and display the count

```
Neural_Networks            818
Probabilistic_Methods      426
Genetic_Algorithms         418
Theory                     351
Case_Based                 298
Reinforcement_Learning     217
Rule_Learning              180
Name: subject, dtype: int64
```

After displaying the count of papers the data need to be converted into zero-based indices. Then comes the plotting of the citation graph and visualizing it.



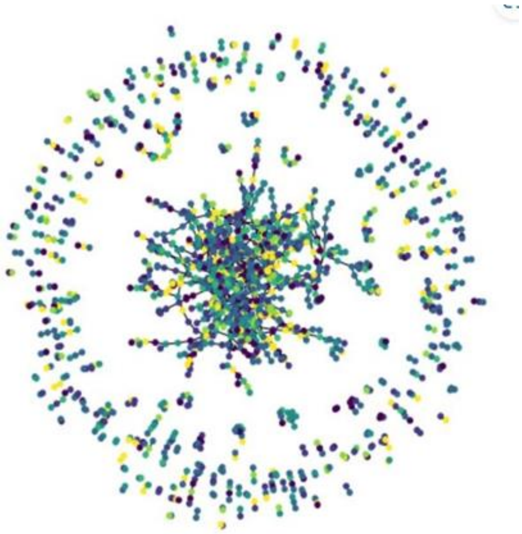
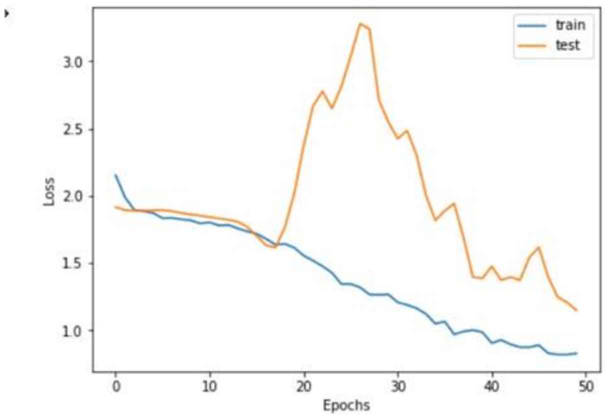


Fig.3: Visualization of citatioNS

Every node in the figure represents a paper and



different colors are for different subjects. Then the data is split into the training data and the testing data and also the size of both sets is displayed. Train the input model and display the accuracy curves along with loss curves.

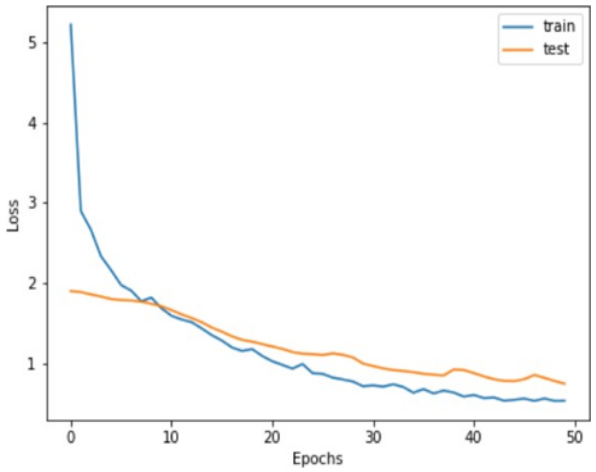


Fig.4: Accuracy and Loss curves of the baseline model

The existing model contained the baseline neural a network model for training the data. So here we used GNN for our proposed system for training our model. In the Baseline NN model, there is a need to implement a baseline classifier in which there are five FFNs i.e. the FeedForward networks along with the skip connections. Plot the curves of the baseline NN model. Lastly, examine the model. As a result instances of the probability of word presence are displayed. The test accuracy calculated of the Baseline model is calculated to be 73.52%. The next step is to build a Graph Neural Network. So first prepare the data. Here, words are the node features and citations are the edges of the links we can say of the dataset. Next prepare, aggregate and update the layers of GNN. Then implement a GNN Node classifier. Train the GNN model for around 250 epochs. Plot the curve.

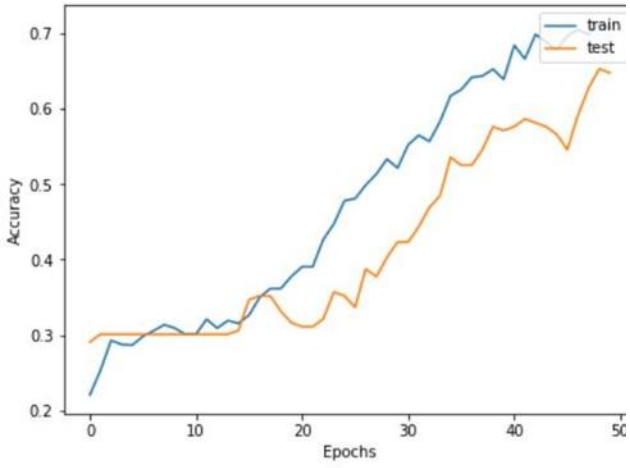


Fig.5: Accuracy and loss curves of the GNN model

Lastly, examine the predictions of the GNN model. The test accuracy being calculated is 84.6%.

V. Result and analysis

So here we randomly took the words from the dataset and generated the instances of the probabilities of the words present in the dataset for each subject. And finally using the baseline model the predictions were as below

```
1/1 [==============================] - 1s 1s/step
Instance 1:
- Case_Based: 10.39%
- Genetic_Algorithms: 0.82%
- Neural_Networks: 41.85%
- Probabilistic_Methods: 38.51%
- Reinforcement_Learning: 1.72%
- Rule_Learning: 1.54%
- Theory: 5.18%
Instance 2:
- Case_Based: 5.3%
- Genetic_Algorithms: 1.41%
- Neural_Networks: 23.19%
- Probabilistic_Methods: 19.6%
- Reinforcement_Learning: 3.73%
- Rule_Learning: 3.1%
- Theory: 43.66%
Instance 3:
- Case_Based: 16.55%
- Genetic_Algorithms: 1.54%
- Neural_Networks: 67.46%
- Probabilistic_Methods: 3.01%
- Reinforcement_Learning: 5.08%
- Rule_Learning: 0.72%
- Theory: 5.64%
Instance 4:
- Case_Based: 2.06%
- Genetic_Algorithms: 1.29%
- Neural_Networks: 49.49%
- Probabilistic_Methods: 24.95%
- Reinforcement_Learning: 1.54%
- Rule_Learning: 4.72%
- Theory: 15.96%
Instance 5:
- Case_Based: 11.79%
- Genetic_Algorithms: 5.32%
- Neural_Networks: 30.92%
- Probabilistic_Methods: 9.13%
- Reinforcement_Learning: 1.77%
- Rule_Learning: 15.74%
- Theory: 25.31%
Instance 6:
- Case_Based: 17.57%
- Genetic_Algorithms: 3.48%
- Neural_Networks: 23.68%
- Probabilistic_Methods: 5.16%
- Reinforcement_Learning: 3.52%
- Rule_Learning: 7.09%
- Theory: 39.5%
Instance 7:
- Case_Based: 2.38%
- Genetic_Algorithms: 84.53%
```

Fig.6: Predictions based on the Baseline model

Similarly, by taking random words from the dataset, using the GNN model we get the following probabilities.

```
Original node_features shape: (2708, 1433)
Original edges shape: (2, 5429)
New node_features shape: (2715, 1433)
New edges shape: (2, 5478)
1/1 [==============================] - 2s 2s/ste
Instance 1:
- Case_Based: 0.84%
- Genetic_Algorithms: 1.06%
- Neural_Networks: 89.26%
- Probabilistic_Methods: 6.64%
- Reinforcement_Learning: 0.81%
- Rule_Learning: 0.58%
- Theory: 0.8%
Instance 2:
- Case_Based: 4.28%
- Genetic_Algorithms: 56.55%
- Neural_Networks: 7.19%
- Probabilistic_Methods: 1.8%
- Reinforcement_Learning: 22.63%
- Rule_Learning: 3.33%
- Theory: 4.22%
Instance 3:
- Case_Based: 0.03%
- Genetic_Algorithms: 0.19%
- Neural_Networks: 98.3%
- Probabilistic_Methods: 0.83%
- Reinforcement_Learning: 0.27%
- Rule_Learning: 0.09%
- Theory: 0.29%
Instance 4:
- Case_Based: 0.02%
- Genetic_Algorithms: 0.16%
- Neural_Networks: 97.95%
- Probabilistic_Methods: 1.14%
- Reinforcement_Learning: 0.23%
- Rule_Learning: 0.09%
- Theory: 0.4%
Instance 5:
- Case_Based: 0.7%
- Genetic_Algorithms: 3.96%
- Neural_Networks: 85.44%
- Probabilistic_Methods: 3.8%
- Reinforcement_Learning: 3.26%
- Rule_Learning: 0.95%
- Theory: 1.9%
Instance 6:
- Case_Based: 0.31%
- Genetic_Algorithms: 1.32%
- Neural_Networks: 91.24%
- Probabilistic_Methods: 3.27%
- Reinforcement_Learning: 1.56%
- Rule_Learning: 0.62%
- Theory: 1.68%
Instance 7:
- Case_Based: 1.63%
- Genetic_Algorithms: 47.78%
- Neural_Networks: 3.74%
- Probabilistic_Methods: 0.28%
- Reinforcement_Learning: 41.32%
- Rule_Learning: 2.53%
- Theory: 2.71%
```

Fig.7: Predictions based on the GNN model

VI. Conclusion

As a result, we draw the conclusion that the GNN model performs better than the baseline model and that its predictions or probabilities are higher. In the topic articles, certain citations were inserted using GNN.

This paper also illustrates the use of GNN for node classification. It includes educating the GNN to forecastnode labels based on their neighborhood structure. The adjacency matrix and node characteristics are used to conditionally define the GNN model. There are structural linkages between the elements in many datasets used in various machine learning applications, and these interactions can be shown as graphs. Applications include traffic forecasting, fraud detection, and social and communication network analysis. Building and training models for graph datasets that may be used for machine learning tasks is the main objective of Graph Representation Learning

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Security Analysis of Cloud Computing Authentication Frameworks

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Abstract – **A digital environment where cross-platform, external cloud services are used to transport every informational detail from one smart device to another. Smart technologies, including smartphones, are playing vital roles in completing daily tasks and official assignments that call for access to many crucial data kinds. There are several research that suggest and develop various authentication and security techniques for Smartphone and cloud computing technologies. This examine affords a novel cloud computing- primarily based device for performing handwritten password authentication as an Internet service. We might be able to deploy many cutting-edge practical algorithms, like a ok-nearest neighbour and an synthetic neural network classifier used for big-scale person reputation, using the cautioned cloud-based totally authentication platform. For each recognition and blunders fee accuracy, the classifier algorithm makes use of a parallel classifier aggregate approach.**

Keyword-Handwriting popularity, Mobile Cloud Computing, Parallel classifier mixture.

I. INTRODUCTION

A digital environment where cross-platform, external cloud services are used to transport every informational detail from one smart device to another. Smart technologies, including smartphones, are playing vital roles in completing daily tasks and official assignments that call for access to many crucial data kinds. There are several research that suggest and develop various authentication and security techniques for Smartphone and cloud computing technologies. Multiple authentication threats and other applicable problems with contemporary smartphone and cloud computing technology have been efficiently solved by using those investigations [1]. The CCS dynamically arranges servers and VMs to function several services, with each provider being broken down into a number of duties which might be done on VMs simultaneously. Although parallel execution and dynamic organization permit the CCS to deliver services efficiently, they also pose a severe threat to CCS security. As a result of the CCS being virtualized, VM security has emerged as a new security component that was absent from the conventional system. Similar elements of VM security include the isolation of distinct VMs and the simultaneous failure of co-located VMs because of an assault on the host server [2].Cloud computing and Software-Defined Networks (SDN) have attracted a lot of interest from both academics and business. The network control plane and data plane are separated by SDN. A control programme may quickly identify the real-time network status and configure high-level state approaches. The advancement of network functions is streamlined by the controller's centralization [3]. The core data plane in SDN can be effectively controlled through network programmability. The essential framework of SDN architecture is focused on applications and network services while network control is decoupled from forwarding capabilities and made programmable. SDN has made significant contributions to the networking paradigm for cloud computing [4]. Threats to data security are frequently used to describe data security. Because it is vulnerable to several dangers, the site of cloud computing is not exceptional. The main cause used for that cloud computation operates by fusing a variety of unique technologies. It is crucial to employ the threat

control procedure to stabilise the advantages of safety risks and cloud computing. Reporting, designing, and implementing the management of patron security and internal security controls is the responsibility of the CSP [5].

II. BACKGROUND

To show where the study is currently going, these authentication difficulties are further summarised and displayed in the form of several graphs. Finally, using those findings as a basis, the author highlights the most recent and current authentication uncertainties, dangers, and other relevant concerns to address outstanding research questions and future directions in authentication for smartphones and cloud computing [1]. This study suggests a correlation metric for measuring the effectiveness of random services. This correlation statistic is more accurate and realistic since it fully accounts for the impact of security considerations. The experimental findings illustrate the significant S-P correlation and the dynamic change in performance brought on by security considerations. Security must therefore be included while modelling and evaluating the QoS metric [2].

This paper proposes a novel methodology for trust assessment of cloud service security and reputation. The security of a cloud service is assessed using the security metrics that are specific to clouds using the security-based trust evaluation approach. Additionally, the reputation-based trust evaluation method uses feedback ratings on cloud service quality to analyse a cloud service's reputation. The proposed trust assessment methodology may more effectively and efficiently evaluate the trustworthiness of a cloud service than current trust assessment approaches, according to tests utilising a real-world author service dataset and a synthesised dataset of security measures [3]. A thorough investigation on DDoS assaults in SDN and cloud computing settings was done by the author of this research. The author considers DDOS attacks in the context of SDN and cloud computing as far as their characteristics go, and they are examined in terms of new patterns and characteristics in distributed

computing and SDN. The author then provides a thorough analysis of the defences against these attacks [4]. In this paper, the author provides a verification method that is mostly based on the concepts of BFT and blockchain technology to overcome those current issues. These CSPs are no longer required to work together or exchange information. These grab hash values can be examined by a customer to determine whether data manipulation has occurred [5].

III. PREVIOUS WORK DONE

To identify current authentication dangers and issues in the literature, the suggested technique undertook an extensive security analysis and assessment of major Smartphone and cloud computing authentication frameworks and protocols. To show where the study is currently going, these authentication difficulties are further summarised and displayed in the form of several graphs. Finally, using those findings as a basis, the author highlights the most recent and current authentication uncertainties, dangers, and other relevant concerns to address outstanding research questions and future directions in authentication for smartphones and cloud computing [1]. This study suggests a correlation metric for measuring the effectiveness of random services. This correlation statistic is more accurate and realistic since it fully accounts for the impact of security considerations. The experimental findings illustrate the significant S-P correlation and the dynamic change in performance brought on by security considerations. Security must therefore be included while modelling and evaluating the QoS metric [2]. In this paper, the author triumph over those existing troubles by providing a verification scheme primarily based on the notions of BFT and blockchain technology. More than one CSP will be hired to save and perform computations on client information. Each CSP will need to periodically compute a grasp hash fee in their database to be stored on a public blockchain consisting of Bitcoin or Ethereum. These CSPs no longer need to collaborate or communicate with one another [5].

IV. EXISTING WORK DONE

Only a broad overview of the security model is given. The absence of any user-defined authentication roles in this framework posed the biggest authentication problem. Furthermore, the framework is dependent on external suppliers for brand-new services, and no external authentication

scenarios are covered. Artificial neural networks are used to introduce a mobile biometric cloud framework. The presentation of a sophisticated mobile-based credential protocol [1]. STRAF is a brand-new methodology for evaluating trust in cloud services that is based on reputation and security. This framework, which is an expansion of the earlier work, may be broken down into three primary parts that collectively comprise [3].

Fundamentally, Mininet has been at the forefront of cutting-edge development and testing of novel controller applications. Mininet is used by some scientists as simulation equipment for lab tests. Each connected hub (switch, have, controller) in Mininet continues to function as a light-authority virtual computer. With the intention of only accessing the assets within its namespace, the virtual machine continues to run in its own Linux component namespace. Since it provides excellent authenticity and constant change from development to deployment, analysts have generally embraced it. These existing approaches are enhanced and developed by the simulation- based approach known as fs-sdn [4].

The multi-CSPs, BC-application, and client— whose functions are described below—will make up the three key components of the verification process, which correspond to the three main phases of the proposed verification method [5].

V. ANALYSIS AND DISCUSSION

The introduction of smartphones has eliminated the need for smartcards in several fields. In contemporary Smartphones like the iPhone and Samsung mobiles, Authentication is weak and is easily compromised via several breaches [1].

Results were obtained by way of analysing the primary and second experiments. The following optimization guidelines approximately balancing the safety and the carrier performance now are proposed.1) When the variety of to be had res theses (such as the CPU and the range of VMs) is restricted in CCS, and writer-depth safety mechanism may also convey a higher carrier overall performance.2) Deploying more VMs improves the service performance faster than enhancing the CPU processing creator of every VM. Three) To concurrently improve the safety and the service performance, making use of a writer CPU with an excessive processing creator is better than deploying more VMs [2]. The method outperforms the opposite strategies, whilst the percentage of malicious remarks rating increases. As predicted, the above experimental consequences suggest that the STRAF combining the security-primarily based accept as true with evaluation technique and the reputation-primarily based believe evaluation technique is indeed beneficial in improving the consider assessment of cloud services [3].Traditional networking devices determine the way to deal with an incoming packet primarily based on its IP destination deal with, however SDN pursues a float-based totally forwarding approach in which many header fields decide a way to take care of the approaching package. The idea of a centralised network manipulate plane is followed via SDN, and programmability is introduced. This can simplify community control and give the chance to organise protection methods at runtime. In this technique, SDN may respond quickly to malicious traffic and community irregularities [4]. The master hash for each CSP's database must be produced, and it is then kept on the BC. Clients will receive the block header for use in verification. The malicious CSP will be identified when

the client checks the master hash values of each CSP since its hash value will be different from the others. As a result, customer data is not altered or destroyed without authorization or detection [5].

VI. PROPOSED METHOD

A handwriting authentication system confirms the user's identification based on his biometric features to ensure secure access to cloud services. An application that serves as a conduit between the cloud and the mobile user is created on the client side. It is used to gather and encrypt biometric information (such as a handwritten password) in preparation for sending it to the cloud. The touch screen of the smartphone is used by the mobile user to enter his password. As a result, in addition to using his right password, the person can also be recognised by his distinctive handwriting. It is vital to encrypt the biometric data before it is delivered to the cloud to guarantee data security and privacy when using cloud services.

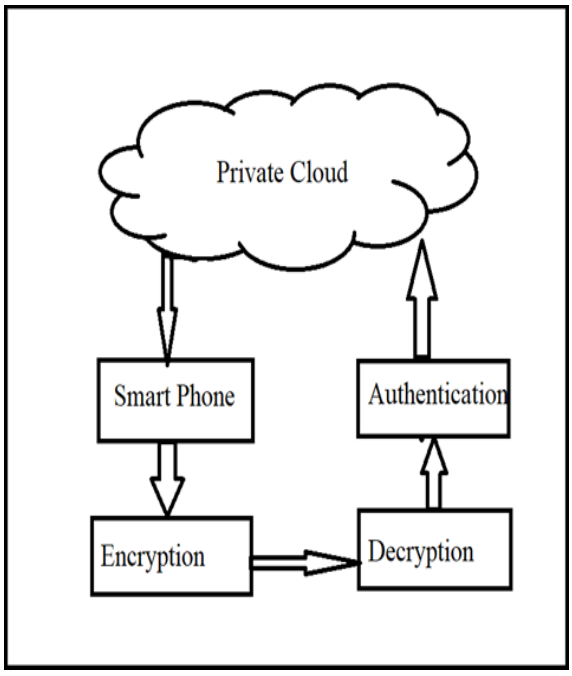

Figure 1: Proposed Method

A.Pre-processing

The new image should be pre-processed before feature extraction because the input image comprises characters of various sizes and spacing.

B.Features Extraction

This module analyses and extracts the characteristics of handwritten characters for use in training and verification. It is a crucial phase since its efficient operation raises the verification rate and lowers misclassification. Handwritten digits can be used to extract two different sorts of information. Binary digit images are used to derive pixel density information. Each digit image is split into nine identically sized windows. Individual zones are the focus of feature extraction rather than the entire image. As a result, it provides greater details regarding the skeleton of the digits. To create the feature vector, the density of black pixels for each zone is calculated. For the remaining digit images, the same procedure is followed.

C. Classifier Process

The feature extractor's feature vectors are used by the classifier process to confirm the user's identification. Two inputs are needed for this verification: a real text test and an optional claimed human identity. After pre-processing and feature extraction on the written data, the system will compare the real feature values to those in the reference database before returning a result set.

VII. RESULT

The overall classification rate and error rate are the most typical metrics for classifier performance. A case's overall classification rate, also known as the recognition rate, is calculated as the proportion of cases that are correctly classified to all cases. A weight voting rule and decision-making system achieves a higher recognition rate than a majority voting rule. The primary cause is that the majority vote rule provides all classifiers 329 identical weights without taking performance accuracy differences into account. Figures 2 to 4 shows off the results of the overall performance evaluation, implementation evaluation, and validation evaluation from the related works, however. Whereas Figure 3 demonstrates the implementation problems that 94% of the authentication techniques have. Figure 4 shows how practically all authentication strategies fall short of adequately validating and verifying their security claims.

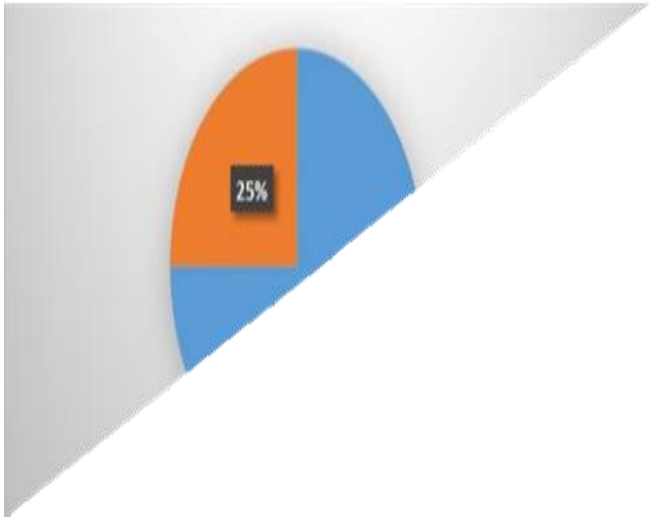

Figure 2: Performance Analysis

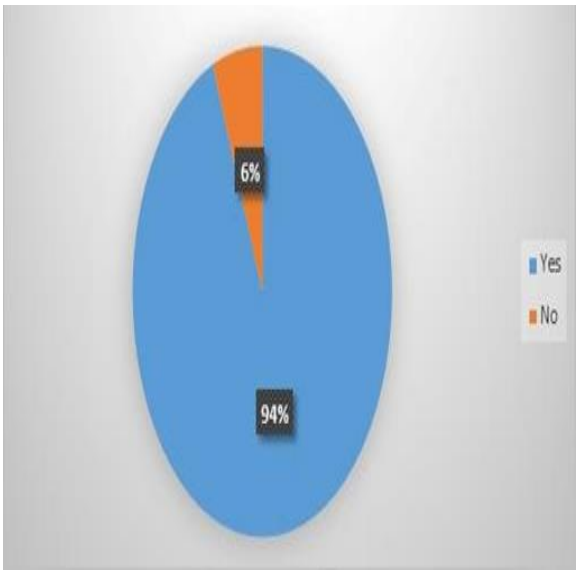

Figure 3: Implementation Analysis

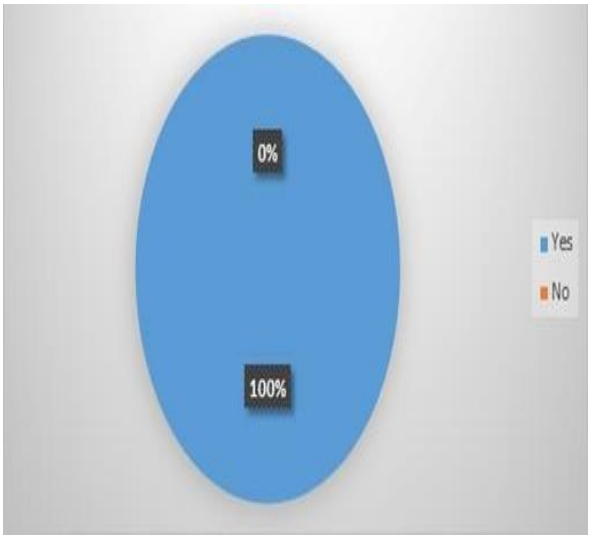

Figure 4: Validation Analysis

VIII. CONCLUSION

In this contribution, a handwriting authentication device has been introduced. The manner permits comfortable get entry to to confined facts in the cloud the use of a cell telephone. It is composed of pre-processing, characteristic extraction, type, and authentication procedure. The classification procedure is primarily based on 3 one-of-a-kind classification strategies: ANN, KNN, and Euclidean Distance classifier. The classifier set of rules employs a parallel combination of classifiers to obtain first-rate accuracy on both recognition and errors charges.

IX. FUTURE SCOPE

The underlined protection uncertainties, assaults, and future directions in existing smartphones and CC authentication frameworks have added a broader view and cognizance of the modern trendy within the domain in addition to their practicality for implementation. Finally, this safety evaluation is anticipated to open similarly studies possibilities as part of future work to deal with the concerns raised in the area of Smartphone and CC authentication frameworks and protocols.

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Fraud Detection on a Healthcare Network, Using Complex Network Analysis

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Abstract – **This compilation describes the various Complex network analytical techniques to detect fraud on a healthcare network. These tactics can be used by admins for surveillance and detection of crime. A motif is a small, organized structure within a network that repeatedly, appears in a network. The second part focusses on using various Network Motifs like feedback loop, clique motifs, rogue nodes and to detect fraudulent activities. These strategies are illustrated using a few simplified fraud-detecting Python programs using NetworkX.**

Keyword:-: networks in healthcare, network analysis, network motifs, fraud detection, machine learning, complex network analysis, python, networkx.

I. INTRODUCTION

Fraud detection using network analysis is an important tool for detecting potential financial fraud cases. The method considers the links between the entities in a data set and uses pattern recognition techniques to identify any irregularities that may point to fraudulent activity. By using both qualitative and quantitative measures, fraud supervisors can identify which accounts are connected to each other and po- tentially linked with fraudulent behavior patterns. Moreover, this technique helps uncover suspicious relationships between money transfers, client profiles, service providers, locations and payment methods that may indicate a fraudulent case. Overall, this method of fraud detection aids investigators in identifying new sus- pects as well as protecting companies from existing threats in a much more effi- cient manner compared to traditional methods [1].

II. COMPLEX NETWORK ANALYTICS TO DETECT FRAUD

To find fraud on a network, several techniques can be applied. Many typical tac- tics include:

Anomaly detection. Finding unexpected rhythms of activity or transactions that can point to deception is known as anomaly detection [2].

Link analysis. Link analysis entails examining the relationships between people or things in a network to find trends that might be a sign of fraud. Link analysis is a method for examining the connections among the items in a network. By exam- ining patterns of linkages between network entities and recognising unusual or suspect patterns, it can be used to detect fraudulent behaviour on a network. Either physical labour or specialist software tools can be used to do this. This may entail the need to collect and analyse data on the links between entities in the network, such as communication records, financial transactions, and other sorts of data, to do a link analysis for the aim of identifying fraud on a network. Afterward, this in- formation can be used to produce graphic depictions of the connections between items, like graphs or network diagrams. Suspicious links are those that exhibit, unusually high or low engagement levels between specific nodes, or unexpected or strange relationships between nodes, or resource flows between communities that are out of proportion and (deceitful) nodal behaviour patterns or transactions that recur over time [3,4].

NetworkX for link analysis.

The structure and characteristics of the network can then be examined using a range of NetworkX functions and techniques. The fol- lowing are a few examples of connection analysis tasks that NetworkX can carry out: examining the network's connectedness, such as by finding the shortest route between nodes or figuring out which nodes are most connected to other nodes finding anomalies or odd patterns in the network, for example, by contrasting the observed network attributes with those of a random network With NetworkX, you can carry out a wide range of additional link analysis tasks. The techniques and algorithms employed will depend on the demands of the analysis [5, 6].

Social netork analysis.

Social network analysis entails looking at the connec- tions between people or things in a social network to spot any trends that might point to fraudulent behaviour [7].

III. MACHINE LEARNING ALGORITHMS TO DETECT FRAUD.

Machine learning is the process of applying algorithms to examine network data and spot trends that might be signs of fraud. For spotting network fraud, machine learning can be a useful technique. Machine learning algorithms can learn to recognise patterns that can be predictive of future fraudulent behaviour by studying data from previous fraudulent behav- iour. Then, for further examination, these algorithms can be utilised to highlight possibly fraudulent transactions or behaviour. For detecting fraud on a network, numerous alternative machine learning techniques can be applied. Typical exam- ples include:

1.Decision trees algorithms build models using a succession of decisions, with each branch of the tree denoting a potential result.

2.Neural network algorithms that draw their design cues from the structure and operation of the human brain.

They excel at finding patterns in data.

3.Support Vector Machines (SVMs) which are frequently used for classifica- tion problems, define a border between several classes of data.

It is crucial to remember that no single machine learning method is suitable for uncovering every kind of fraud on a network. Instead, a sagacious combination of algorithms might be required to accurately detect and stop fraud [8].

IV. MEASURES OF CENTRALITY IN NETWORK ANALYTICS

The various measure of centrality of a vertex or node provides information on the role and relative weight of a node relative other nodes in a complex network. The following are measures of centrality.

Betweenness Centrality. A graph's vertex's centrality is determined by its be- tweenness centrality. It is determined by counting how many shortest routes exist between each vertex and every other vertex. Because it resides on numerous shortest paths, a vertex with high betweenness centrality has a significant impact on the flow of information or resources through the graph. Think of a graph of cit- ies connected by roads as an illustration. Since many road journeys pass through a city that is situated on a key transportation route between other cities, its between- ness centrality may be high. Both directed and undirected graphs can calculate be- tweenness centrality [9].

Node strength centrality. Node strength centrality, which is based on the quanti- ty and weight of a node's connections to other nodes, is a measure of a node's significance in a network used in complex network analysis. It is described as the to- tal of all edge weights occurring to the node. It is possible to determine the node strength centrality for both directed and undirected graphs. With many connec- tions to other nodes and/or connections with high weight, a node with a high strength centrality score has many connections overall. This trait can be helpful in several applications, such as locating crucial infrastructure in a transportation net- work or recognising essential nodes in a social network [9].

Clustering centrality. Clustering centrality is a measure of a node's centrality in a graph used in Complex network analysis that is based on how closely related those nodes are to one another. It is described as the percentage of neighbouring pair connections between the nodes. It is possible to determine clustering centrality for both directed and undirected graphs. With numerous neighbours who are connect- ed to one another and a high clustering centrality score, a node is well-connected to the other nodes in the graph. Applications for this trait include locating communities inside a network or recognising important nodes in social networks [10].

Proximity Centrality of a Node. According to Complex network analysis, the proximity centrality of a node in a graph is determined by the average length of the shortest paths connecting it to every other node in the graph. It is described as equal to the reciprocal of the total of the distances between each node in the graph. Graphs that are directed or undirected can both have their closeness centrality computed. A node that has a high proximity centrality score is well-connected to other nodes and has many short pathways to them. This trait can be helpful in sev- eral applications, such as locating crucial infrastructure in a transportation network or recognising essential nodes in a social network [10].

V. Network Motifs in Networks to detect fraudulent activities

A motif is a small, organized structure within a network that repeatedly, appears in a network. A motif in graph analysis is a brief subgraph that reappears regularly in a larger graph. Motifs can be used to locate structures and patterns within a graph and to shed light on the connections and interactions between its constituent parts. An illustration of a prevalent pattern in a social network graph would be a trio of individuals linked together by friendships. Finding and examining motifs can as- sist scholars in comprehending a graph's fundamental structure and operation. Dy- ads (2 vertices) and triads (3 vertices) are examples of small subgraphs or motifs that are made up of a collection of nodes and links between them [11].

Network motifs are connectivity patterns that show up in a network more fre- quently than would be predicted by chance. In the investigation of complex sys- tems, such as social and biological networks, they are frequently employed. Net- work motifs may be utilised in crime analysis to spot linkages or patterns of behaviour among people or groups that might be involved in criminal activities. There is a chance that some network motifs are more common in fraudulent net- works than in genuine ones. For instance, in a fraud network where the central "hub" character is orchestrating the fraudulent activities while others are taking part, a motif with several people who are all related to one another may be more likely to arise [11]. Building a network that represents the connections or interactions between people or groups suspected of engaging in criminal conduct is one method of employing network motifs for crime analysis. The network might be built using data from phone records, social media interactions, or other kinds of association or commu- nication data. Comparing the motifs found in the network to those found in other networks or to recognised patterns of criminal activity is another method for eval- uating network motifs for crime analysis. For instance, it may indicate that a motif is significant in the context of drug trafficking networks if a network of people suspected of being involved in drug trafficking displays a specific sort of theme that has been seen in other networks of drug traffickers. Using algorithms, it is possible to find network motifs in the data after the network has been built [12].

Comparing the network motifs to a null model, a fictitious network produced by a random process that retains some aspects of the actual network (such the number of nodes and edges) but eliminates any innate structure or patterns, is one tech- nique to study the network motifs. It may indicate that patterns are significant in the context of the network under study if they appear more frequently in the real- world network [11].

For instance, it may indicate that a motif is significant in the context of drug traf- ficking networks if a network of people suspected of being involved in drug traf- ficking displays a specific sort of theme that has been seen in other networks of drug traffickers. It is important to keep in mind that network motifs are just one tool that may be utilised in the study of complex systems; to provide a more thor- ough knowledge of the system being investigated, they should be used in conjunc- tion with other techniques and information sources [12].

By locating patterns of behaviour or connections between people or entities en- gaged in fraudulent activities, network motifs can be utilised to detect fraud. Based on information from records like bank statements, credit card statements, or other financial records, for instance, a network reflecting financial transactions might be built. To find anomalies or patterns that might point to fraudulent activi- ty, algorithms could be used to identify network motifs within the data [12]. These motifs could then be compared to known patterns of fraudulent behaviour.

Clique motif.

A group of nodes in a network that are all linked to one another is referred to as a clique. This is a collection of interconnected nodes, is another form of network motif that could be helpful in the identification of fraud. This trend can point to a network of people or organizations that are conspiring to per- petrate fraud.

An example of a clique motif in network analysis is a collection of three or more connected nodes that together make up a whole subgraph. Because they can pro- vide light on a network's structural characteristics and the ways in which various groups of nodes interact with one another, clique motifs are frequently explored in network research. For instance, the presence of clique patterns in a network may be a sign of close-knit communities or the emergence of alliances between various node groupings. Clique motifs can occasionally be used to pinpoint certain pivotal roles in a network including fraud perpetuation.

For instance, nodes that belong to several cliques may be thought of as playing a "hub" role in the network, bridging several communities. Similarly, this, nodes with limited connections to other nodes in the network are said to be "peripheral" if they only belong to one clique [11].

Rogue node motif. A vertex or device connected to a network but not connected to any other nodes is referred to as a rogue node. A rogue node is of zero degree as it has no edges connecting it to other parts of the network. These nodes could end up being exploited to carry out harmful tasks like hacking, virus distribution, or other types of criminality, which could endanger the network's security. Using network modelling and simulation tools is one way to examine how rogue nodes affect a network. With the help of these tools, admins can develop virtual repre- sentations of the network and test various scenarios to determine how they can impact its performance and security. Users may be more susceptible to attack from rogue nodes, for instance, if they click on links in questionable emails and do not manage their passwords according to recommended standards [12].

Feedback loop motif. A feedback loop is a loop or circular edge that begins and finishes at the same node in a graph. The "feedback loop" is a pattern in which a node in the network has both inbounded and outgoing connections to the same other node, is one form of network motif that might be particularly pertinent in the context of fraud detection [13].

Feedback loops can be used to detect network anomalies by observing the behav- ior of the network over time. Feedback loops measure the input and output of the network and compare them to a predefined baseline. If the output deviates from the baseline, it could indicate an anomaly. Additionally, feedback loops can be used to detect anomalies in traffic patterns, as they can observe the time between successive packets and measure the rate of change in the data. By monitoring the data over time, feedback loops can identify any sudden or unexpected changes that could indicate an anomaly [14].This pattern might point to a plan in which one party assumes several identities to scam others. Feedback loops are common in many biological networks and play vital role in maintenance of Network state, a typical example is ‘circadian rhythm,’ or 24-hour periodic sleep wake cycle of Drosophila which is driven by a positive feedback loop between accumulation and degradation of 2 proteins name- ly: Per, and Tim. These loops are concerned with all or none decision making in biological networks, for example in the above case a fruit-fly cell cannot be awake and sleep at the same time [14].Feedback loops in Complex network analysis are used to examine the interactions between two or more components of a system. A feedback loop is a process in which the output of a system is fed back as input into the same system. In complex analysis, feedback loops can help identify emerging patterns and trends, as well as uncover hidden relationships between variables. Feedback loops can also be used to identify potential problems with a system, such as a lack of efficiency or an un- expected increase or decrease in output [15].

VI. NetworkX Python Module for Complex Network Analysis

NetworkX is a Python library for analysing complex networks and graph algorithms. It offers numerous tools and techniques for network analysis and can be applied

to link analysis. It can be used to detect fraud by analysing the network structure of a system. NetworkX can be used to identify clusters of nodes that are connected to each other or to other nodes in the network. It can also detect anomalies by comparing the structure of the current network to that of a baseline network. Additionally, NetworkX can be used to detect patterns of fraudulent activity by analysing the connections between nodes and the flow of data within the network. NetworkX is optional module available via PyPi channel, which provides Complex network analysis capabilities in Python 3.5 and above. This module must be installed via python package manager pip (python –m pip – install networkx or just pip –install networkx). The "simple_cycle" is a NetworkX method can also be used to locate every feedback loop in a graph. A self-loop, or cycle that connects a node to itself, can be detected using NetworkX. This method

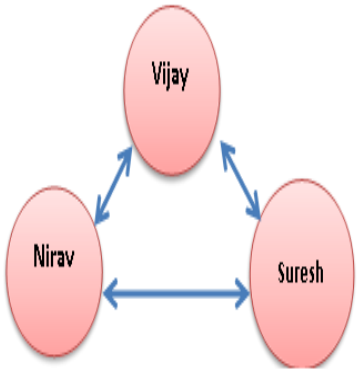

Fig. 1. Feedback Loops in Criminal network of 3 persons Vijay, Suresh, and Nirav. The feedback loops are self-propagating, like so Nirav bribes the bank official who in turn bribes the auditor Vijay who gives a "cut" of his income back to "Nirav". Thus, the criminal network grows in

Another loop method called as nx.simple_cycles module can be used to determine whether a graph contains a feedback loop [17]. If at least one feedback loop is pre- sent in the graph, this method returns True; otherwise, it returns False.

```
# Modules networkx, matplotlib, numpy and PySimpleGUI have to be installed
via pip pip -install networkx

import networkx as nx
import matplotlib.pyplot as plt
import PySimpleGUI as sg
sg.theme("material 2")

# Create a graph with multiple feedback loops
G = nx.DiGraph()

G.add_edge('Vijay', 'Suresh')
G.add_edge('Suresh', 'Nirav')
G.add_edge('Nirav', 'Vijay')

# Find all the feedback loops in the graph and show them to user via Popup
box

for loop in nx.simple_cycles(G):
   sg.popup(loop, title="feedback loops in the graph by simple_cycles",
auto_close=15)

# Create figure and plot for preparation
fig = plt.figure(figsize=(20,10))

# Create the Options dictionary for plotting
options = {'node_color': 'yellow','node_size': 700,'alpha':0.9,'width': 1,
    'edge_color':'red',}

# Plot the network using Kamada Kawai layout algorithm
```

```
# Modules networkx, matplotlib, numpy and PySimpleGUI have to be
installed via pip pip -install networkx

import networkx as nx
import matplotlib.pyplot as plt
import PySimpleGUI as sg
sg.theme("material 2")

edges = [('Home', 'Home'), ('Home', 'Office'),('Office','Home'), (
'Club','Home'), ('Home','Club'), ('Club', 'Home'), ('Club', 'Office'),
('Club', 'Club'),('Farm','Home'),('School','Home'),('Farm','Farm')]
#Create a directed graph

G = nx.DiGraph(edges)
#Detects loops in Original Orientation they appear in the graph
sg.popup(nx.find_cycle(G, orientation="original"))

#Detects loops in but ignore the Orientation they appear in the graph
sg.popup(list(nx.find_cycle(G, orientation="ignore")))

# Create figure and plot for preparation
fig = plt.figure(figsize=(20,10))

# Create the Options dictionary for plotting
options = {'node_color': 'yellow','node_size':
700,'alpha':0.9,'width': 1,
```

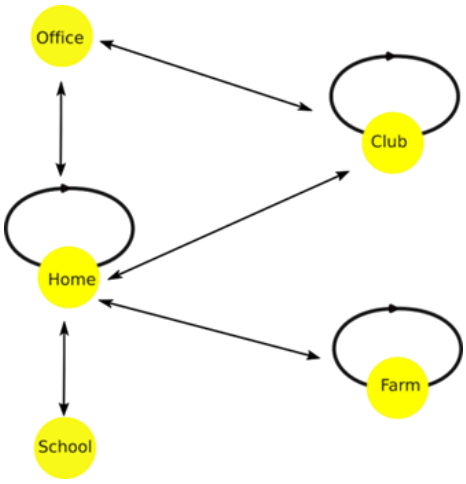

Fig. 2. Another example of Feedback Loops detection in Python NetworkX. This time Orientation of the loops is also considered and ignored by command nx.find_cycle (G, orientation="original")). It can be observed that Home, Club, and farm have self-loops, in addition Home, Club and Office nodes form a loop. NetworkX can greatly simplify a variety of Complex network analytical tasks

VII. .CONCLUSION

As a summary, the use of network science and machine learning can be a powerful tool in the fight against healthcare fraud, helping to identify and prevent fraudu- lent activity and ensure that healthcare resources are used efficiently and effective- ly.

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Virtual Machine Load Balancing using Improved ABC for Task Scheduling in Cloud Computing

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Abstract – **Computing resources are now more accessible, powerful, and inexpensive than ever before thanks to the widespread adoption of the Internet and rapid advancements in processing and storage technology. Thanks to this development in expertise, a new kind of computing architecture known as "cloud computing" is now a practical reality. Load balancing task scheduling is an essential issue that has a direct impact on resource utilisation in cloud settings. One of the most important goals of scheduling is to distribute work among virtual machines in such a way that no individual machine is overburdened or underutilised. Considering load balancing scheduling is crucial because of the importance it has on the backend and frontend of the cloud research sector. Any time a cloud environment is able to effectively balance its load, resource utilisation improves. The challenge with load balancing in the cloud is that it is an NP-hard optimization delinquent. To solve this issue, this research suggests a method that combines a heuristic scheduling algorithm with an artificial bee colony; this method is referred to as enhanced Artificial Bee Colony for Task Scheduling (IABC-TS). For better cloud computing scheduling of virtual machines in both homogeneous and heterogeneous contexts, this approach is used. The goal of its implementation was to shorten makespan and distribute weight more evenly. The IABC-TS cloud computing system's scheduling performance was measured against that of competing swarm intelligence techniques. In our lab tests, we used CloudSim to simulate systems with various augmentation techniques to examine their makespan and load balancing ability. Based on the results of the experiments, it is clear that the suggested IABC-TS outperformed the baseline models.**

Keywords: Load balancing; Virtual machines; Improved Artificial Bee Colony; Task Scheduling; CloudSim; Resource utilization.

I. INTRODUCTION

One of the most cutting-edge technologies of our day is cloud computing, in which tens of thousands of computers work together to store and process data and programmes that users access via the internet. Cloud computing combines distributed and parallel computing to enable, and data stored on remote devices. When looking at cloud services from the perspective of programmers, we may classify them into three classes: IaaS, Platform as a Service, and Software as a Service. To run services with virtualization technology, users can take advantage of the cloud provider's infrastructure as a service [2]. High-level services can be developed using the software layer offered by the platform as a service. Cloud application creation, testing, and hosting are all simplified with the aid of this platform. (SaaS) refers to the delivery model in which consumers obtain the necessary programmes via remote access, or the cloud [3].

Software as a service is one of the most popular cloud services because it allows customers to quickly and easily deploy applications via the internet. The previous methods of using software, such as installing it on the computer that needs it, have been rendered obsolete by this new level, which removes the restrictions that previously hindered the installation of substantial software or the provision of software for the users. When users need access to shared resources, the cloud's servers in the data centre make those resources available [5-6]. Renting virtual machines from cloud providers allows multimedia application developers to offer their customers a wider range of features and functionality. Here, subscribers can ask for and get their preferred apps sent straight from the service provider [7].

Through the use of task scheduling, users' workloads can be distributed across multiple virtual computers. Ideally, a customer-focused scheduling algorithm would have the virtual machine do the customer's specified activities in the least amount of time possible [8]. Instead, the service provider needs a scheduler that can make the most of available resources while keeping customers happy. The onus is now on the service provider to choose an appropriate technique of job scheduling [9, 10]. Load balancing is an essential part of scheduling tasks in the cloud. In order to enhance efficiency and throughput, load balancing spreads work over multiple servers. Because of this, we may decrease waiting time and maximise virtual machine utilisation by employing an appropriate load balancing algorithm to avoid load redundancy and scarcity in certain of the serves [11].

In order to solve the task scheduling issue, many different approaches have been offered, each of which attempts to balance a different set of user and service provider requirements. Load balancing across virtual machines is a crucial part of the methods in [12], which address the scheduling problem. Different from earlier works, the proposed method not only aims to improve load balancing but also to present a dynamic multi objective solution for job scheduling on virtual machines [13]. The goals of the proposed strategy are as follows:

First, enhancing the degree to which virtual machines load balance. Making it last less time

Strengthening the system's dependability, third.

Four, maximise u se of existing assets

A scheduling mechanism for distributing work among virtual machines is developed to achieve these aims. To reduce unnecessary work [14], the suggested system assigns tasks to the most suitable virtual machines. After

a task has been assigned to a virtual machine, the suggested method can make predictions about its future state. By preventing any further work from being assigned to that computer, the suggested strategy achieves load balancing among virtual machines. The proposed solution both shortens makespan and improves load distribution. However, the proposed approach monitors the current status of each virtual machine's job execution to increase the system's dependability [15, 16]. This technique chooses VMs with a history of stability and gets rid of VMs that are underperforming. In other words, the node's recent failure rate makes it less likely to accept jobs compared to nodes with better reliability. The simulation findings suggest that compared to previous research, the proposed strategy increases reliability, minimises waiting time, and improves average makespan. As a whole, the proposed method is an improvement above the prior literature because:

Improving the consistency of job scheduling using virtual machines' historical data increasing virtual machine load balancing Taking into explanation both the QoS for the end user and the requirements of the service provider. The remaining sections of this work are laid out as follows. In the following section, we'll examine several complementary works. The proposed algorithm and its mathematical model are presented and discussed in Section 3. The results of the simulations and evaluations are presented in Section 4, while the deductions and suggestions for further research are provided in Section 5..

II. .RELATED WORKS

Recently, a new Credit-Based Resource Aware Balancing Scheduling method (CB-RALB- SA) was introduced by Narwal and Dhingra [17]. Using the FILL and SPILL purposes of Resource Aware and Load with the Honey bee optimization heuristic method, we map the tasks weighted by the credit-based scheduling procedure to the resources, taking into account the load and computational capability of each resource. It has been shown through experimental evaluations and results that the suggested method improves upon the existing CBSA-LB algorithm by 16.90% in makespan time and 48.5% in processing time. Thus, it boosts overall system speed, as well as the performance of individual processes, and saves memory that was previously dedicated to RAM.

A Multi objective trust aware scheduler was developed by Mangalampalli et al. [18], which prioritises jobs and virtual machines (VMs) and allocates them to the most suitable virtual resources, all while reducing makespan and energy consumption. We modelled our scheduler after the whale optimization technique. Cloudsim was used for the entirety of the simulation. This simulation makes use of both synthetic and real-time workloads taken from HPC2N and NASA. We compared our method to the standard metaheuristic methods already in use, such as ACOs, GAs, and PSOs. The simulation results showed that the makespan, energy consumption, overall) all improved significantly.

An ACO-based algorithm, ACO-RNK, has been proposed as a practical answer to the job scheduling problem by Elcock and Edward [19]. In order to lead the solutions, our method makes use of pheromones and a priority-based heuristic called the upward rank value, as well as an insertion-based policy and a pheromone ageing mechanism that tries to prevent premature convergence. We evaluated the performance of our approach to that of the HEFT algorithm and the MGACO procedure on directed acyclic networks that were constructed at random (DAGs). Our method demonstrated performance that was on par with or better than the chosen algorithms in the simulations.

Using data from the (RM), the (NM), and the Application Master, Bawankule [20] proposes a new process for scheduling tasks based on deep reinforcement learning. This method dynamically schedules tasks based on the current state of the nodes, including their load, resource availability, usage, and task information (AM). In order to handle difficult scheduling issues in a heterogeneous setting, the suggested Map Reduce Scheduling utilising the Deep- Q- Networks (MRSDQN) employs a deep reinforcement learning approach. The projected process is evaluated in terms of its efficiency in relation to Hadoop's most valuable benchmark, the HiBench benchmark suite. It validates the efficiency of the suggested method using the latest Hadoop benchmark. Finally, it contrasts the proposed strategy with Hadoop's multiple scheduling strategies, each of which places less value on the timely completion of jobs and the successful completion of tasks in a diverse computing environment. Last but not least, it expedites the completion of tasks in a diverse set of benchmarks by an average of 23% to 36%.

In order to accomplish the goal of smallest makespan in the shortest amount of time, Yadav and Mishra [21] have created and enhanced an ordinal optimization technique. Ordinal optimization, which employs horse race conditions as selection rules, is applied in an improved reiterative fashion to meet the current requirement of optimal schedule for, thereby achieving low overhead through the judicious allocation of work to the most talented schedule. The proposed ordinal optimization method, in conjunction with linear regression, creates schedules that maximise productivity and minimise the time needed to produce a product. More importantly, the proposed exact equation, which was derived using linear regression, forecasts any future dynamic workload in terms of the minimum makespan period aim.

Talmale and Shrawankar's [22] suggested Cluster-Based Real-Time Catastrophe Resource Management Framework makes use of different disaster resources and emergency services. Edge computing resources are pooled together to form a cluster, and then a set of tasks is assigned to the cluster and scheduled on the edge computing cluster to increase resource utilisation and acceptance rate and decrease response time and overhead due to communiqué and migration, thereby solving the problems associated with the current partitioned scheduling.

Nematpour et al. [23] provide a new method of constructing chromosomal representation. After three

iterations of ranking, clustering, and cluster scheduling, the suggested method schedules clusters using a genetic algorithm. To achieve optimal performance, the proposed genetic algorithm incorporates four heuristic philosophies: load balancing, idle time reuse, work duplication, and critical path. Finally, we compare the amounts of optimization over 6 task graphs of 3 different types, and we find that in one type, the quantity of optimization is equal to the findings of the previous best approach, but in the other 3 types, the amount of optimization is between 4.25 and 6.88%..

III. PROPOSED SYSTEM

3.1. SYSTEM MODEL

The suggested method's primary purpose is to allocate tasks to VMs in accordance with the latter's available resources and current workload. The load balancing algorithms work to take work away from VMs that are too busy and distribute it to others. Each physical machine (PM) in the proposed system hosts several virtual machines (VMs) that are responsible for carrying out the user's requests. Each cloud customer has a unique workload requirement for their virtual machine. In this work, we employ a load-balancing technique to distribute the jobs among the VMs. The suggested load-balancing technique is constantly monitoring the workload of every virtual machine (VM) in the cloud. The VM's workload is proportional to the time required to complete each individual activity. Because each job takes a different amount of time to complete, the VM's workload is always changing..

3.2.PROBLEM DEFINITION WITH SOLUTION FRAMEWORK

Take cloud C, for example, where there are "n" data centres or physical machines (PMs) and "m" VMs in each physical host (PH) (VMs).

$C = \{PM1, PM2, \dots, PM\text{n}\}$ (1)

In this equation, C stands for the cloud, PM 1 for the first bodily machine, and PM n for the nth. Following are several ways to designate the PM:;

$PM\text{n} = \{VM1, VM2, \dots, VM\text{m}\}$ (2)

where VM 1 refers to the very first VM and VM m to the very latest VM. It's the same in the cloud: there are I users, and each user has I tasks. The user may be identified in the following ways:;

$U\text{i} = \{T1, T2, \dots T\text{j}, \}$ (3)

The chief goal of this study is to efficiently distribute the workload across all virtual machines (VMs) in a cloud infrastructure while simultaneously reducing the task's execution time and associated costs. Specifically, we are interested in achieving three goals. First, we strive to reduce the amount of time required to complete each task (ET). Secondly, we want to reduce the time and money needed to carry out an action (EC). A third is to divide up the work among all of the cloud-based virtual machines..

Time taken to complete an operation can be determined using Eq (4).

$$ET = \frac{1}{\max(ET)\times \text{number of task}} \sum_{j=1}^{\text{Number of task}} (ET \text{ of corresponding } VM \times \text{Size of the task}) \quad (4)$$

The execution cost (EC) can be intended using Eq. (5).

$$EC = \sum_{j=1}^{\text{Number of task}} \left[\frac{\text{Execution time} \times \text{Communication time}}{\text{Number of task}} \right] \quad (5)$$

Lode can be intended using Eq. (3).

$$Load = \frac{1}{\text{Number of task}}$$

$$\sum_{j=1}^{\text{Number of task}} \left[\frac{\text{size of VM} - ((\text{Toatal size of VM} - \text{Free space of VM}) + \text{siz of task})}{\text{Size of VM}} \right] \quad (6)$$

When planning, it's important to distribute work fairly. In the absence of load balancing, the system will consume the most resources and take the longest to complete the task. In this research, we propose a method for effectively balancing loads that takes into account multiple objectives..

The planned multi-objective function (MOF) is distinct in Eq. (7).

$$MOF = [\alpha 1(ET) + \alpha 2(EC) + \alpha 3(1 - Load)] \quad (7)$$

3.3.Proposed Method

Let $VM = \{vm1, vm2, vm3, \dots, vm\text{m}\}$, variables used in this study and Table 1 definitions the parameter of the study.

Table 1 Variables used in this study and their meanings.

Symbol	Definition
m	The number of virtual machines (VMs)
$VM = \{vm_1, vm_2, vm_3, .vm_\text{m}\}$	The set of VM
K	The total sum of tasks the scheme has to achieve
$Task = \{t_1, t_2, t_3, \dots, t_\text{k}\}$	The set of tasks
N	The total quantity of bees performing in thealgorithmic procedure
C_j	The presentation of the jth virtual machine

Symbol	Definition
Pe	The sum of processors in the VM
Mi	Million Instructions Per Second (MIPS)
Bw	Bandwidth of VM
F	Fitness
Tl	The distance of task in MIa
Pi	Probability that the ith food source is good which be contingent on its fitness value, $\underline{fitness_i} pi = \sum^{NS} fitness_i$ Where, NS is the size of food bases

Configure the system to operate in a non-preemptive, hence interrupt-free mode. Heuristic algorithms were used to sort the tasks into three distinct orders before running the ABC method. By processing the tasks with the ABC method, as was previously described, the optimal setup would require the least amount of computational time. Then, the ABC algorithm used these steps to plan when tasks would access the VMs::

1. First, the population size, denoted by n, of bees was determined. Algorithm 1 depicts the random assignment of VMs to the various food sources (m) that represent them, followed by the calculation of their fitness scores.

2. Second step: the stipulations of the VM. Bees were grouped into 3 categories: Scout Bees, Employed Bees, and Onlooker Bees. A Scout Bee found the initial position of a food source. An Employed Bee went to the food source, recalculated and updated the fitness value of food source. An Onlooker Bee decided which food source was the best food source. The operation of an employed bee is presented in Algorithm 2.

Procedure 2: Employed bee phase

1. *For* $i = 1$ *to* n

2. *Employed bees are sent randomly to food sources (VMs i:*

$$F_{ij} = \frac{\sum_{i=1}^{n} Tl_{ij}}{Evaluvate\ capacity\ of\ VM_j(c_j)} \quad (9)$$

4. *Update the fitness value*

3. *Third step*: *the Employed bees have searched around for food sources, they brought back*

Algorithm 3: *Onlooker bee phase*

1. *The onlooker bee chooses the first m food sources* (VM) *with the highest*
2. *An nsp number of employed bees are sent to bring back new positions of*
3. *The onlooker bee calculates the new fitness values of the food sources a*

$$fit_{ij} = \frac{\sum_{1}^{n} Tl_i + In_{length}^{i}}{Evaluate\ capacity\ of\ VM_j(C_j)} \quad (10)$$

where In_{length} *is the length of the task that is waiting to access a VM at tha*

4. *The onlooker bee chooses the best food source* (VM) *and assigns a task to*

4. *Fourth step*: *the employed bee that was the owner of the best food source was then transf*

Algorithm 4: *Scout bee phase*

1. *If food source* $=$ *null then*
2. *Send the previously transformed scout bee into the system to find an ap*
3. *Calculate the fitness value of that VM by using* (8)
4. *End If*

5. *Fifth step*: *the overall operation of HABC algorithm is described in Algorithm*

Sixth, following VM task scheduling, determine the system load balance value.

Standard Deviation (S.D.) in the range of 11 is used to determine this (12),

$$S.D = \sqrt{\frac{1}{n}\sum_{j=0}^{n}(X_j - \bar{X})^2} \quad (11)$$

$$imbalance = \frac{K_{max} - K_{min}}{K_{avg}} \quad (12)$$

The amount of time needed to process each virtual machine (X j) is determined by (13),

$$X_i = \frac{\sum_{i=1}^{k} task\ lengt}{capacity_i} \quad (13)$$

To determine how long it takes the system on average to execute a virtual machine (X

), we need (14) $$\bar{X} = \frac{\sum_{j=1}^{n} K_i}{n} \quad (14)$$

If the standard deviation is less than X, then the system is in equilibrium; otherwise, it is out of whack.

Stage six: scouting (Algorithm 4)

IV. RESULTS AND DISCUSSION

Cloudsim 3.0.3 is utilised for the performance evaluation proposed here. In Cloudsim, the user initiates actions by submitting requests, or tasks, that occur in a specific order within a series of clouds. Each cloudlet has its own unique set of characteristics, including the number of tasks it must do, the amount and length of any linked files, and so on. The cloudlets are then forwarded to a broker, where they are used to assign IP addresses to the desired virtual machines. This utility can be used with the broker's preexisting regulations. Hosts initiate the creation of brokers' worth of virtual machines. The TSA operates in an operational data centre broker. Code for the proposed technique is implemented in the datacenter broker. Planners for data centres and virtual machines can work together in real time or across great distances..

4.1.PERFORMANCE OF PROPOSED SCHEME IN TERMS OF MAKESPAN

It is primarily aimed at reducing the amount of time needed, i.e. the whole duration of the work schedule, where all work has been completed or the time taken for it from the beginning to the end. The following equation demonstrates the makeup formula.

$$Makespan = \sum n$$

$$Fti \quad (15)$$

Where, F is the finishing time of the task (n).

The existing techniques such as Whale Optimization algorithm (WOA) [18], ACO [19], Butterfly Optimization (BO) and ABC are implemented in this research work and results are averaged, which is shown in Table 2 to 4.

Table 2: Makespan comparison with a different algorithm

Number oftasks	Makespan (time in seconds)				
	WOA	ACO	BO	ABC	IABC-TS
1000	434	428	421	415	395
2000	917	921	836	816	800
3000	1302	1293	1264	1251	1229
4000	1688	1686	1635	1619	1602
5000	1979	2000	1994	1891	1875

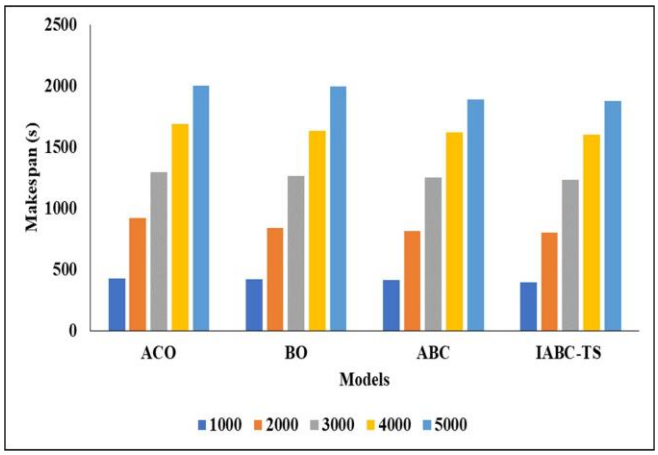

Figure 2: Graphical Representation of Algorithm in terms of Makespan

Analyzing the make span of the projected and existing methods is shown in Fig. 2. Our proposed load balancing method has a shorter make span than the state-of-the-art methods by a significant margin; for 1000 tasks, is around 395 seconds, while ABC's is around 415 seconds, BO's is around 421 seconds, ACO's is around 428 seconds, and WOA's is around 434 seconds. The system's manufacture time is inversely proportional to its throughput. The proposed model has a make span of roughly 800s for 2000 tasks, 1229 for 3000, 1602 for 4000, and 1875 for

5000 activities, while ABC needs 816s, 1251 for 1619, and 1981 for 1981 tasks. The WOA

model has a longer makespan need than the 917s, 1302s, 1688s, and 1979s for the same amount of tasks.

Table 3: The comparison among the TSA using the energy consumption

Algorithms	Number of Tasks					
	1000	2000	3000	4000	5000	6000
WOA	2453	2723	3473	4142	4663	5081

ACO	2273	2657	3845	4361	4534	4921
BO	2265	2558	3518	3965	4307	4709
ABC	2159	2471	3350	3659	3878	4548
IABC-TS	**2055**	**2206**	**3032**	**3435**	**3726**	**3976**

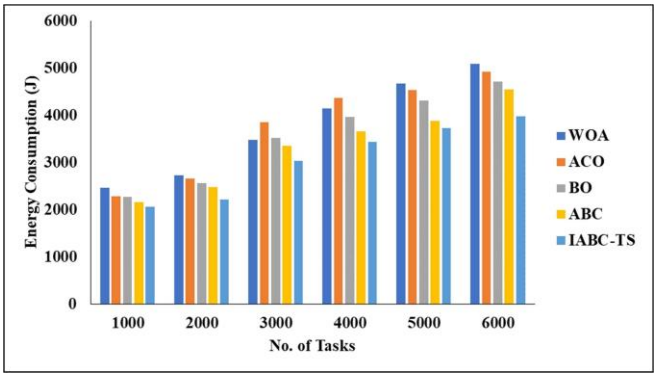

Figure 3: Graphical Representation of Algorithm in terms of Energy Consumption

Energy usage in the projected system is associated to that of existing models in Fig. 3.

The system's energy usage is increasing as the number of nodes and tasks increases. Additionally, the IACO-TS method's energy efficiency improves with network size, as the percentage of total nodes visited increases in proportion to the total network size..

Table 4: The comparison among the TSA using the execution overhead

Algorithms	Number of Tasks					
	1000	2000	3000	4000	5000	6000
WOA	792	875	810	826	846	884
ACO	821	854	844	861	871	892
BO	523	708	567	593	614	627
ABC	605	639	646	649	663	689
IABC-TS	482	503	537	542	551	561

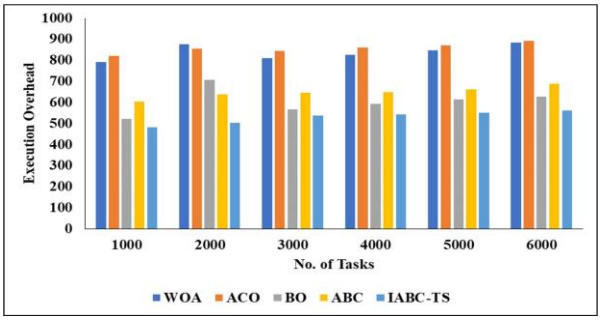

Figure 4: Graphical Representation of Algorithm in terms of Execution Overhead

In order to demonstrate the efficacy of the suggested method, we benchmark our results against four additional algorithms: WOA, ACO, BO, and ABC. To be useful, a technique needs to have a shorter runtime. Our proposed technique takes less time than WOA, ACO, BO, and ABC when evaluating Fig. 4. Figure 4 provides a similar performance analysis, this time based on Execution overhead. The sum of jobs is on the x-axis, while the execution time is on the y- axis. When the workload size is 3000, the suggested IABC-TS method has the lowest execution cost (537), followed by BO (567), ACO (844), WOA (810), and ABC (0.649). The proposed solution is preferable than competing approaches due to its decreased execution overhead. Therefore, it is evident that the proposed IABC-TS approach has outperformed other methods..

V. CONCLUSION

As part of this study, we present an algorithm for cloud-based virtual machines (VMs) based on the IABC-TS for VMs in cloud computing in both contexts with the intention of enhancing job scheduling and load balancing. The implementation of the IABC-TS utilised cloud computing, which improved work scheduling and load balancing across enormous data sets. This study presents a new multi-objective Load balancing approach based on the IABC-TS standard, and puts it through its paces in a series of simulation studies. The goal of the scheduling method we offer is to provide a balanced workload among virtual machines while also minimising delivery time and cost. In addition, the benefits of using the IABC-TS to optimise resource allocation are explained by our suggested approach. Three examples of the problem are studied to gauge the efficacy of the proposed strategy. The proposed model's

simulation results are associated to the standard method in terms of runtime and cost. Upcoming work will involve building a hybrid model and clustering the virtual machines (VMs) using optimization models, both of which will improve the proposed model.

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Aspect-Based Sentiment Classification: Survey

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Abstract – **Through a variety of Internet applications that act as a rich source of information, Web 2.0 makes it easier for people to voice their opinions. The latent information in textual expressions can be processed and analysed to disclose the user's or people's sentiment. Sentiment analysis, also identified as opinion mining, review mining, attitude mining, and other similar terms, practise of computationally obtaining opinions and perspectives from textual data. One of the three primary forms of sentiment analysis is aspect-level sentiment analysis, which uses granule-level processing to determine sentiment orientation by utilising the various characteristics of entities. The development of deep learning and machine learning methods has left a profound influence on aspect-oriented sentiment analysis. This paper surveys and reviews current works on aspect-based sentiment analysis using machine learning methods.**

Keywords: Aspect-based sentiment analysis, Sentiment analysis, Machine learning, Deep learning

I. INTRODUCTION

In today's world, social media is crucial for instantly distributing information about anything and everything. This encouraged regular people to participate in and interact on social media. The astounding number of 500 million tweets in a year, or 6000 tweets per second, revealed by the statistics for the year 2018 confirmed Twitter's status active community platform. Persons express thoughts and feelings through the review of a good or service, for example, and this eventually leads to an enormous volume of data on the Internet. We can extract a lot of latent information from this unstructured digital data using sentiment analysis (SA). Customer reviews have equalised the impact of word-of-mouth advertising in such a way that it now impacts the purchasing outcomes of tens of thousands of customers spread out geographically around the globe. A text can genuinely change a potential customer's mind- set. Processing every customer review comment provided individually is a completely foolish idea. SA is the ideal tool for analysing the trend that underlies any such purchasing behaviour. One of the quickly expanding research topics in Natural Language Processing (NLP) is sentiment analysis. The technique known as SA involves using NLP to extract the attitude or opinions from a text and categorize them according to polarity, such as positive,

negative, or neutral. In contrast to most NLP study fields; SA involves a variety of issues. Sentiment analysis is done at several levels of detail in documents, such as the sentence, aspect, and content. There are comparative reviews and surveys of SA in the literature [1, 2, 3, 4], but only a few authors, like Do et al. [5] have put together work on aspect-based sentiment analysis.

Popular methods for further sentiment analysis include machine learning and deep learning. As a result, we seek to discuss the numerous works in this paper that have employed machine learning and deep learning methods to perform aspect-based sentiment analysis. Aspect- based sentiment analysis has been focused on key domains and a variety of datasets in this study.

The remaining parts of the paper are divided up into these five sections: Section 2 focuses on detailed study of sentiment analysis and annotation. Section 3 focuses on analysis on emotions. Various domains used for sentiment analysis are discussed in Section 4. Detailed discussion on various dataset used for research is presented in Section 5. Different Machine Learning algorithms used in sentiment analysis has been discussed in Section 6. Section 7 provides the challenges occurred during implementation. Finally, Section 8 concludes the paper.

1.1Objectives of Research:

i.Analysis on aspect-based sentiment classification based on various machine learning technique identify which technique is better suited for sentiment analysis.

ii.To improve the accuracy further analysis on deep learning procedure will be done.

iii.To outperform single model in terms of adaption ability performance on hybrid model (NLP)

II. SENTIMENT ANALYSIS

Determining the polarity of the textual data is one of the key goals of the SA job. A text's inclination to favour positive or negative polarity might be observed. For instance, “That was the nastiest movie I've ever seen” has a negative polarity while “I really loved the picture” has a positive polarity. Some sentences may not have either positive or negative polarity. Such statements fall within the heading of neutral polarity. “I neither loved nor despised that movie,” for instance. Factual sentences do not fall under the category of neutral sentences.

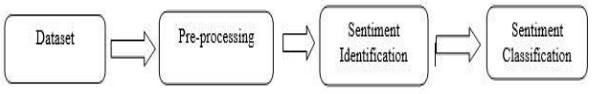

Figure 1: Sentiment analysis procedures

The practice of acquiring unprocessed text information in the form of reviews, blogs, and discussion board posts from several social networking sites, such as Twitter and Facebook, or e-commerce websites, such as Amazon and Flipkart, is known as data collection. These sources include ideas or feelings stated in a variety of sizes, formats, and styles regarding various entities. The subsequent stage involves carrying out the necessary filtering procedures to retrieve pertinent data from the datasets while deleting unnecessary stuff. The most crucial phase is sentiment recognition, which requires simultaneously identifying sentences containing

subjective expressions and implicit sentiments without ignoring them.

It might be challenging to extract opinions from unstructured textual data. An opinion or a fact may both be present in a statement; the former provides objective information about the subject at hand, while the latter provides subjective data. Identifying whether a sentence is subjective, or objective is one of the first tasks in SA. Only subjective statements containing opinions are to be continued. The problem of classifying subjective sentences into positive, negative, or neutral polarity follows the classification of subjectivity. As we work to get sentiments from textual texts, we can divide them into two categories: explicit or implicit opinions and direct or comparative opinions [6][4]. Straightforward language with direct opinions conveys the feelings. Comparative opinions, as opposed to direct opinions, compare various things or aspects of the statement. Instead, an explicit view reveals a person's position on something completely and explicitly, leaving no possibility for the reader to infer anything from the silence. Implicit opinion, however, lacks clarity, necessitating the reading of the underlying meaning to convey the message that was meant to be conveyed but was left unsaid. Contrary to the former, implicit opinions have a wide range of metaphors they can utilise, which makes the entire analytics process even more difficult because they are meant to have a lot of semantic information.

The primary objective of the SA is sentiment classification, which involves correctly categorising subjective phrases into their appropriate polarity kinds, such as positive, neutral, or negative.

2.1 GRANULARITY OF THE TEXT

There are many tasks to face, therefore solving SA is not a single, straightforward task. As shown in Figure 2, sentiment analysis is done at several text granularity levels, such as documents, sentences, and aspects. The most straightforward and fundamental type of SA, document-level SA seeks to identify the whole sentiment polarity of the textual material. The very first SA-related works [7, 8] focused on document-level SA. In comparison to document-level SA, sentence-level SA is a finer level of analysis [9][10]. The sentiment polarity in the document's sentences is computed at the sentence level. The aspect level's task SA is a fine-grained one in which multiple features identifying the entity are discovered in the text and their associated sentiment words and polarity are then resolute.

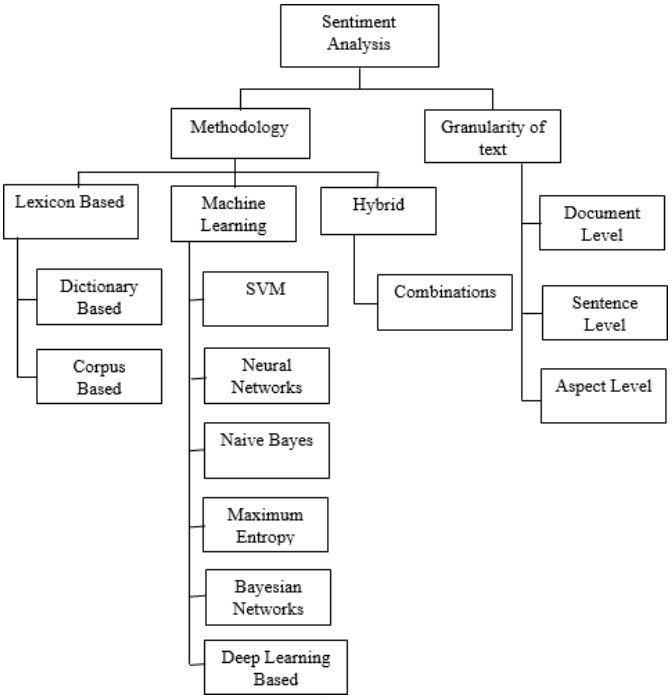

Figure 2: Sentiment analysis classification built on granularity and methodology

2.2 Methodology

The various methodologies discussed in this section provides brief insights on how features can be considered for sentiment analysis based on different datasets.

2.2.1 Lexicon based approach

The lexicon-based approach was used in the initial efforts on SA [11][12][13][14] and can be used to perform the SA. Lexicon-based approaches employ terms that have polarity values annotated, which provides insight into the sentiment-leaning of the text's content. This method's key benefit is that it does not require training data, making it an unsupervised learning strategy. However, the sentiment lexicons do not include all expressions and terms. Here, the task of a SA is aided using lexical resources like Sent WordNet [15] or WordNet

[16] etc. Dictionary-based approach and corpus-based approach are two further categories under which the lexicon-based method can be divided. The construct in the dictionary-based approach is a dictionary that includes opinion terms supported by their sentiment value, but in the corpus-based method, context knowledge replaces such a dictionary. In the corpus-based method, the likelihood that a word will be annotated or appended with both positive and negative descriptive words is more important. The primary difference between dictionary-based and corpus-based approaches is that the previous cannot be used to identify terms with specific domain orientation while the latter can [17].

2.2.2 Machine learning approaches

By using accessible data to train models, machine learning (ML) algorithms can predict or categorise any incoming input that is unknown to them. These algorithms

provide a better level of accuracy in their outcomes. There are primarily two types of data used in ML techniques: training data and test data. An ML classifier receives the training data to begin the training process. Numerous classifiers, including neural networks, NB, K-means, SVM, etc., can forecast the appropriate classifications. Chi-square or Information Gain (IG) feature selection algorithms are used to rank the relevant set of features and omit the inappropriate features to increase classification accuracy. A classifier receives test data following the training phase to determine whether the machine learning model is producing the expected results or not.

2.2.3 Hybrid approaches

There are numerous different types of studies that use hybrid methodologies that combine multiple SA approaches. To achieve better outcomes than the stand-alone strategy, a certain approach will be combined with another approach. A hybrid strategy was created by many studies [18][19][20][21] by combining lexicon-based and machine learning-based methods.

2.3 Evaluation metrics

The metrics Precision (P), Recall (R), F-score (F1), and Accuracy (Acc) are used to evaluate the SA as the problem primarily focuses on the categorization of words based on their sentiment polarity. Both lexicon-based and machine learning-based techniques are evaluated using the same measures. While recall identifies the proportion of relevant outcomes that the SA model correctly classifies, precision provides the percentage of relevant results. Using the precision value and recall value as a starting point, F1 score determines the overall accuracy of the SA model. A high F1 score suggests that the SA model is categorising considerably more accurately because it exhibits fewer false-negative or false-positive results. If the SA model's F1 score is zero, it represents a total failure, whereas a score of one indicates the model is performing at its peak. The percentage of accurate predictions to all available inputs is known as accuracy.

$$Precision, P = \frac{True\ Positives}{Actual\ Results}\ or\ \frac{True\ Positives}{True\ Positives\ +\ False\ Positives}$$

$$Recall, P = \frac{True\ Positives|}{Predicted\ Results}\ or\ \frac{True\ Positives}{True\ Positives\ +\ False\ Positives}$$

$$F1\ Score\ = 2 * \frac{Precision\ *\ Recall}{Precision\ +\ Recall}$$

$$Accuracy, Acc\ = \frac{True\ Positives\ +\ False\ Negatives}{Total}$$

III. AN APPROACH TO ANALYZING EMOTIONS BASED ON PERCEPTIONS

A fine-grained level of SA work called aspect-based sentiment analysis (ABSA) [22] looks for the sentiment of several elements of an item within textual data. An entity in the SA is a distinct individual thing or circumstance. It could be anything, such as a person, place, movie, or thing. The entity may be described in the textual data using several word groups, also known as features detailing the entities; these characteristics are referred to as "aspects" of the related entity. The entity may be described in detail using a few different aspects and several words or even phrases that express certain feelings about those aspects. To uncover the pertinent details about the entity and its supporting statements, ABSA looks for its polarity or attitude. Think about the phrase, “This guitar looks so wonderful, but the sound quality falls short of expectations.” Here, “guitar” is the object of concentration, and "look" and “sound quality” are two factors to be considered. An ABSA for a statement of this kind must, as shown in figure 3, assign a positive feeling to the element of "appearance" and a negative sentiment to the feature of "sound quality."

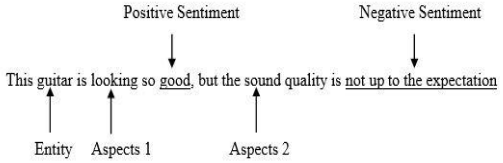

Figure 3: Identification of aspect sentiments Group text and arrows

ABSA employs a multistage analysis in a manner like the conventional SA. Numerous methods and approaches have already demonstrated how well they execute various jobs. The ABSA workflow is depicted in Figure 4, where the text data is first pre-processed to weed out unnecessary expressions. Pre-processing entails putting provided data in an appropriate format so that it may be used for the task at hand. Tokenization, stop word removal, negation handling, and other processes are used in SA to clean up the data and transform it to the appropriate format. Tokenization is the process of breaking the supplied text down into a collection of tokens. Tokenization aids in vector construction and gets rid of words that don't belong in the text. Special letters, standalone punctuation, and numerical tokens are eliminated from the text because they don't provide any meaning. Following tokenization, stemming is used to look for provided terms' true bases in the textual material. Word embedding, a crucial step in SA employing machine learning, is performed after pre- processing. Word embedding is the process of translating a token of words into a vector representation. Despite their close similarity, the words "aircraft" and "aeroplane" have different meanings. Word embeddings are used to change the text into another dimension so that a machine can comprehend the differences in meaning. These vectors can also be used to extract aspect and sentiment using a machine learning model. The third stage involves finding the texts' associated features of the entity, which is followed by finding the contextual phrases that best express the identified aspects' feelings. The precise sentiment orientation of sentiment words is determined in the last phase.

Figure 4: Workflow of aspect level sentiment analysis

Figure 4: Workflow of aspect level sentiment analysis

The task of ABSA can also be split into two halves, specifically aspect category SA and aspect term SA [5]. The former is a little finer-grained level of removal of the same, whereas Aspect Category SA is a coarser-grained one. The arts of music and dance are examples of aspect category SA.

The scalability of ABSA is one of its key benefits. Because ABSA can quickly and automatically do a fine-grained textual analysis. The manual analysis task is challenging since it is nearly impossible to process the enormous amount of text in a timely manner and at a fine-grained level. Additionally, ABSA will be analysing textual elements such as reviews, comments, etc. so that businesses or individuals can concentrate on the precise elements where their customers are voicing complaints or making ideas to enhance their goods or services. The respective businesses or consumers will save a substantial amount of time and money as a result. Since ABSA falls under SA, there are multiple issues to address. ABSA produces more thorough and precise results than sentiment analysis of the document and sentence levels. Today, text analysis in ABSA is quick and simple thanks to the development of machine learning and deep learning algorithms. SVM, CNN, LSTM, and other ML techniques have been employed in several papers for the ABSA challenge [23] [24] [25].

IV. DOMAINS

The different domains that are frequently utilised in ABSA are covered in this section. When explaining the SA, the domain is crucial, particularly when the focus is on aspect level. It is easy to extract aspects from the given text when one has domain knowledge. Because it is challenging to separate the characteristics from the text without context. Think about the phrases “speaker sound is so loud that everyone in the auditorium can hear it” and “vehicle's engine is so loud” from the speaker and car domains. According to the speaker, the loudness in the first case is conveying a positive mood, whereas the loudness of the car's engine in the second example is conveying a negative sentiment. Therefore, it is evident from the example that domain expertise is crucial to SA's job. In other words, the training statistics based on many domains will have an impact on the outcomes of SA. We can claim that SA is rather domain determined. Based on the literature study conducted here, this conclusion was

reached. It is obvious that there will be a distinct strategy that produces improved results on SA for each domain. Most of the work on SA's aspect level focused on consumer reviews of products including laptops, TVs, mobile phones, restaurants, hotels, and movies. Table 1 lists all the research on ABSA that has been done across several fields.

Table 1: ABSA domains and datasets

Domain	**Authors**	**Dataset used**	**Algorithm/ Technique**
TV reviews	Fu et al. [26]	Manually collected ChineseTV online reviews	K-means+Co-clustering
Product reviews	Rezaeinia et al. [28]	CR(Amazon),SST (Stanford sentiment treebank)	LSTM
Movie reviews	Thet et al. [22]	IMDB	CNN, BiLSTM
	Anand et al. [29]	Manually collected movie reviews from IMDB & Amazon	
	Zainuddin et. al [30]	Twitter	SVM
	Manek et al. [23]	Large movie review dataset SAR14, Cornell polaritydataset V1.0, and large movie review dataset V1.0	Attention basedLSTM
	Rezaeinia et al. [28]	MR(IMBD),RT (Rottentomatoesmovies reviews)	LSTM
	Zhang et al. [31]	MR,SST1,SST2, CR, AFFR	LSTM
	Piryani et al. [32]	IMDb	Linguistic approach
Hotel reviews	Al Smadi et al. [33]	Manually collected Arabic hotel reviews	SVM
	Akthar et al. [34]	Manually collected hotel review dataset	LDA, DP, CR, And NER NLP tools

	Pham et al. [35]	Hotel reviews from tripadvisor.com	CNN
	Garcia-Pablos et al. [36]	SemEval 2016 task 5	CRF
	Al Smadi et al. [37]	Arabic hotel reviews-SemEval2016 task 5	Attention based LSTM
	Kumar et al. [38]	Manually collected reviews from booking.com	Neural network
	Garcia-Pablos et al.[36]	SemEval 2016 task 5	CRF
Restaurants	Qiu et al. [39]	Yelp	LDA
	Pham et al. [24]	Manually collected restaurant reviews	LSTM
	Garcia-Pablos et al.[36]	SemEval 2016 task 5	CRF

V. DATASETS

Review-type data are the focus of aspect-based sentiment analysis since they are full of thoughts about the various characteristics of the products being reviewed. Lack of benchmark datasets is one of the early issues in implementing ABSA. More studies in this area have been conducted recently, and the good publicly accessible datasets that are the outcome are shown in Table 2. SemEval 2014 task 4 is a dataset Pontiki et al. [41] generated in 2014 specifically for ABSA. Pontiki et al. [42] included reviews of hotels, laptops, and restaurants—all in the English language—in the SemEval 2015 dataset. 6,940 tweets make up the target-dependent Twitter sentiment classification dataset, which was created in 2014 by Dong et al. [44]. ICWSM 2010 JDPA Sentiment corpus is a dataset that was created by Kessler et al. [45]. Documents pertaining to digital and automotive devices are included in this dataset. Darmstadt Service Review Corpus dataset, developed by Toprak et al. [46], covers reviews of online institutions and their services.

Table 2: ABSA Datasets

No.	Name of the Dataset	Domain	Language	Number of reviews/tweets/micro blogs
1	SemEval 2014	Restaurant, laptops	English	Restaurant – 3841 Laptops - 3845
2	SemEval 2015	Hotel,restaurant,laptops	English	Hotel – 30 Restaurant – 350 Laptops – 450
3	SemEval 2016	Hotel, restaurant, laptops, mobile, camera	English, Arabic, Chinese, Dutch, French, Russian, Spanish and Turkish	Laptop – 350 (English) Hotel – 2291(Arabic) Camera – 200 (Chinese) Mobile – 200 (Chinese),270 (Dutch) Restaurant 339 (Turkish), 313 (Russian), 555(French), 400 (Dutch), 913 (Spanish)
4	Target-dependent twitter sentiment classification dataset	Tweets	English	6,940
5	FiQA ABSA	Financialmicroblogs and financial news headlines	English	Micro blogs – 774 News headlines – 529
6	ICWSM 2010JDPA Sentiment corpus	Automotiveanddigital devices	English	515
7	Darmstadt Service Review Corpus	Online universities and their services	English	118

VI. MACHINE LEARNING (ML) APPROACHES FOR ABSA

Regarding aspect-based sentiment analysis, ML algorithms have been thought to perform accurately. The various ML algorithms are discussed in the following subsections, along with how well they work for ABSA.

6.1 Latent Dirichlet Allocation (LDA):

Latent Dirichlet Allocation, or LDA, is a probabilistic, generative model for a collection of texts that can be thought of as combinations of underlying issues. A topic-developing technique called LDA assists in automatically identifying the core subjects in each material. Documents are viewed by LDA as mixtures of subjects with certain probabilities of words. Kull-back-Leibler (KL) divergence was utilised by Fu et al. [47] to ascertain the relationship between specific paragraphs and topic models, with the main goal being to ascertain the theme

of the paragraph. The authors identified the blogs' themes using the LDA model, and they measured the distance between the themes using KL divergence. To extract the hidden information and features from a manually compiled sample of hotel reviews, Akthar et al.

[34] employed a topic modelling tool named Mallet. W2VLDA is an unsupervised system that deals with multi-domain and multilingual ABSA, according to Garcia-Pablos et al. [36]. W2VLDA uses a substantial amount of unlabelled textual data and starts with a small number of seed words. For distinguishing between different aspects of opinion words, the authors used LDA topic demonstrating in conjunction with an unsupervised pre-trained classification model. Aspect Sentiment Unification Model (ASUM) was created by Amplayo et al. [48] by incorporating product descriptions. Aspect and its accompanying emotion are combined in ASUM, a modified form of LDA [49].

6.2 Conditional Random Field (CRF):

Conditional Random Fields (CRF), a discriminatory model for predicting orders as opposed to generative models like LDA, are employed. For more precise prediction in CRF, data from the prior labels is employed. A prediction methodology was put forth by Qiu et al. [39] for calculating the ratings of unrated reviews from the Yelp dataset. For the generation of pair terms and for calculating their sentiment scores, authors employed a sentiCRF form of the CRF. They developed a cumulative logit model, which forecasts review ratings using attributes and the associated sentiment values from the reviews. Furthermore, they suggested

a heuristic re-sampling approach to address the class imbalance issue at the time of sentiment score calculation.

6.3 Support Vector Machine (SVM):

The supervised machine learning algorithm SVM is promising for the tasks of classification and regression. Every data point in SVM is displayed on an n-dimensional graph, and a hyper plane is created depending on whether classification or regression is needed. The potential hyper plane with the greatest separation from the support vectors will be taken into consideration. A heuristic mix of Parts of Speech (POS) is combined with feature selection techniques as PCA (Principal Component Analysis), Latent Sentiment Analysis, random project, etc. The authors also used Stanford Dependency Parser to extract implicit elements in this work. A model was put out by Al-Smadi et al. [33] to help the ABSA perform better while translating hotel reviews into Arabic.

6.4 Convolutional Neural Network (CNN):

CNN is a feed-forward neural network that was initially employed mostly in image processing before being applied to nearly all other fields. The convolutional layer, which is the initial layer, extracts all the characteristics from the input. CNN was used by Kumar et al. [38] for the ABSA task, and stochastic optimization was carried out in their research. Word- level embedding in this case was carried out using word2vec, and semantic feature extraction was carried out by creating ontologies. Particle Swarm Optimization (PSO) was added by the authors as a multi-objective function for CNN parameter tuning. Particle Swarm Optimization (PSO) was included by the authors as a multi-objective function for CNN parameter tweaking.

6.5 Long Short-Term Memory (LSTM):

The vanishing gradient and inflating gradient problems that Recurrent Neural Networks (RNN) experienced were addressed by the development of the Long Short-Term Memory (LSTM) network, a form of RNN. The main advantage of LSTM is its intelligence, which enables it to recognise long-term dependencies. In other words, LSTMs have a longer retention time for the information. For this, the LSTM network included a cell-class explicit memory unit. LSTM bases its decision on three inputs: the current input, the previous output, and the previous memory. A technique based on LSTM that has a two-stage aspect level classification of feelings was proposed by Ma et al. [50]. A generative model for aspect level

sentiment classification was created by Xu et al. [25] using LSTM over reviews of restaurants and laptops. It is a semi-supervised technique with sentiment and context as its two stochastic variables.

Authors	**Algorithm / Technique**	**Accuracy**
Zainuddin et al. [30]	SVM + ARM	Accuracy = 76.55%
Thet et al. [22]	CNN, BiLSTM	Complete Movie- 86% Direction- 86% Cast-83% Storywriter- 80% Scene play- 90% Music- 81%
Kumar et al. [38]	Neural network	Accuracy = 88.52%,
Manek et al. [23]	Attention based LSTM	Accuracy = 97.32%
Fu et al. [47]	LDA	Accuracy= 89.165%
Fu et al. [26]	K-means+Co-clustering	Accuracy= 78.198%
He et al. [51]	Attention based LSTM	Accuracy = 85.58%
Ma et al. [52]	Hierarchical attention-basedLSTM	Accuracy=89.32% onSentiHood dataset 76.47% on SemEval 2015 dataset

Authors	Algorithm / Technique	Accuracy
Al-Smadi et al. [37]	Attention based LSTM	Accuracy = 95.4%
Yang et al. [53]	JABSTand MaxEnt-JABST	Twitter dataset- 71.2% Sina dataset- 69.8%
Amplayo et al. [48]	Ensemble based on PSO	Accuracy = 85.73%
Al-Smadi et al. [33]	SVM	Accuracy = 95.4%
Song et al. [54]	Attention based LSTM	Wikipedia 91.28% Customer reviews- 92.91% News articles- 92.07%
Ma et al. [50]	LSTM	Laptop- 73.1% Restaurant- 80.1
Tang et al. [55]	JABSTand MaxEnt-JABST	Amazon-83% Yelp-85%
Qiu et al. [39]	CRF	Accuracy = 93.6%

VII. CHALLENGES

In the past four to five years, ABSA, a fine-grained level of SA, has significantly impacted the modern technology-oriented world. This research addressed a few papers in this field, and it is evident from comparing the approaches used by different authors that deep learning works are producing more encouraging outcomes on aspect level SA. However, other studies indicate that machine learning techniques outperform deep learning techniques. For instance, Al-Smadi et al. [37] noted that SVM is outperforming RNN [37] in terms of performance. SA is very important today for several uses, including analysing client feedback. As a result, the domain is important for aspect level SA. It is evident from the works presented in this paper that most research projects are concentrating more on similar areas, such as computers, restaurants, hotels, etc. Several other highly significant categories, such as travel reviews and news, are still unexplored by researchers. Another major issue for researchers in this field is the absence of benchmark datasets on various domains. The language in which SA is conducted is another serious issue. Regional languages are hardly ever employed for SA duties; only a select few languages, such as English, Chinese, etc., are actively used. The widespread use of regional languages in social media has significantly increased the importance of this field, encouraging further research in SA at the aspect level. Further research in this field is being hampered by a lack of high-quality datasets in regional languages.

VIII. CONCLUSION

In the present e-world, SA, which is the process of deleting the opinions, feelings, or emotions from a text, has become well-known. Document level, phrase level, and aspect level SA are three levels of granularity within SA. Third level of analysis, known as ABSA, is far more in-depth and involves the extraction of aspects, words with matching feelings, and their polarity orientation. Since there has been a lot of research done on ABSA over the last three to four years, the organisation is currently attempting to stand on its own. The level of perception and complexity in SA have significantly changed because of the advent of machine learning. The absence of a benchmark dataset and the fact that publicly accessible datasets only cover a limited number of domains are two fundamental problems with ABSA. Deep learning techniques are producing some encouraging results for ABSA because of technology developments, but it is still clear from the literature review that the outcomes fall short of expectations. In other words, we may argue that the development of ABSA using deep learning is just getting started.

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Epilepsy Detection with different ML Models using EEG Signals

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Abstract – **The electroencephalogram (EEG) has emerged over the past few decades as one of the most important instruments used by doctors to identify seizures and other neurological abnormalities of the human brain. The particular character of epileptic convulsions and their subsequent negative effects on patients' quality of life made a precise epilepsy diagnosis crucial. As a result, this research suggests a novel deep-learning method based on the categorization of minimally pre-processed raw multichannel EEG signal recordings for detecting seizures in paediatric patients. In our model, the best accuracy we got is for the gradient boosting classifier which is 96% for the time series and 97% for the Fourier series.**

Keywords: **Aspect-based sentiment analysis, Sentiment analysis, Machine learning, Deep learning**

I. INTRODUCTION

One of the most prevalent neurological disorders in people, epilepsy is a non-communicable illness that frequently manifests as abrupt bouts. A quick and early aberration in the electrical activity of the brain that disturbs a part, or the entire body is a sudden episode of seizures. Millions of people globally experience various epileptic seizures. Sometimes these assaults result in mental illnesses that can seriously harm the patient's body. Additionally, humiliation and social isolation can cause mental anguish in those who have epileptic seizures. Therefore, catching epileptic seizures early can benefit patients and enhance their quality of life. Neurologists frequently utilise electroencephalograms (EEGs), which have been available for a while, to identify a variety of brain illnesses, particularly epilepsy, for practical reasons like availability, ease of use, and affordability. The way an EEG works is by placing a number of electrodes along the scalp's surface, then recording and measuring the voltage oscillations produced by the ion current running through the brain. These voltage oscillations, which represent the brain's neuronal activity, are subsequently converted into a number of time series known as signals. Since we can utilise EEG to precisely capture and indicate epileptic signals that are characterised by spikes, sharp waves, or spike-and-wave complexity, it is a very potent non-invasive diagnostic technique. EEG signals have therefore been the most widely used tool for both the detection and prediction of epileptic seizures.

II. LITERATURE REVIEW

[1]An Automated System for Epilepsy Detection using EEG Brain Signals based on Deep Learning Approach-Ihsan Ullah1 , Muhammad Hussain2. These methods do not perform well when classifying ternary cases e.g. ictal vs. normal vs. inter-ictal; the maximum accuracy for this case by the state-of-the-art methods is 97±1%. To overcome this problem, we propose a system based on deep learning, which is an ensemble of pyramidal one-dimensional convolutional neural network (P-1D-CNN) models.

[2]Detection of Epileptic Seizures using EEG Signals-Sarthak Gupta, Siddhant Bagga, Vikas Maheshkar automatic epileptic seizure detection techniques are needed, which are able to provide high-quality results in a short time for this an approach has been proposed that uses Discrete Wavelet Transform to convert the EEG signal into the time-frequency domain. various features are extracted and then classification is carried out on a number of classifiers including convolutional neural networks, random forests etc for the detection of epilepsy seizure. , an accuracy of 99.29 was achieved which outperformed the conventional epileptic seizure detection techniques.

[3]Detection of Epileptic Seizures using Convolutional Neural Network-Surbhi Gupta, Mustafa Sameer, Neeraj Mohan Most neurologists widely use Electroencephalogram (EEG) signals to identify epilepsy by recording the brain's electrical activity directly. They made a lightweight CNN architecture for seizure classification. High accuracy is achieved in only 20 epochs with few trainable parameters for binary classification.

[4]Seizure Detection Using EEG signals-Zakareya Lasefr, Sai Shiva VNR Ayyalasomayajula, and Khaled Elleithy.The authors propose an epilepsy seizures detecting method that can be implemented in a hardware device to help epileptic patients. They utilized an EEG dataset that is used in various research regarding epilepsy detection and processed the EEG signal in both time and frequency domains and applied a Chebyschev filter for preprocessing the signal, then, by using Wavelet Analysis, we decomposed the filtered signal into five sub-bands in both time and frequency domain.

[5]Detection of Epileptic Seizures from EEG Signals by Combining Dimensionality Reduction Algorithms with Machine Learning Models-Muhammad Zubair, Maria Vladimirovna Belykh I, Umesh Kumar Naik. In this paper, more emphasis has been given to developing SPPCA and SUBXPCA dimensionality reduction algorithms to increase the classification accuracy of various machine learning models. Firstly, Discrete Wavelet Transform (DWT) is applied to EEG signals for extracting the time-frequency domain features. , to select the prominent features and to retain their properties, correlation feature sub-pattern-based PCA (SPPCA), and cross subpattern correlation-based PCA (SUBXPCA) are

used as a dimensionality reduction techniques and the best accuracy of 98% for SUBXPCA is achieved by random forest classifier.

[6] Early Detection of Epilepsy using EEG signals-Selvin Pradeep Kumar.S, Ajitha.L ,According to the paper, they have studied pre-ictal (background) and ictal (epileptic) EEG signals using higher order spectra (HOS) and the measures obtained were shown which distinguish epileptic EEG from normal and background EEG with high confidence levels.

[7] Epilepsy Detection and Classification for Smart IoT Devices Using hybrid Technique-Sani Saminu, Guizhi Xu, Shuai Zhang. This paper presents an effective and efficient technique suitable for smart, low-cost, power and real-time devices that can be easily integrated with recent 5G network IoT devices for mobile applications, home and health care centres for monitoring and alerting the doctors and patients about its occurrence to prevent a sudden collapse and consciousness which may cause injury and death. The efficiency and accuracy of these smart devices highly depend on the quality of feature extraction methods and classifier performance. Therefore, this work employed two machine learning classifiers, a support vector machine (SVM) and a feedforward neural network (FFNN).

[8] Enhanced Detection of Epileptic Seizure Using EEG Signals in Combination With Machine Learning Classifiers- WAIL MARDINI, MUNEER MASADEH BANI YASSEIN, SHADI ALJAWARNEH. The proposed framework in this paper uses the 54-DWT mother wavelets analysis of EEG signals using the Genetic algorithm (GA) in combination with other four machine learning (ML) classifiers: Support Vector Machine (SVM), K-Nearest Neighbors (KNN), Artificial Neural Network (ANN), and Naive Bayes (NB). The performance of 14 different combinations of two-class epilepsy detection is investigated using these four ML classifiers. The experimental results show that the four classifiers produce comparable results for the derived statistical features from the 54-DWT mother wavelets; however, the ANN classifier achieved the best accuracy in most dataset combinations.

[9] Machine Learning Approach for Epileptic Seizure Detection Using Wavelet Analysis of EEG Signals-Abhishek Kumar, Maheshkumar H. Kolekar. In this paper, discrete wavelet transform is used for the time-frequency analysis of EEG signals. Using discrete wavelet transform, the EEG signal is decomposed into five different frequency bands namely delta, theta, alpha, beta and gamma. Only theta, alpha and beta carry seizure information. The support vector machine classifies the input EEG signal into the seizure-free signal. Experimental results show that the proposed method classifies EEG signals with excellent accuracy, sensitivity and specificity.

[10] Multichannel Detection of Epilepsy using SVM classifier on EEG signal-Manish N. Tibdewal, Swapnil A. Tale. They proposed an efficient mechanism algorithm based on statistical analysis using features i.e. average value, standard deviation, variance and kurtosis along with the electrical features such as least significant value, most significant value and band power. These features were used on multichannel EEG signals which provide promising results with less complexity, simplicity along with accuracy. Thus, an automatic seizure detection mechanism based on multichannel EEG signal analysis using advanced signal processing techniques with statistical and electric features helps to reduce the physician workload.

III. Methodology

The original dataset can be found at (https://archive.ics.uci.edu/ml/datasets/Epileptic+Seizure+Recognition) in the UCI Machine Learning Repository. This dataset contains the electroencephalogram (EEG) measurements of 500 people, which were broken down into 4097 separate data readings and 23 chunks for each person. As a result, there are 23 x 500

= 11,500 rows of data. The 178 columns in each row correspond to EEG readings taken over the course of one second. The label y in column 179 denotes whether the patient is experiencing a seizure (y = 1) or not (y = 2, 3, or 4,5).

We're interested in learning ways to spot epilepsy as early as possible. From a data science perspective, our issue can be viewed as a classification problem in which we are dividing cases of epilepsy and cases without epilepsy. We expanded this issue and made the decision to use the most effective machine learning model for identifying epilepsy.

We used classification accuracy and FNR as our measures. To reduce the amount of undiagnosed epilepsy, we made the FNR an important variable.

EEG Signals

A signal from an electroencephalogram (EEG) shows the electrical activity of the brain. They have a highly erratic nature and could provide insightful data about the status of the brain. However, it is quite challenging to infer anything helpful from these signals in the temporal domain simply by seeing them. In essence, they have a non-linear and non- stationary nature. Consequently, crucial features can be retrieved by utilising cutting-edge signal processing techniques for the diagnosis of various disorders.

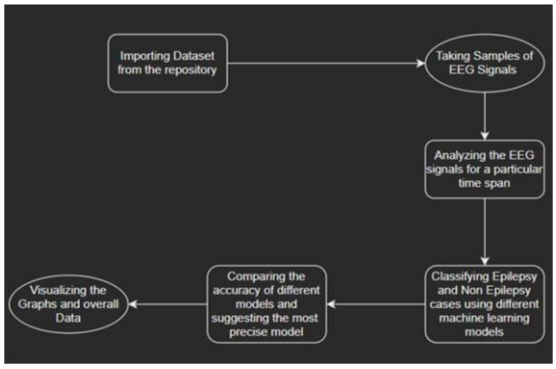
Gradient Boosting Classifier

The combination of gradient descent and boost is known as gradient boosting. Each new model in gradient boosting employs the gradient descent method to reduce the loss function from its forerunner. This process is repeated until the target variable's estimation is more accurate. In contrast to previous ensemble techniques, gradient boosting builds a succession of trees, each one attempting to fix the flaws of the one before it.

Anomaly Detection Algorithm

Finding something that deviates from a dataset's expected behaviour is done using the anomaly detection technique. Anomaly detection, in other words, locates data points in a dataset that differ from the rest of the data. They are referred to as outliers, quirks, exceptions, surprises, and so on.

IV. Flowchart



V. Time Series

Step 1: Balancing the Dataset for Time Series

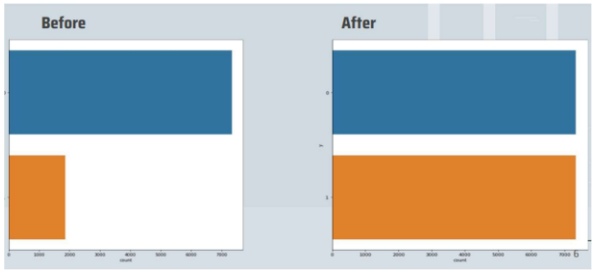
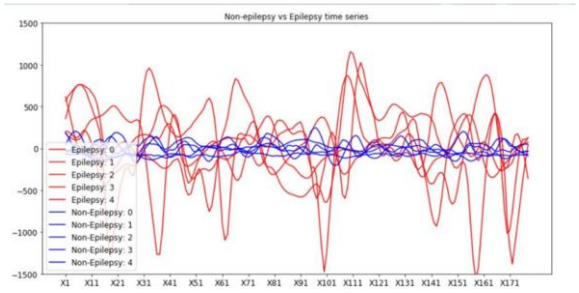


Fig [1]

Step 2: Analysing Non-Epilepsy vs Epilepsy patients through Time series



Step 3: Analysing the KNN, Logistic, Anomaly and Gradient Boosting Classifier Machine Learning algorithms through Time series.

Step 4: Comparing the 4 machine learning models accuracy and False Negative Rate for the Time series.

VI. Fourier Series

Step 1: Visualizing Dataset for Fourier Series

Step 2: Analysing Non-Epilepsy vs Epilepsy patients through Fourier series

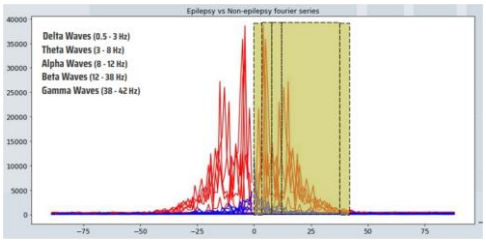


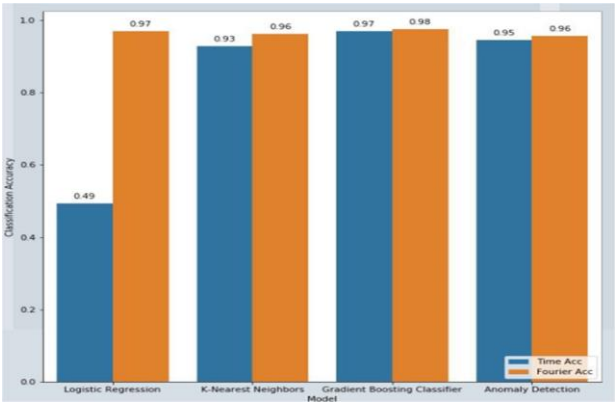
Fig [2]

Step 3: Analysing the KNN, Logistic, Anomaly and Gradient Boosting Classifier Machine Learning algorithms through Fourier series.

Step 4: Comparing the 4 machine learning models accuracy and False Negative Rate for the Fourier series.

VII. Results

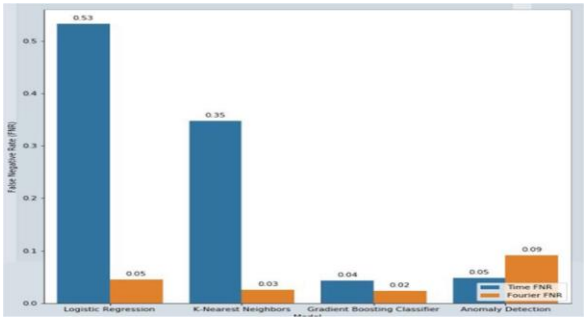
The figure shows the accuracy of all the 4 machine learning models.



	Model	Time Acc	Fourier Acc
0	Logistic Regression	0.4935	0.9265
1	K-Nearest Neighbors	0.9278	0.9634
2	Gradient Boosting Classifier	0.9696	0.9757
3	Anomaly Detection	0.9452	0.9573

Fig [3]

The figure shows the False Negative Rates of all 4 machine learning models.



	Model	Time FNR	Fourier FNR
0	Logistic Regression	0.5326	0.0545
1	K-Nearest Neighbors	0.3478	0.0260
2	Gradient Boosting Classifier	0.0435	0.0392
3	Anomaly Detection	0.0482	0.0910

Fig[4]

VIII. CONCLUSION

This review serves as an introduction to epileptic seizures and identification of highlighting the main factor restricting the detection, i.e., a method for identifying epileptic seizure data from different EEG circumstances. In order to highlight the significance of various machine-learning techniques, a brief history of several machine-learning models for epileptic detection is given.

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Music Overflow: A Music Genre Classification Web Application

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Abstract – **"Music Overflow": An automated classification model for music genres is proposed to be created using a Music Genre Classification Web Application. A traditional class that identifies some portions of music as belonging to a not unusual way of life or set of conventions is known as a music genre. It must be distinguished from musical style and shape. there are numerous methods that tune may be divided into distinctive genres. Pop, Hip-Hop, Rock, Jazz, Blues, country, and steel are popular forms of track. Content-based music genre classification is an essential component of music information retrieval systems. With the rise of digital music on the Internet, it has gained prominence and received a growing amount of attention. Automatic music genre classification has received little attention to date, and the reported classification accuracies are also quite low. To determine a music piece's genre, we examine how various classifiers perform on various audio feature sets. Lastly, we experiment with combining various classifiers to improve classification accuracy. On a 10 style set of one thousand song pieces, we first obtain a take a look at style category accuracy of round 73.2 percent with a set of different classifiers. This performance is higher than the great that has been reported for this statistics set, that is 71.1 percent. we discover that the classifier used determines which function set is first-rate.**

Keywords: ***Model View Template (MVT), Django Template Language (DTL), Mel Frequency Cepstral Coefficients (MFCC), Music Information Retrieval (MIR), Hypertext Markup Language (HTML), Database Management System (DBMS).***

I INTRODUCTION

Genre classification is the process of grouping similar types of data into a single identity and giving that identity a name (based on its rhythm, played instrument, or harmonic content). The music industry is increasing around the globe and every day new songs are written. Because categorizing these songs on a daily basis will become tiresome, technology can be used to cure the music and make categorizing it easier or more efficient by utilizing its rhythms, beats, and lyrical composition. An audio signal can be used to represent a song. The frequency, spectral roll-off, root-mean-square (RMS) level, bandwidth, zero-crossing rate, spectral centroid, and other characteristics of this audio signal are just a few examples. The computer in different format such as wav or mp3 reads this audio signal. Different music streaming apps like Spotify, Wynk, Apple Music, etc. use genre classification to recommend songs to its user. Anessential component of a comprehensive music information retrieval system for audio signals is the automatic classification of musical genres, which has the potential to automate this process. For classification, we hire pattern recognition algorithms as function vectors. For our class hassle, we attempted some extraordinary supervised studying algorithms. [1]

II.Literature Survey

Since the beginning of the Internet, the classification of music genres has been the subject of extensive research. Using supervised machine learning techniques like the Gaussian Mixture model and knearest neighbor classifiers, Tzanetakis and Cook (2002) solved this issue. [1]

They introduced three sets of features: timbral structure, rhythmic content, and pitch content. Music genre classification has also been investigated using Hidden Markov Models (HMMs), which have been extensively utilized for speech recognition tasks (Scaringella and Zoia, 2005; Soltau and others, 1998). [2]

For genre classification, Mandel and Ellis (2005) study and compare support vector machines (SVMs) with various distance metrics. According to Zwicker and Fastl (1999), the authors of Lidy and Rauber (2005) talk about the role that psycho-acoustic features play in determining the genre of music, particularly the significance of STFT taken on the Bark Scale. [3]

The features used by were Mel-frequency cepstral coefficients (MFCCs), spectral contrast, and spectral roll-off (Tzanetakis and Cook, 2002). [4]

In Nanni et al., SVM and AdaBoost classifiers are trained using a combination of visual and acoustic features. (2016).[5]

A number of studies employ deep neural network techniques to analyze speech and other kinds of audio data in light of their recent success (AbdelHamid et al., 2014; Gemmeke and others, 2017). Due to the high sampling rate of audio signals, it is difficult to represent audio in the time domain for neural network input. [6]

However, Van Den Oord et al. (have addressed it. 2016) for tasks related to making audio. The spectrogram of a signal, which includes information about both time and frequency,is an alternative representation that is frequently used. [7] Music genre classification is an important and highly studied field of research in the music industry. The goal of this literature survey is to examine and summarize the current state of research in this area. In conclusion, it can be seen that music genre classification is an important and highly studied field of research. A variety of approaches have been explored for this task and the combination of content-based analysis and machine learning algorithms has been found to be effective.

III. Motivation

Web Application Development is one of the most rising & promising arenas due to the increase in computation power and the never-ending problems which lay the foundation for building the web applications. The

software is for music lovers. By allowing music fans to simultaneously listen to songs with their closest friends, a music streaming app can improve its social features. People who enjoy listening to music and want to share their experience with close friends use web apps that stream music online. A music information retrieval (MIR) task whose goal is the computational comprehension of music semantics is to comprehend and apply music classification. The classifier predicts relevant musical attributes for a given tune. There are nearly limitless classification tasks based on the assignment definition, ranging from genres, moods, and gadgets to extra preferred principles like musical options and similarity. numerous extra applications, which includes playlist generation, semantic search, and music recommendation, can employ the retrieved statistics.

IV. Problem Statement and Objectives

Even though categorizing a song into a genre is a task that is inherently subjective, the human ear finds it easy to do. A new song's timbre, instruments, beat, chord progression, lyrics, and genre are all easily identifiable in a matter of seconds. For machines then again this is a seriously mind boggling and overwhelming errand as the entirety "human" experience of paying attention to a tune is changed into a vector of elements about the melody. In the past, many of these musical characteristics that humans recognize in music have not been reliably detected by machines. We are considering a 10-genre classification problem with the following categories: classical (cl), country(co), disco(d), hip-hop(h), jazz(j), rock(ro), blues(b), reggae(re), pop(p), metal(m). Finally, we have chosen six popular genres namely classical, hip-hop, jazz, metal, pop and rock to get more accuracy for our final web-app. Mel Frequency Cepstral Coefficients (MFCC) are the feature vectors used in our pattern recognition algorithms for classification. Over traditional music players, we are planning to make an entertainment music web app. Objective:

The objectives of music genre classification are as follows: -

•To extract the features from the given music.

•To classify the input music based on the extracted features and label a class(genre) name to it.

•To quantify the match of any input music to the listed genres.

•To make genre classification more accurate.

•To discover the more than one genres to which a song belongs to.

•Our group is highly enthusiastic to build web apps.

•To learn and implement MVT architecture components.

•To make a music lovers community web app.

V.METHODOLOGY STEP

1: Data Preparation

In our paper, the GTZAN dataset is used, which was first used by authors in [10]. This dataset has 10 classes, Blues, Classical, Country, Hip-Hop, Pop, Jazz, Metal, Disco, Reggae and Rock. Each class containing 100 audio clips, each clip being 30 seconds long in .wav format and is samples at 22050Hz, 16bit.

Step 2: Data Pre-Processing

Sr no.	Class	Clips
1	Blues	100
2	Classical	100
3	Country	100
4	Disco	100
5	Hip-hop	100
6	Jazz	100
7	Metal	100
8	Pop	100
9	Reggae	100
10	Rock	100
	Total	**1000**

Table 1. Brief information of dataset

Train-Test Split

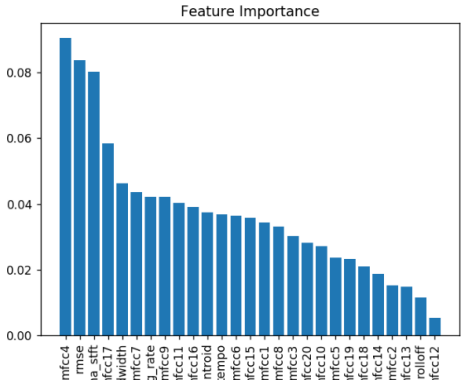
while machine learning algorithms are used to make predictions on records that has not been used to train a model, a split train test method is used to estimate how well they perform using the consequences of this quick and smooth technique, you could examine the overall performance of machine learning algorithms for your predictive modelling trouble. even though the method is straightforward to apprehend and use, there are instances when you should no longer use it, such as when you have a small dataset or whilst you want additional configuration, inclusive of whilst it is used for class and the dataset isn't always balanced.

Min-Max Normalization

The fundamental idea behind normalization and standardization never changes. Variables that are measured at different scales may result in a bias because they do not all contribute equally to the model fit and learned function. Consequently, prior to model fitting, feature-wise normalization like MinMax Scaling is typically utilized to address this potential issue.

Feature Importance

The degree to which each feature contributes to the prediction of the model is shown by the feature (variable) importance. It basically determines how useful a particular variable is for the current model and prediction. For instance, if we want to predict a person's weight using their height, age, and name, it is clear that the variable height will have the greatest impact, while the variable name has no bearing on the person's weight. In general, we use a numerical value that we refer to as the score to represent the importance of features. The higher the score value, the more significant a feature is. A feature importance score has numerous advantages. For instance, the relationship between the independent variables (features) and the dependent variables (targets) can be determined. We would be able to identify and exclude



irrelevant features by analyzing variable importance scores. The model may run faster or even perform better if the number of not meaningful variables is decreased.

Fig.1 Feature importance

Step 3: Extraction of features

Mel-Frequency Cepstral Coefficients

The maximum current methods for sound recognition and type employ MFCC, which is a hard and fast of brief-term power spectrum traits of the sound. It exemplifies human voice characteristics. The final feature vector (13 coefficients) contains a significant portion of this feature.

The following is how to use this feature:

–Breaking up the signal into a number of brief frames. This step aims to keep a constant audio sign.

–The periodogram estimate of the energy spectrum became calculated for every frame. that is to study the frequencies within the brief frames.

–Injecting the power spectra into the mel filterbank and summing the energy from each filter The number of energy residing in the various frequency regions will then be known.

$$m = 2595 \log_{10}\left(1 + \frac{f}{700}\right)$$

–Using the previous method of calculating the logarithm of the filterbank energies, we can bring our facial features closer to what we can hear.

–Determining the result's Discrete Cosine Transform (DCT). It links the energies of the filterbanks together.

Chroma Frequencies

The presence of each chromatic key is represented by the chroma frequency vector, which divides the spectrum into chromatic keys. A 12-length function vector is taken from the histogram of cutting-edge notes on a 12-observe scale. The song concept explains the chroma frequency. The chord performed in that window can be correctly defined through looking at the histogram above the 12-note scale. It affords a sturdy technique for describing a degree of musical similarity.

Spectral Centroid

It specifies the area of the "centre of mass" for sound. It is basically the weighted mean of the sound's frequencies.Take a look at two songs—one from metal and one from blues. A blues tune is by and large steady all through it length while a metal melody ordinarily has more frequencies collected towards the end part. Consequently, a blues music's spectral centroid will normally be towards the center of its spectrum than a metal music's.

$$\text{Centroid} = \frac{\sum_{n=0}^{N-1} f(n)x(n)}{\sum_{n=0}^{N-1} x(n)}$$

Zero Crossing Rate

The wide style of instances the waveform crosses zero is represented via this. It generally has better values for sounds with a whole lot of percussion, like rock and metal.

$$zcr = \frac{1}{T-1}\sum_{t=1}^{T-1} 1_{\mathbb{R}_{<0}}(s_t s_{t-1})$$

Spectral Roll-off

It is a measurement of the signal's shape. It's the frequency at which the high frequencies drop to zero. To get it, we need to figure out how many bins in the power spectrum have 85 percent of their power in lower frequencies.

Step 4: Model Selection

Support Vector Machine Support Vector Machine, also known as SVM, is one of the most widely used supervised learning algorithms. It can be used to solve regression and classification problems. However, in Machine Learning, it is primarily utilized for Classification issues.

The SVM algorithm's objective is to find the most effective line or decision boundary for classifying n-dimensional space, allowing us to quickly place a new data point in the appropriate category in the future. A hyperplane is the name given to this best decision boundary.

The extreme points and vectors that aid in the creation of the hyperplane are selected by SVM. The algorithm is known as a support Vector machine because of the reality the ones severe instances are known as support vectors.

Step 5: Train and Test

Dataset has 10 classes, Blues, Country, Pop, Classical, Hip- Hop, Metal, Disco, Jazz, Rock and Reggae. Each class containing 100 audio clips, each clip being 30 seconds long in .wav format.

Of which,75% of data is used for training and 25% of data is used for testing.750 examples are used for training the model and 250 examples are used for testing the accuracy of the model.

We get highest testing accuracy with SVM ML model is 73.2%.

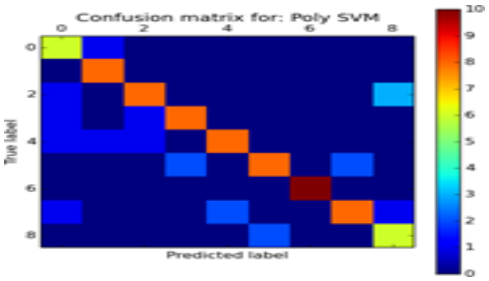


Fig. 2 Confusion Matrix for SVM classifier

VI.PROPOSED SYSTEM

So, this will be the general process flow of the project. User gives music file as an input, with is then processed which includes check for null data or any garbage value in dataset.subsequent step is feature Extraction using mel frequency cepstral coefficients (MF1CC) which extracts characteristic vector from music record. Next step is Classifier in which we create ML model using different machine learning algorithms which results into generation of genre label.

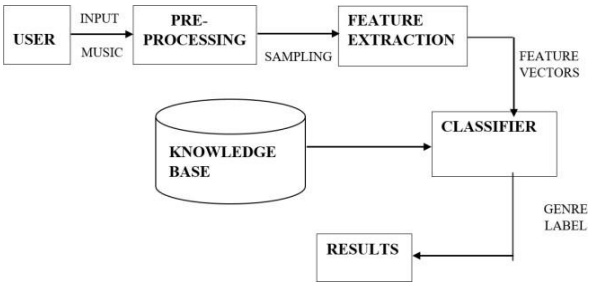


Fig. 3 Process Diagram

VII. DJANGO MVT ARCHITECTURE

A software design pattern is MVT (Model View Template). Model View and Template are two of its three key components. The Model makes managing databases easier. The data is handled by a data access layer.

The User Interface component is entirely handled by the Template, a presentation layer. The View renders a template, interacts with a model to carry data, and carries out the business logic.

Even though Django adheres to the MVC pattern, it still adheres to its own conventions. As a result, the framework itself handles control.

The entire application is built on Model View and Template, so there is no separate controller. It is therefore known as an MVT application.

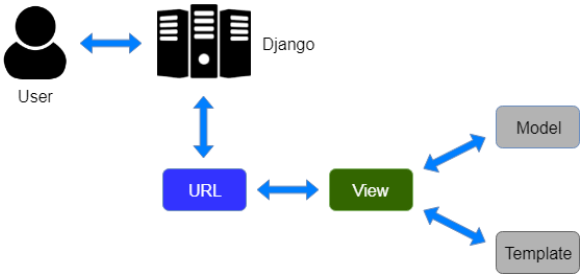


Fig. 4 MVT Architecture

VIII. RESULTS

The results explanation related to the snapshots of the various modules to the entire process of execution. The different modules can explain the working of procedure.

The user has to select the option depending upon the requirements. The choice-based option contains upload music and find genre.

Figure 5 shows the front face of the Web App.

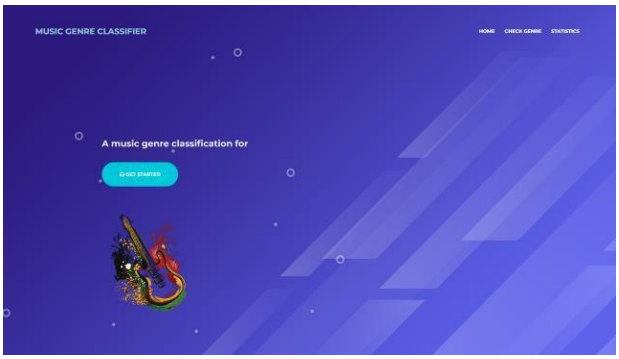


Fig. 5 Front face of web app

Figure 6 illustrates the uploading of the music. As the user clicks the 'upload file' button the Web App shows the file explorer to select the file or directly drag and drop file.

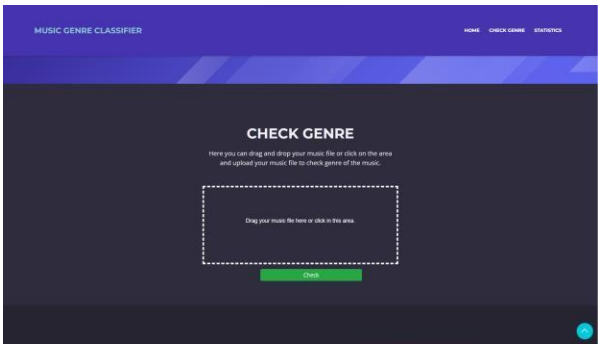


Fig. 6 Upload the music

Figure 7 illustrates the file being classified according to genre. As the user clicks the 'check' button the Web App. It will take 2-5 minutes according to the input file and display the genre of the uploaded file.

Fig. 7 Finding the genre

IX. CONCLUSION

The user can classify music files according to genre with the help of the proposed research.

Utilizing a variety of machine learning algorithms, this project on the classification of music genres was

completed. We wanted to get the best accuracy.

In order to develop and train our model, we have implemented a number of best practices. We have learned a variety of framework patterns and best practices that are currently utilized in industry throughout the model's development.

It has been found to be impossible to test a large number of combinations in order to obtain an accurate application evaluation.

The analysis of the results indicates that the current model functions properly and has attained the desired format of 73.2 percent accuracy. In order to develop and train our model, we have implemented a number of best practices. Throughout the model's development, we learned about various architecture patterns and best practices currently used in industry.

X. FUTURE SCOPE

We can deploy Web App on the cloud so that we can scale our web app. We can also provide API for developers. Another thing we can try to improve the accuracy is trying a different dataset or dynamically increase the dataset as the user input new music.

XI. ACKNOWLEDGEMENT

We would like to thank our school director Dr. Pramod R. Rodge for providing laboratory equipment and permission to continue our project.

We also extend our deepest thanks to our H.O.D. Dr. Uttara Gogate who is benevolent is helping us to make computer equipment available to us for our project in our lab and to make it a real success. Without his kind and enthusiastic cooperation, our project would have stalled.

We would like to thank our project coordinator Prof. Reena Deshmukh for all the support we need from her for our project.

Finally, we would like to sincerely thank our project guide Prof. Pallavi Bharambe for her encouraging and provoking steerage which helped us to make our project a success. Our project guide makes us persevere along with her professional steerage, kind advice and timely motivation to assist us decide on our undertaking. We would also want to thank our colleagues who directly or in a roundabout way helped us in the course of our project.

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Ensemble Model For Spam Detection

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Abstract— **E-mail has become a globally used application for official communication. This is because it is easy to use and the transfer speed is faster than any other communication app. However, its lack of intelligence to detect whether received mail is spam or ham reduces its main effectiveness. Currently, there have been several reported cases of identity theft or phishing activities via email from a user, leaving the user helpless. E-mail spam has become a big problem nowadays, with the rapid growth of internet users, e- mail spam is also increasing. People use them for illegal and unethical behavior, phishing and fraud. This project will discuss how machine learning can play a major role in spam detection. Machine learning is an application of artificial intelligence that provides the ability to automatically learn and improve data without being explicitly programmed. We use a binary classifier to classify text into two different categories; spam and ham. The algorithm predicts the score more accurately. Now, no single algorithm can be fully relied upon to categorize an email as spam or not. Many important emails will be missed if they are falsely marked as spam. This can cause heavy losses and negligence. Many spam classifiers currently available classify emails, but their reliability is questionable. The goal of developing this model is to detect and evaluate a word faster and more accurately using multiple algorithms and provide a single accurate classification based on the ensemble model.**

Keyword- spam, ham, KNN, Naïve Bayes, Support Vector Machine, Ensemble Classifier, Voting, Bagging, Boosting.

I. INTRODUCTION

Spam email is email that the recipient does not want to receive. Multiple identical messages are sent to multiple email recipients. Spam usually results from providing email addresses on unauthorized or immoral websites. Spam has many consequences. Fill your inbox with ridiculous emails. It greatly reduces your internet speed.It steals useful information like details from your contact list. Change search results in any computer program. Spam is a huge waste of time for everyone and can be very annoying if you get spam in bulk. Identifying these spammers and their spam content is a daunting task. Although a large amount of research has been done, the methods described so far still barely distinguish spam surveys and do not show the benefits of all factors removed. Despite the growth of network communication and massive memory loss, spammessages are also used in some attacks. Spam email, also known as non-proprietary email, is unsolicited commercial or malicious email sent to influence individuals, businesses or groups. In addition to advertisements, it may contain links to phishing sites that have been found to steal confidential information or to sites hosting malware. Various spam filtering methods are used to solve this problem. Spam filtering methods usually protect mailboxes from spam.

Ensemble Learning - A generic technique to machine learning called ensemble learning combines the predictions from various models to get superior predictive performance. There are three techniques that rule the world of ensemble learning, even though there are an apparent infinite amount of ensembles you can create for your predictive modelling issue. So much so that it is a topic of study that has given rise to numerous more specialised approaches rather than algorithms. Bagging, stacking, and boosting are the three primary classes of ensemble learning techniques, and it's critical to understand each one well and take it into account in any predictive modelling project. Spam e-mails, known as unsolicited e-mail messages, have become an increasing problem for information security.

Email spam intrusions annoy users and waste network resources. Traditionally, machine learning and statistical filtering systems have been used to filter email spam. However, there is no unique method that can be successfully used to classify spam messages. Detecting spam and effectively filtering out the growing number of spam emails requires several approaches. In this article, we use an ensemble approach based on decision trees, support vector machines, and back propagation networks to classify spam emails. The proposed approach is based on the nature of spam messages. Spam emails are classified according to 14 characteristics and then an ensemble approach is applied to classify them. Simulation results show that the proposed ensemble approach outperforms the other approaches on both test datasets. No single algorithm can produce perfect predictions for a given set of data. Machine learning algorithms have limitations, and building models with high accuracy is challenging. Creating and combining multiple model can improve overall accuracy.Ensemble Methods - An ensemble method is one in which multiple models are created and then combined to produce improved results. Ensemble methods usually produces more accurate solutions than a single model would as they combine different single methods. Majority Voting Every model makes a prediction (votes) for each test instance and the final output prediction is the one that receives more than half of the votes. If none of the predictions get more than half of the votes, we may say that the ensemble method could not make a stable prediction for this instance. Although this is a widely used technique, one may try the most voted prediction (even if that is less than half of the votes) as the final prediction. In some articles, one may see this method being called “plurality voting.”

Machine Learning Algorithms Used

A. SUPPORT VECTOR MACHINE

Support Vector Machine (SVM) is a machine learning algorithm that is commonly used for email spam detection. The algorithm is used to classify an email as

either spam or not spam (ham). The basic idea behind SVM for email spam detection is to represent each email as a vector of features and then use these features to train the SVM algorithm to distinguish between spam and ham emails. The features used in the vector representation can be words, phrases, or any other characteristics of the emails that are informative for the classification task. In the training phase, the SVM algorithm learns to separate the spam and ham emails in the feature space by finding the optimal boundary that maximizes the margin between the two classes. This boundary is known as the maximum margin hyperplane, and it defines the decision boundary that the SVM uses to classify new emails. In the testing phase, new emails are transformed into feature vectors and then classified by the SVM algorithm based on their position relative to the maximum margin hyperplane. If an email is on the spam side of the boundary, it is classified as spam, and if it is on the ham side, it is classified as ham. SVM has proven to be an effective method for email spam detection and is widely used in industry for this purpose. Its ability to handle high- dimensional data and find non-linear decision boundaries makes it well-suited for text classification tasks like email spam detection.

B. MULTINOMIAL NAÏVE BAYES

Multinomial Naive Bayes is a classification algorithm used to detect email spam. It is based on the Bayes theorem of probability and assumes that features of an email (e.g. words) are independent of each other. The algorithm calculates the probability of an email being spam or ham (legitimate email) based on the frequency of words in each category.The algorithm starts by training a model on a large dataset of labeled emails (spam or ham). It creates a vocabulary of all the words used in the emails and calculates the frequency of each word in each category. During the classification phase, the algorithm uses these probabilities to determine the likelihood of a new email being spam or ham. The Multinomial Naive Bayes algorithm is specifically designed for text classification problems like email spam detection, where the features are discrete values representing word frequencies. It works well in practice and is commonly used in spam filters due to its high accuracy and efficiency. Formula: P(A|B) = P(A) * P(B|A)/P(B)

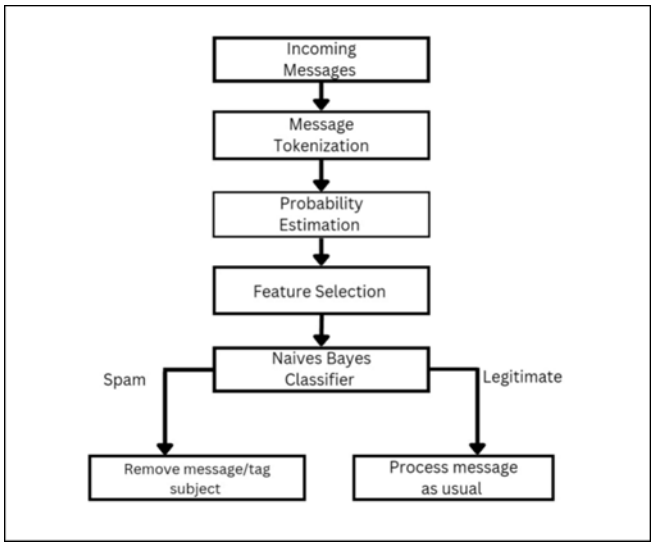

Fig 1: Multinomial Naïve Bayes

C. EXTREMELY RANDOMIZED TREES CLASSIFIER

Extremely Randomized Trees Classifier is a machine learning technique that can be used for email spam detection. It is an ensemble learning method that belongs to the random forest family of algorithms. In email spam detection, the goal is to classify incoming emails as either spam or not spam (ham). Extremely Randomized Trees Classifier works by training a large number of decision trees on a random subset of the features of the email. Each tree votes on the class of the email, and the class with the most votes is the prediction of the ensemble. The "extremely randomized" part of the name refers to the way the trees are constructed. In a traditional random forest, the features are randomly selected for each split. In an extremely randomized tree, the feature selection is random, as well as the threshold value used to split the data. This randomization leads to more diverse trees, which results in a more robust and accurate prediction. Overall, Extremely Randomized Trees Classifier is a powerful and efficient tool for email spam detection, and has been shown to perform well in practice. Its ability to handle high-dimensional and sparse data makes it well-suited for the task of classifying emails.

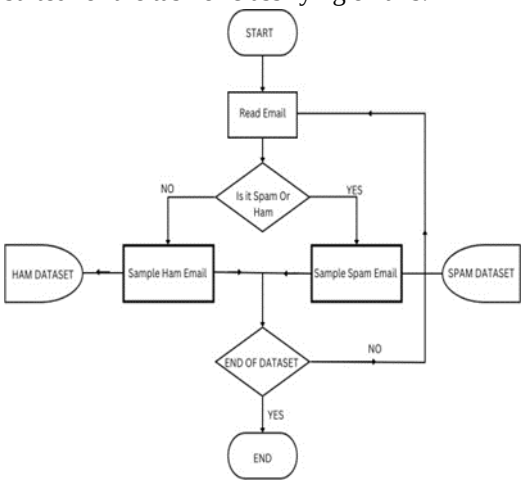

Fig 2: EXTREMELY RANDOMIZED TREES CLASSIFIER

A tight competition between filtering method and

spammers is going on per day, as spammers began to use tricky methods to overcome the spam filters like using random sender addresses or append random characters at the beginning or end of mails subject line. There is a lack of machine learning models that focus on the model development that can predict the activity. Many algorithms fail in such tests and give inaccurate classification. Here we try to solve the problem of this inaccuracy based on single algorithm. The ensemble model is the single voter model that runs the spam detection activity with multiple different algorithms and provides the improved accuracy. The email now has to go through many filters. As spam is a waste of time to the user since they have to sort the unwanted junk mail and it consumes storage space and communication bandwidth. It is hard to manually compare the accuracy of classified data.

II. RELATED WORK

E-mail spam acts as a plague of network technology as it affects both individuals and business users with receiving more spam e-mails. Email spam comes in various formats such as shortened URLs, attachments, advertisements, spyware, trojans, etc. Researchers are constantly working on techniques to control and limit email spam. In this research paper, we have discussed the latest and quality publications by researchers who have presented some significant works for email spam detection. The research publications considered are discussed here.

Hassan [8] tested a combination approach of k-means clustering with supervised learning classifiers. The author conducted research experiments to verify the change in evaluation accuracy results with the addition of a clustering approach with classifiers. Research experiments were conducted on the Enron-Spam dataset. The combined approach includes clustering with supervised decision tree (DT), logistic regression (LR), k-nearest-neighbor (KNN), support vector machine (SVM), and naive bay (NB) classifiers. The evaluation results showed that no major change in accuracy was observed. Only a small improvement was noted for the combined clustering and LR approach. All methods were unaffected.

Olatunji [9] performed email spam detection by considering Extreme Learning Machines (ELM) and SVM approach. In the research experiments, the ELM approach consumes less time compared to the SVM algorithm, but the SVM outperformed in terms of accuracy compared to the ELM. ELM & SVM concepts are also compared with Fuzzy logic, BART, NSA, PSO & NSA-PSO concepts and show better results than others for email spam classification.

Kumaresan and Palanisamy [10] adapted the algorithm of Cuckoo Search by adding the StepSize feature to it and introduced as Cuckoo Search with Stepsize (SCS) approach. In this work, authors have also used the classification approach of SVM. Here, feature selection is performed with proposed SCS approach and classification with SVM approach. The performance efficacy results indicate the dominance of proposed SCS-SVM approach as compared to existing CS-SVM.

Chawathe [11] used a fuzzy rule (FURIA) to improve the security of an email system. Here, a system based on fuzzy rules for email spam detection is proposed and the SpamBase database is used for experimentation. The author performed the experiment on a Java virtual machine and the Weka tool. The PART and JRip algorithms were also considered for classification comparison. The author monitored the comparable performance of the proposed concepts with other concepts.

Cohen et al. [12] utilized extensive email features related to header, content, and other attachments to analyze the content of malicious email. There is a manual collection of email dataset by analyzing emails using VirusTotal tool to define the status of emails. The authors conducted various experiments based on feature set, email depth with spam impact analysis, etc. The authors used several machine learning classifiers to analyze the results with an integrated detection rate parameter and reported an effective evaluation using a random forest classifier.

Agarwal and Kumar [13] combined the concepts of Particle Swarm Optimization (PSO) and Naïve Bayes algorithm to detect spam emails. In this approach, the PSO algorithm was used to improve the classification efficiency evaluated using the Naïve Bayes approach. The authors took into account the ling spam corpus and conducted an experiment with 1000 randomly selected e-mails. The evaluation of the system was carried out in terms of evaluation metrics. The integrated approach suggests the superiority of the concept compared to the individual Naïve Bayes classifier.

Naem et al. [14] conducted e-mail spam detection experiments by combining the concepts of access reinforcement and Ant-Lion optimization (ALO). The combined approach was named ALO-Boosting and was experimented on Spam Assassin and CSDMC2010 datasets. In the combined approach, the ALO algorithm is used for feature selection and the Boosting approach is used for the classification procedure. The proposed integrated approach was compared with ALO-Bagging, ALO-SVM, ALO-KNN, Boosting, Bagging and individual SVM & KNN classifiers.

III.IMPLEMENTATION

Jupyter Notebook is used to implement this model and, in this module, a dataset from “Kaggle” website is used as a training dataset and perform necessary preprocessing that needed to be transformed in an useful format so that it can used for further analysis. We divided the Dataset into two parts: Training (80%) and Testing (20%).

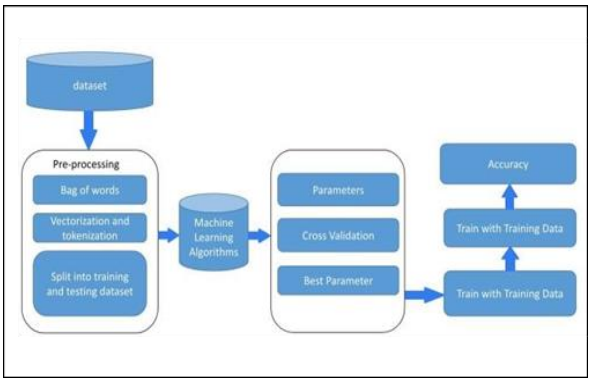

Fig 3: System Design

1. Data Cleansing – It is the process of correcting or removing incorrect, duplicate or incomplete data within a dataset. When combining multiple data sources, there are many opportunities where data can be duplicated or mislabeled. We encountered many duplicate emails/messages in our dataset which were removed using the drop_duplicates() function just as it works in python 3.0. All missing values were checked using the isnull() function, and unnecessary columns that did not add any value to the analysis were removed from the dataset.
2. EDA – Exploratory Data Analysis (EDA) is an approach to data analysis using visual techniques. Used to discover trends, patterns, or check assumptions using statistical summary and graphical representation.
3. Text pre-processing – Text pre-processing is an approach to cleaning and preparing text data for use in a specific context, or the text can be converted into a suitable format so that it can be fed into a model for analysis purposes. This is done using different steps, we lowercase all alphabets and then tokenization, tokenization is basically separating each word of a sentence, it helps the model to evaluate each word so that it can accurately recognize the word tag(spam/ not spam). Special characters, punctuation and ignored words (words that are used in the construction of a sentence and have no meaning; for example – as, for, of, in, is) have been removed, which do not add much value in the parsing process. And finally, we use stemming, which essentially converts all words to their root form.
4. Creation of the model - The construction of the model is focused on the required algorithms. Model validation is important to develop a sense of confidence before using it. The definition of a good model includes robustness and well-defined accuracy. Since it contains text data, Naives Bayes works best with text, but we also use different algorithms to find accuracy. Since most algorithms work best on numbers, we converted the text to vectors using the vectorization function of the Sklearn library. We use different algorithms like Multinomial Naives Bayes (MNB), Gaussian Naives Bayes (GNB), Bernoulli Naives Bayes (BNB), Decision Tree Classifier, Random Forest Classifier, Extra Tree Classifier, Adaboost Classifier and Support Vector Machine (SVM). We use tf-idf vectorization to calculate accuracy and precision.
5. Evaluation- Evaluation is a process that critically examines a program. It involves collecting and analyzing information about a program's activities, characteristics, and outcomes. Its purpose is to make judgments about a program, to improve its effectiveness, and/or to inform programming decisions.
6. Improvement- One of the best ways to improve the performance of your machine learning model is to feed it high-quality training data. But this is easiersaid than done. Training data for machine learning can be challenging to find, collect, and annotate.
7. Website- The interface where the spam classification can be displayed to user.

Accuracy is defined as the proportion of correct predictions made by a model, out of all the predictions it has made. It can be calculated as:

Accuracy = (Number of Correct Predictions) / (Total Number of Predictions)

Precision, on the other hand, refers to the fraction of positive predictions that are actually correct. It is a measure of the model's ability to identify positive instances correctly. Precision can be calculated as:

Precision = (Number of True Positives) / (Number of True Positives + False Positives)

IV. RESULTS

Our model has been trained using multiple classifiers to check and compare the results for greater accuracy. Each classifier will give its evaluated results. After all the classifiers return its result the best performing classifier are then combine for better accuracy and precision. Each classifier result are shown in tables for better understanding

Sr. No.	Methods	Accuracy	Precision
1	Multinomial Naive Bayes	97.19%	1.0000
2	Support Vector Machine	97.29%	0.9741
3	Extremely Randomized Trees Classifier	97.77%	0.9914
4	Random Forest	97.00%	0.9908
5	AdaBoost	96.22%	0.9541
6	Decision Tree	93.52%	0.8380

Table 1: Results

We combine best top three classifier using voting classifier to formed Ensemble Model giving the accuracy of 98.1% and precision of 0.9917.

V. CONCLUSION AND FUTURE SCOPE

In this paper, we have presented different Spam Detection Techniques that have been used to detect spam. In existing Projects they mostly make use of only one algorithm for Spam Detection, while in our Project

we are making use of different algorithm like Multinomial Naive Bayes having Accuracy 97.19% and precision 1.0000, and other algorithm like Support Vector Machine having Accuracy 97.29% and precision 0.9741, Extremely Randomized Trees Classifier having accuracy 97.77% and precision 0.9914. And combining all three algorithm using voting classifier we are building, Ensemble Model for Email Spam detection which slightly provides better accuracy (i.e 98.1%), precision (i.e 0.9917) by providing a better feature than existing systems. Existing System are making using Of Single algorithm while our system is making use of different algorithm for creating Ensemble Model for Spam Detection. In Such way it make our system to have outstand feature or improved version of existing systems. Email spam detection is a crucial component of modern email systems, and it is likely to continue to play an important role in the future.

Machine learning algorithms have already been widely used for email spam detection, and there is potential for further advancements in this area to improve the accuracy and effectiveness of these solutions.

Integrating with other technologies: Email spam detection could be integrated with other technologies such as artificial intelligence, natural language processing, and computer vision to provide a more comprehensive solution.

Improved filtering: The development of more sophisticated filters, such as content-based filters and reputation-based filters, could lead to a more effective email spam detection system.

Real-time monitoring: As the volume of emails sent continues to grow, there is a need for real-time monitoring of email traffic to quickly identify and prevent the spread of spam.

Combating image-based spam: Image-based spam is becoming an increasingly common form of spam, and there is a need for effective email spam detection solutions that can handle this type of spam.

Overall, the future of email spam detection is likely to be shaped by advances in machine learning, integration with other technologies, and the development of new and innovative filtering techniques. The goal is to provide a more effective and efficient email spam detection system that can keep pace with the ever-changing landscape of email spam.

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Cryptochain for Cryptocurrency using SHA-256

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Abstract – **A relatively new method in the realm of information technologies is called Blockchain technology. As one of its initial applications, Bitcoin as a cryptocurrency has increased in popularity a lot of focus. In addition cryptochain for cryptocurrency, Blockchain Using smart contracts as the centre piece of their implementation, the current crypto currency development at its core. Many people view Blockchain as a disruptive fundamental technology. Blockchain research is still in its infancy, even though many researchers have realised the significance of blockchain. As a result, this paper studies the current Blockchain technology and the new solutions over the flaws of the Blockchain.**

Keywords: Blockchain, Ethereum, Bitcoin, Cryptocurrency.

I. INTRODUCTION

Bitcoin and blockchain technologies are shaping and defining new areas of computer science and information technology. The requirement for a decentralised currency has been used mostly as a theoretical idea, however in the past decade, it became feasible, due to the well-known paper of Satoshi Nakamoto introduced the technology of Bitcoin and blockchain in 2008 [1]. While there are disagreements over Nakamoto's genuine identity, one thing is certain: he introduced something revolutionary to the world, and it is up to the users to determine what to do with it. Some may use this chance to create their own application to solve various social problems, while others will invest in those ideas or just trade the market's ups and downs in cryptocurrency values. We considered including a brief introduction to blockchain and cryptocurrency We begin with a brief overview of some of the most well-known methods for decentralized digital money prior to Bitcoin. The bulk of cryptocurrency is held by two cryptocurrencies. capitalization of the market Of course, like with all new things, technology, certain limitations and issues arose, and They were also described[2].

1.1 Blockchain

Blockchain is a technology, a universal online database that can be used by anyone and anywhere using internet connectivity. Blockchain does not allow supporting faking documents, transactions and other information. Blockchain is a technology, a universal online database that can be used by anyone and anywhere using internet connectivity. Blockchain does not allow supporting faking documents, transactions and other information. Blockchain is a spreadsheet a revolutionary picture which has generated thousands of clones across computer network. After that computer network which is designed using blockchain, to update the spreadsheet regularly and you should have the basic perception about the understanding of blockchain concept [1].

Blockchain contains the collective information and frequently submissive database. The Blockchain is a distributed database in which every block can get the copy of newly entered record which means that the information it keeps is truly publically accessible for everyone but no one can change any of the record . Each block has an enticement for processing and verifying the transactions . So, that's why these characteristics make the blockchain wonderful to keep the records transparent and everyone can use it [2].

Blockchain technology can be characterized as a completely decentralized, trustless peer-to-peer data storage that is distributed throughout all participants also known as nodes. The blockchain is made to store immutable information it is consequently a decentralized, distributed, and immutable database where data is logically arranged as a series of smaller bits once it is committed to the chain(blocks). A cryptographic hash function called H(Bi1) links each block Bi>0 immutably to a single preceding block Bi1. Bi and all subsequent blocks would contain an invalid hash if Bi1 were changed. The genesis block, which is the sole block without a predecessor, is the very first block B0. A block is typically didgitally signed to ensure bith the integrity of the block and the data it contains [2].

II. . LITERATURE SURVEY

1. In this paper, author describe the how we can implementthe blockchain from scratch for fulfilling the requirments. It has advantages like Problems of previous version solved and the basic of blockchain are covered with implementation but alsohave some disadvantages like It contains the security and scalability issues, it was time consuming [1].

2. In this paper, author expressed the Blockchain security propertiesand the challenges faced by the Blockchain. So in this paper we found that It express the challenges which can be improved by adding various feature, also that It express the challengesand improving features but can't state that how to overcome the security problems [2].

3. This article summarizes the research of all blockchain domains and how blockchain is used in it. They review the papers which was helpful to understand how many domains there in existing system are. But It helps theoretically not practically and the review wasn't good enough to solve the existing problems [3].

4. This article summarizes the existing blockchain technology in detail. They review the blockchain technology in details, so it is easy to understand. But They didn't specify how we can overcome the existing system. It's easy to understand but they didn't review the crypto market [4].

5. In this article, author research on the various domains of blockchain and gathered all the information of existing blockchain. They give brief information about various Domains. But the advantagesand disadvantages are missing [5].

III. . PROBLEM DEFINITION

Blockchain systems have weaknesses in many domains, making mass adoption of blockchain a far-fetched idea. Records of transactions can be manipulated easily or changed. To resolve this issue, Blockchain comes in. We found that the current technology have different issues like Transparency, Scalability, Regulations, Transaction speed, Energy consumption and main issue on which we are focusing is the Security

IV. SYSTEM ARCHITECTURE

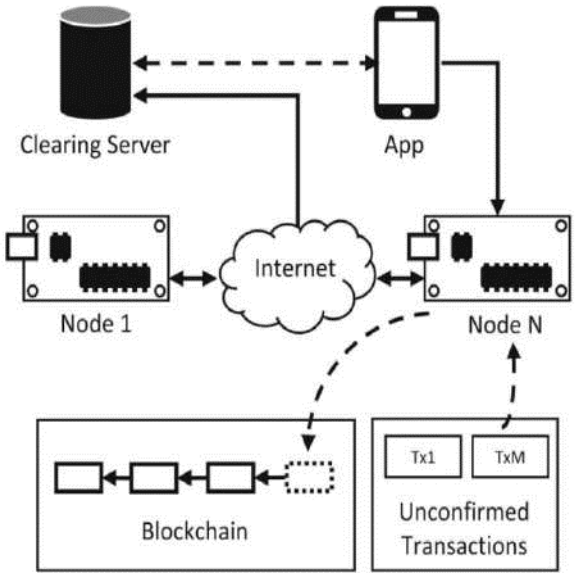

Fig . 1 System architecture of blockchain

The Fig, 1 of system architecture of Blockchain consists following field:

4.1.1 Blockchain setup

1. Set up the overall blockchain application.
2. Create the basic building block of the blockchain - with blocks themselves
3. Start a test-driven development approach to the project.
4. Built the genesis block - to get the blockchain going.
5. Add functionality to mine a block - create a new block for the blockchain.
6. Develop the important sha-256 hash function.
7. Apply hash to mine a block.
8. Implement the proof of work system by adding a difficulty and nonce value to each block.
9. Adjust the difficulty for a block to ensure that blocks are mined at a rate which approaches a set mining rate for the system. 10. Investigate the proof of work system by writing a script which checked how will the dynamic difficulty adjusted the system to approach the mine rate.
11. Switch the hexadecimal character-based difficulty criteria to a more fine-grained binary bit- based difficulty criteria.
12. Prevent a potential difficulty jump attack by adding extra validation for the blockchain.

4.1.2 API section

1. Set up an express API to allow for interaction to the backend through HTTP requests.
2. Created a GET request to read the blockchain.
3. Added a POST request to write new blocks to the blockchain.
4. Implemented a real-time messaging network through Redis or PubNub. 5. Added the ability to broadcast chains.
6. Started peers through alternate ports, and broadcasted chains when blocks were mined through the API.
7. Synchronized chains when new peers connected to the network.
8. Optimized the implementation to avoid redundant interaction.

4.1.3 Wallet and Transaction

1. Created the core wallet class for the cryptocurrency.
2. Developed the cryptographic key pair and public key addressing system.
3. Implementing signature generation and verification to make transactions official.
4. Built the main transaction class - with the output map and input structure.
5. Developed functionality to actually validate transactions.
6. Tied transaction creation with the wallet class.
7. Allowed transactions to be updated with multiple outputs to efficiently use existing objects.
8. Improved the hash function to recognize objects with new properties as changes in incoming data.
9. Covered edges cases with transaction updates to prevent vulnerabilities.

4.1.4 Transaction pool

1. Created the core transaction pool with an ability to set transactions.
2. Handled transaction through the API and added API-generated transactions to the pool.
3. Made sure invalid transactions did not go to the pool.
4. Handled updates to transactions through the API.
5. Exposed a new API method to read the transaction pool data.
6. Broadcasted transactions as they occurred through the API.
7. Synced the transaction pool map as a network-dependent object like the blockchain

4.1.5 Mine transaction

1. Created the core transaction miner class to capture how miners should add transactions to the blockchain.
2. Added the ability to grab valid transactions from the transaction pool. 3. Added a way to clear blockchain transactions to ensure that only unique transaction objects could be recorded.
4. Added a mining transactions endpoint to enable transaction mining through the API. 5. Cleared recorded transactions on a successful replacement of the blockchain. 6. Calculated the wallet balance based on the blockchain history.
7. Applied these wallet balances whenever conducting a new transaction.
8. Exposed the wallet information including the public key and balance through the API. 9. Validated transaction data incoming into the blockchain.
10. Validated incoming transaction input balances.
11. Prevented duplicate transactions from appearing in a block's data.
12. Validated the entire transaction itself when accepting new user-contributed blockchains.

V. SOFTWARE AND HARDWARE REQUIREMENTS

Software Requirements

Front-end : React.js, Express API

Back-end : Node.js

Web server : Redis (Optional) Operating System : windows XP/7/8

Hardware Requirements

Processor : Pentium III

RAM : 4 GB

Hard Disk : 20 GB (minimum)

VI. RESULTS

Fig.2 Frontend Blockchain

The Fig.2, gives the idea of address of your wallet and the balance.

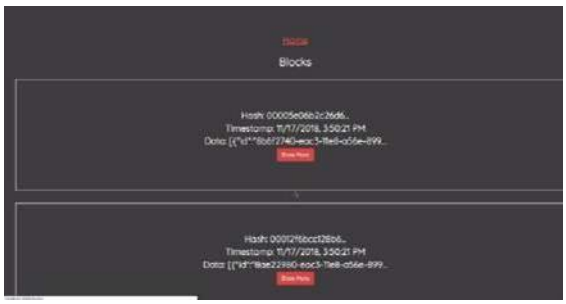

Fig.3 Block part in frontend

The Fig.3, give the idea of various blocks with the hash values, timestamp and data

CONCLUSION

Bitcoin and Ethereum today are the most known and valuable cryptocurrencies. They are based on blockchain technology that is intended to promote a trust mechanism in a peer-topeer network based on the consensus of the majority of the nodes. We have shown in the early stages of the digital money implementation, as well as the foundations of blockchain technology, and it's most promising (or popular) implementations, Bitcoin and Ethereum.

In the past few years, there has been a rapid growth of numerous cryptocurrencies, hashing algorithms, and consensus agreements in the networks. Some of the cryptocurrencies worth mentioning are Ripple, Cardano, NEO, Stellar, Litecoin, EOS, IOTA, Dash, Monero, TRON, Qtum, Lisk, Tether, Stratis, Zcash, Steem, Siacoin, Verge, Electroneum, Nxt, Dogecoin, and many more.

Future research should delve into these topics and new applied applications, as well as study adoption rates of the technology. For those who do adapt blockchain, further study would grant us insight as to what increases (if any) in productivity have been recorded. Studies may also focus on roadblocks as to why this technology has not been adopted as well as investigate trends in consumer confidence. Additionally, as technology increases, future studies may help shed light on any security issues not initially discovered.

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Combot: A Commercial Chatbot For Sales And Social Media

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Abstract – **Chatbot has become widely popular recently and it is gaining speed as an application of computer communication. Few programs reply intelligently like human. Such program is called a Chatbot. This paper addresses the design and implementation of a Chatbot system**

Keywords: Chatbot, Natural Language Processing, Artificial Intelligence

I. PROBLEM STATEMENT

As technology is progressing we have seen websites, apps are getting better, larger and more complex everyday. From simple static read only website we have now websites with multiple pages, multiple components and many different ways to interact with the site. This has drastically increased the complexity of the website and now having a good user friendly website is a huge task. Most users who visit a website most of the time are looking for one or two information/services on the website. Because of the nature of the website now has become very complicated even to perform simple tasks or to find specific information on the website has become a complicated process for the user. Therefore services like Chatbot can be very useful. Rather than navigating throughout the website, the user can directly send its query to the chat bot and the bot replies immediately with the required result. A chatbot can be designed to fulfil many purpose like a customer service bot can handle customer problems etc. Also a chatbot can be design for cross platform like Android or iOS or it can be integrated with third party apps like WhatsApp, Messenger, telegram etc.

II. INTRODUCTION

A chatbot can be defined as an AI (Artificial Intelligence) based computer program that simulates human conversations. They are also known as digital assistants that understand human capabilities. These bots interpret the user intent, process their requests, and give prompt relevant answers. 80% of marketers plan to start using a chatbot in some way or another. It is a significant reason why brands are investing in improving the customer experience. Diagram below depicts use cases of a chatbot. You can see how they add value in the healthcare industry.

The first conceptualization of the chatbot is attributed to Alan Turing, who asked “Can machines think?” in 1950. Since Turing, chatbot technology has improved with advances in natural language processing and machine learning. Likewise, chatbot adoption has also increased, especially with the launch of chatbot platforms by Facebook, Kik, Slack, Skype, WeChat, Line, and Telegram. By September 2016, Facebook Messenger hosted 30,000 bots and had 34,000 developers on its platform. The Kik Bot Shop announced in August 2016 that the 20,000 bots created on its platform had “exchanged over 1.8 million messages.”

As per Transparency Market Research, The overall market size for chatbots worldwide would be over $1.2 billion by 2023 and around $2.4 billion by 2027. Now, as you are aware of what a chatbot is and how important bot technology is for any business. You will certainly agree that bots have drastically changed the way businesses interact with their customers. Chatbot technologies will become a vital part of customer engagement strategy going forward. Near to future bots will advance to enhance human capabilities and human agents to be more innovative, in handling strategic activities. Hence, it is inevitable that the chatbot industry will become the driving force of business communications.

III. THEORY

A chatbot is built on the foundation of many computer science core concepts. The following concepts are the foundation of a chatbot.

Key Concepts

Client-Server Model:

A Client-server model is a distributed system framework that separates tasks or responsibilities between service providers or services, called servers, and service requesters, called clients. The client and the servers communicate over computer networks. Both client and the server runs on a different machine. The client which is a user, in this case, who wants to establish communication with the chatbot sends a request to the server. The server then responded with the request. The client can be a desktop, mobile, API, cross- platform OS like android, IOS etc.

N.L.P. :

Natural language processing is part of linguistics, computer science, and practical intelligence related to the interaction between computers and human language, especially how to configure computers to process and analyze large amounts of native language data. In the case of a chatbot, NLP is used to translate text once any kind of random data. The NLP can process text, translate it into computer language as well produce results in a language that people can understand.

Text-to-Speech (TTS):

Text-to-speech (TTS) is a form of technical assistance that is readable digital text aloud. It is sometimes called "reading aloud" technology. By clicking a button or with the touch of
a finger, TTS can take words from a computer or other digital device and convert them into text. TTS is very useful for giving the option to users to listen to the text messages of the bot.

Automatic Speech Recognition (ASR):

ASR technology that converts spoken words into text. With ASR, voice technology can detect spoken sounds of the user and recognize them as words. ASR allows computers to finally understand a natural form of communication: speech.
U.I. of a chatbot allows users to communicate with their voice. With a click of a button, the user can send a message to the bot with the voice commands.

A.P.I. :

An Application Programming Interface is a communication between computers or between computer programs. It is a type of software interface, which provides service to other pieces of software. A document or standard that describes how to build or use such a connection or visual interface is called API specification. With the help of an API, the chatbot sends user messages to the server. That message is then sent to another server like Dialogflow etc. via API or is then processed on the same server depending on the Client-Server architecture. The response of the chatbot is sent to the client machine via API.

Javascript:

Javascript is a programming language used for the frontend of the website and can also be used in the backend of the architecture. Other programming languages python, GO, C++ etc, can also be used for the backend.

Python:

Python is a programming language is used for data science, machine learning, systems automation, web and API development.

Application of different technology:

In terms of technology, a chatbot is a continuous command system that knows to retrieve the input data and then process and retrieve the corresponding output data through the user interface at a given time. Input and output data is now invoice format, so it still is properly processed under various technologies such as Automatic Speech Recognition (ASR), Indigenous Language Processing (NLP) and Text-to-Speech (TTS). Basically, ASR is used to translate user words into text in a few types of conversations such as speech-to-text in private conversation, captions for online meetings and phone conversations. Then, the NLP focuses primarily on understanding machine learning to understand the content of the text to extract relevant instructions based on the understanding of the text. Finally, TTS reads a sentence or a paragraph to readers aloud such as reading email news or news etc. The chatbot process is similar to an online chat system for client creation a way for the server to receive the signal and transmit it to the server. The server module waits for the first client to send a connection request. If a connection is provided, the client can share the contact server.
In chatbot mode, the web browser plays the role of the client in order to find the input method signal. This signal is then sent to a server to process, analyze and generate responses.
Server response production can be divided into two categories: data retrieval and information output.

Methods:
Before using any chatbot, we need to know which chatbots are currently available. There are many different types of Chabot for business today that can help in different types of work like customer service bot, sales bot, question & answer bot, general-purpose bot, query bot etc. As there are many types of bots there are many different ways to build a chatbot.
Following are some ways to build chatbots. Frontend:

A front-end of a chatbot can be a website, a mobile app or any other app like Whatsapp, telegram, messenger, slack etc. The most commonly used Programming language to build a chatbot's frontend for the web is javascript, for the mobile app it is swift, javascript, java, kotlin etc. From the frontend the data is send to the backend.

Backend:

Programming languages like Java, Clojure, Python, C++, PHP, Ruby, and Lisp is used for building architecture of a chatbot. Using other known chatbot development platforms such as RASA, Botsify, Chatfuel, Manychat, Flow XO, Chatterbot, Pandorabots, Botkit, and Botlytics.

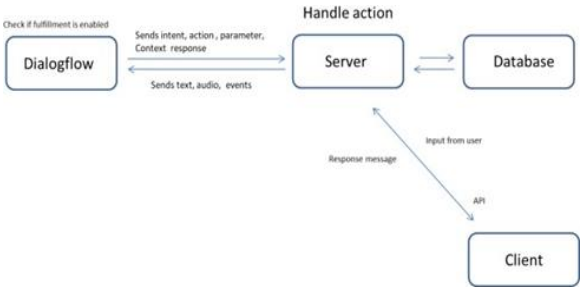
A.I. :

We distinguished six leading NLP cloud platforms that we can use to create applications able to understand natural languages: Google's DialogFlow, Facebook's wit.ai, Microsoft LUIS, IBM Watson Conversation, Amazon Lex, and SAP Conversation AI. All these platforms are supported by machine learning, N.L.P., TTS, ARS. They share some standard functionality (cloud-based, support various programming and natural languages) but differ significantly in other aspects.

Designing of chatbot:

As there as many different types of chatbot which can build in many different ways. In this paper we will be focusing on a query bot for a website using dialogflow.

Chatbot Architecture:



There are four key steps which should be kept in mind during designing a Chatbot.

Client-side chatbot:

Client-side chatbot is where user interact with the bot. It has chat interface where user can send its query and bot can response. Client-side or frontend of our chatbot can be built with the help HTML, CSS, JAVASCRIPT, REACTJS. API is used to communicate with the server. With the help of react JS we can build different components like input component, button component, message component ,components to shows various products etc. It gives us the flexibility to reuse components which helps us in development and making code more modular and scalable.
API calls are used to send and receive message to the server when the user inputs any message the API call gets executed and the message is then sent to the server for the processing.

Server:

In the server the chatbot communicates with different services like dialogflow or our database or third party API's etc. When it receives message from the user it sends that message to the dialogflow the dialogflow checks the fulfillment if the fulfillment is true it sends actions parameters intents to the server the server then process that action parameter intents and fetch the needed data from the database and then passes it to the client via API.

Dialogflow:

In dialogflow the developer creates intents and entities. When the server sends the user message to the dialogflow the dialogflow matches it to the intent the intent consists of the action, parameters and response of that message. It sends back response to the server.

Database:

A database where all the entity and the response related to the entity and other data stored. We will be using mongoDB as our database.

Dialogflow Architecture Key terms:

Dialogflow: Dialogflow is an end-to-end tool powered by natural language understanding to facilitate rich and natural conversations. Dialogflow sits in the middle of the stack. A user can communicate with all the common channels including text, website, apps etc.

Dialogflow Agent:

Dialogflow Agent is basically your entire chatbot application. Experience of what user is saying mapping to an intent, taking an action on it and then providing user with the response. It all starts with the trigger event called utterance.

Utterance:

This is how users invoke a chatbot. If you say, “Hey Google, how are you?”, the whole sentence is utterance and the phrase “Hey google” is the trigger.

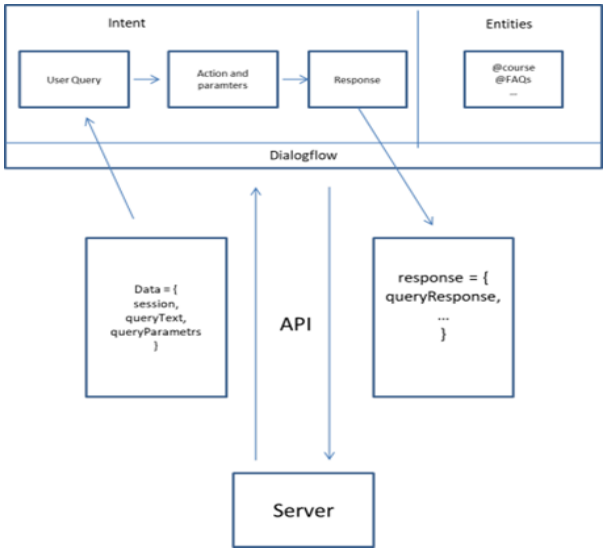
Intent: Intent is way to identified why our user want to talk to our chatbot. Like if a user says “I want to learn javascript”, the phrase “learn javascript” is the intent.

Action and Parameters:

We can use actions and parameters to defines variables you want to collect and store. Action and parameters help us to give user a response.

Entities:

When user says “I want to learn javascript”, the word “javascript” is critical piece of information in that statement that we would need to give response to user. Those variables are defines as entities. Dialogflow offers different types of entities.

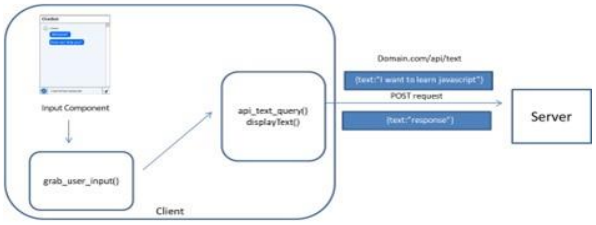


IV. IMPLEMENTATION OF CHATBOT:

In this section we will focus on how the entire architecture works with an example.

Goal

Process



Phase 1 Client to server

Client to server:

On the client machine we have user interface of the chatbot. The user interface of the chatbot has many different components like chat box message component input component button component etc. Design this component with the help of HTML CSS JavaScript and reactJS. Different components are used for different purpose one can design many other components as per the usability.

Input Component:

Input component is design to grab user query. This component can be robust enough to grab user query in many different ways like text, image, audio, video etc. For simplicity you can design simple import component which grabs user text.

grab_user_input()

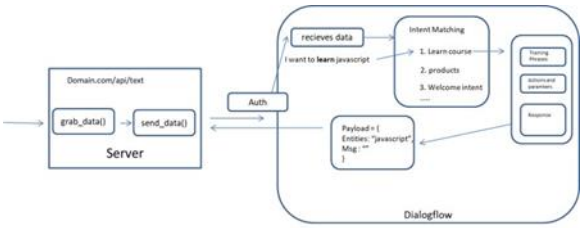
This function collects the user input and store them into a variable then we can use this variable for further use. This function also validate whether the user input is appropriate like is it empty strings etc.

Here the user input is "I want to learn javascript".

api_text_query()

This function takes the data and sends it to the server via post request on domain.com/api/text URL. This is an asynchronous function because it is sending and receiving data on another server. To send post request we can use fetch API which is provided by the browser default or we can use third party modules like axios etc. Once the request and the data is sent it waits for the response from the server.

displayText() This function is responsible to display text of user and bot in the chat box. This function uses react hooks to update the user and bot messages into an array. Then it uses a for loop to display all the messages in the chat box.



Phase 2 Server to dailogflow

Server to dailogflow:

Server to dailogflow Once the user text is send to the URL domain.com/api/text,we grab that data and then send it to the dialogflow with essential credentials.

grab_data()

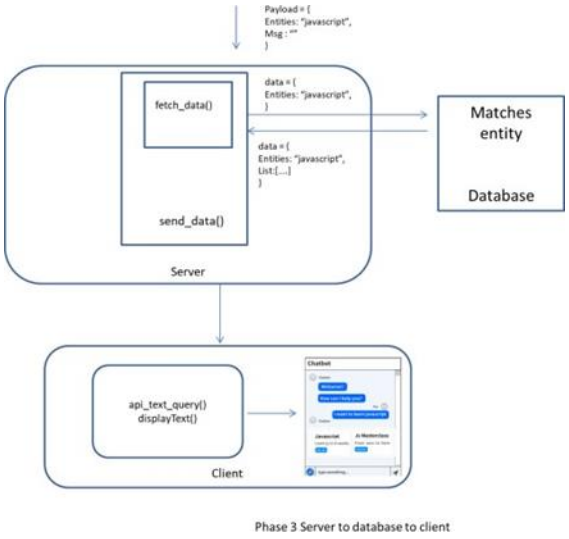
This function stores the data which comes from the client into a variable. The data is then further used.

Here the data we get from client is "I want to learn javascript".

send_data() This is an asynchronous function. In this function we send the user data which has come from the grab_data()

function to the dialogflow server. Apart from the data we also send necessary credential required to authenticate in dialogflow server. After sending post request to the server with then wait for the response from the dialogflow. We use try catch method in JavaScript to handle errors and edge cases if they occur.

Dialogflow: When dialogflow receives a request it first authenticate our request. After successful authentication, dialogflow matches the intent from our data text (text="I want to learn javascript"). Here learn course intent gets matched with our text. After successfully matching the intent it sends the respective response which is been stored in the intent in the dialogflow by the developer. This response can be either text message for a custom payload developed by the developer. In this intent with send custom payload with an entity(which is payload = {entities: “javascript”, …}). If the intent doesn't matches the dialogflow sends the default intent which in this case is welcome intent.
Dialog flow is it responsible for all the machine learning, natural language processing, spelling detection, auto correction, multilingual messages etc. From dialogflow we get payload as a response. That payload contains entities messages etc.



Server-database-client

send_data() This function receives the payload from the dialogflow. This function then execute the fetch_data() function which takes payload as an argument.

fetch_data()

This function then execute search operation on the database with the query as entity from the payload which we recieved from the dialogflow server. Here the entity is "javascript" (note here javascript is a keyword and not a language). In the database, the developer has already stored the collection of data which is associated to an entity. For example in the database we can have list of courses available which is stored in the form of array where each individual item is a Javascript object.

```
{
"javascript": [
        {
          "title" : "Javascript",
          "description":"Learn js in 4 weeks.",
          "course_id": "1234"
        },
        {
          "title" : "Js Masterclass",
          "description":"From zero to hero.",
          "course_id": "4321"
        },
        ...
    ],
    ...
}
```

After fetching the results the fetch_data() function returns the response.

send_data()

After receiving the result from the fetch_data() function. The send data function then send the result the client.

api_text_query()

This function after making the post request get the result from the server this result is then been shown to the user via displayText () function.

displayText()

This function displays the data in different components depending on what kind of data it is receiving. In this case it is showing the data in the form of a card component. Similarly a developer can create different kinds of components which can be used in different use cases

V. IMPORTANT FINDINGS

As we explained above, chatbots are automated and efficient programs that can work together as well communicate with people in a common language using text or voice-based audio conversation. As a standard chat app, chatbot installs an app layer, website and Driving APIs for jobs.

Users can easily send an application to the chatbot app with the Conversation UI, then ML / AI Instance is responsible for analyzing and processing user request, access website or ways to call APIs if necessary, and ultimately generate the right response for the user.

ML / AI Instance lists all processes related to Natural Language Processing (NLP). NLP it mainly focuses on quoting the expression and expressing purpose and organizations. To The NLP unit is able to map words to targets, trained and organized by examples of purposeful maps.

In this paper, we do not go into detail on how to train or adjust a machine reading. Instead, we will focus on building and researching the use of chatbot as a web site an application that uses the AI Assistant API

VI. RESULT AND DISCUSSION

We received feedback from testing the last prototype that participants did not have a problem getting information from a chatbot rather than a human. It is possible that the fact that the chatbot provided a source for the information it provided did not make them less trusting of the information they got. Interacting with the chatbot and reporting on how they use it has been interesting to investigate. In view of the scope of the project, we were unable to conduct enough user testing and redesign of the chatbot as we would have liked. Through the project, we have touched on some theory, but this should also be emphasized more for higher validity . Despite the fact that our participants trusted the information provided in this project, we cannot say that they trust a chatbot as much as a human does.

VII. RESEARCH OUTCOMES

While there is a developing collection of examination accessible on chatbot client experience there actually is an absence of information on the most proficient method to use the discoveries from this exploration in chatbot plans that reliably please and connect with clients . Clients actually experience issues in chatbot connection, both as far as even minded encounters where chatbots neglect to

comprehend or to assist clients with accomplishing their expected objectives and as far as gluttonous encounters where chatbots neglect to draw in clients over the long run. These issues may to some degree be viewed as because of the more broad test of planning human-AI collaboration . For sure signs that these difficulties are being alleviated, for instance on account of enhancements in client care chatbots and in the take-up of social chatbots like Replika . Notwithstanding, the fortifying of chatbot client encounters stays a key examination challenge. Connected with the test of fortifying chatbot client experience, is the test of estimating and surveying chatbots as far as client experience and from a more comprehensive point of view to decide if chatbots are really gainful. Applicable perspectives for this are, for example, handiness, productivity and cycle support. While there is countless investigations on chatbot client experience accessible, there is an absence of normal definitions, measurements and approved scales for key parts of chatbot assessments . Besides, while a wide scope of approaches are utilized there is an absence of ordinarily applied ways to deal with assessment.

VIII. FUTURE SCOPE

Man-made consciousness is the most smoking argument for business clients hoping to work on their productivity, convey groundbreaking thoughts and make the following strides in the progress to an advanced undertaking. Simulated intelligence and chatbots are democratizing business, engage new companies and assist with building new associations, something that each association needs to plan for.Presently as we move into the 2020s, endeavors and new businesses the same are making the following stride, embracing AI and bringing brilliant administrations into their associations. It has effectively begun with chatbots and investigation instruments, however is now extending to business- empowering innovation, utilizing a blend of AI, profound learning, PC vision, regular language handling, machine thinking (MR), and profound or solid AI.Organizations will keep on conveying AI for astute mechanical cycle mechanization, PC vision assignments, and AI applications. Contingent upon the business, there are different pieces of the business where AI will become quicker.

As per a McKinsey research overview, 75% of telecoms respondents are centered around AI for administration activities. 59% work on item advancement for cutting edge organizations and money organizations consider 40% zeroed cursor on a screen for extremely lengthy, currently the utilization of symbols is working on their discernment, yet use through Amazon Alexa, Apple Siri, etc will assist with carrying them to a more extensive crowd. Message to- discourse and voice-to-message are fundamental elements coming soon for chatbots.

IX. CONCLUSION

The chatbot's motivation is to have a shrewd, exact, what's more continuous discussion with the understudies. Thusly, understudies talk with the bot to ask about specific things they look to buy and pay online for the things before they visit the shopping center. (e chatbot is available through compact cell phones or PCs, which understudies can sign in to anyplace and whenever nearby, accordingly giving a 24-hour online assistance. Preceding this examination, design based chatbots have had a sketchy degree of knowledge. In spite of the fact that chatbot is design based, it has a high learning rate, and that implies that it advances quickly from any internet business thing that is added to its data set. We have overviewed a few chatbot frameworks which prevail in pragmatic areas like schooling, data recovery, business, web based business, as well concerning entertainment. Innovation like PC variable based math frameworks, mixed media introductions or 'chatbots' can fill in as enhancers however not supplant a great aide". By and large, the point of chatbot fashioners ought to be: to construct devices that help individuals, work with their work, and their connection with PCs utilizing normal language; yet not to supplant the human job absolutely, or impersonate human discussion impeccably. On the off chance that one had an ideal reproduction of a human familiar, it would be human-human discussion and not human computer discussion with its occasionally odd yet appropriate properties.

X. ACKNOWLEDGMENT

We gratefully acknowledge the support, guidance and encouragement of our Dissertation Guide Associate Professor Dr. Rekha Sharma ma’am for this novel work.

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Review On 5g Wireless Technology

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Abstract— **5G stands for fifth-generation wireless Technology. The latest iteration of cellular technology has three main features: greater speed, lower latency, and the ability to connect several devices simultaneously. 5G wireless network will aspect new contents, as well as growing claim on network capacity to support a lot more devices running applications necessitating high data rates and always-on connectivity; hugely and supportive of the emerging business models in the wireless network market demanding network to be more open. New challenges initiate new resolutions and involve changed plans in the network positioning, management, and operation of 5G wireless networks equated to those of current wireless networks. One of the key purposes of the 5G wireless network is to completely provide service- customized networks to a wide variety of services using integrated cloud reserve and wireless and wired network possession, which may be presented by several infrastructure providers and operates. The term 5G is used alternatingly with the worldwide wireless web (WWWW), which is a platform that enables us to connect to any kind of device, anytime and anywhere**

Keyword- 5G, Wireless, 5G Architecture, Evolution of 5G.

I. INTRODUCTION

Everybody loves speed and further over speedy internet so it's no surprise that every major Telecom in the world is working to make it indeed hastily. Smartphones, watches, homes, and buses are decreasingly taking stable internet connections. To survive in a world where every second the speed changes and where we prompt for further and further technology, then comes the fifth generation's technology 5G. 5G represents the coming major face of mobile telecommunication ethics. Beyond the forthcoming 4G networks technology is contributing the service in product manufacturing attestation supporting Electronics Communication business, etc. As the Purchaser becomes further and further apprehensive of the smartphone Technology youthful generation will look for a decent package or together including all the advanced features a cellular phone can have. Hence the hunt for new technology is always the main provocation of the top smartphone titan to number their challengers. The end of a 5 G- grounded telecommunication network would impeccably answer the challenges that a 4G prototype would present once it has entered ubiquitous use. Huawei will begin charging smartphone makers a majesty to use its patented 5G technology. The Chinese telecom company will charge a “per unit majesty cap” of$2.50 for smartphones able of connecting to 5G and former generations of mobile networks. Huawei has 007 declared 5G patent families, the loftiest out of any company in the world. The wireless system uses orthogonal frequency division multiplexing with expansive area content, a high quantum of milli- cadence swells “10 mm 21 mm” covering a frequency range of 30 GHz to 300 GHz, but current 5G communication includes frequency below 30 GHz, analogous to 28- GHz band and frequentness up to about 100 GHz as the upper limit, and permitting a 20 Mbps data rate to distances of 2 km. The millimeter surge band is the most active result of the current swell in wireless internet operation; this provision is suitable for furnishing wireless world wide web operations.

II. EVOLUTION

a. First generation (1G)

First Generation developed in the 1980s and was completed in the early 1990s. grounded on the Analog system. Speed up to 2.4 kbps. AMPS (advanced mobile phone system) was launched by the US and it was the first-Generation mobile system to allow users to make voice calls in one country. But it had low capacity, unreliable handoff, poor voice links, and no security since voice calls were played back in radio halls, making them susceptible to unwanted wiretapping by third parties.

b. Second Generation (2G)

Second Generation developed in the late 1980s and was completed in the late 1990s. Commercially launched on the GSM (Global System for Mobile communication) standard in Finland (1991). grounded on a digital system. Speed up to 64

kbps. Services such as digital voice and SMS with further clarity. Text dispatches are digitally translated. Semi-global installation. 2G are the handsets we are using moment with 2.5G having further capabilities.

c. Third Generation (3G)

The Third Generation developed between the late 1990s and early 2001s. It uses Wideband Wireless Network with which clarity is increased. The data are transferred through the technology called Packet Switching. Transmission speed from 125 kbps to 2 Mbps. Superior voice quality, and good clarity in a videotape conference. Email, PDA, information surfing. online shopping, E-banking, online/offline games, etc. Global roaming.

d. Fourth Generation (4G)

Fourth Generation developed in 2009. 4G offers both cellular and broadband multimedia services far and wide. Faster and further dependable. Speed up to 100 Mbps. High-performance easy roaming. 4G provides the same point as 3G and fresh services like multimedia journals, to watch television programs with further clarity and Send data much faster than previous generations. LTE is considered a 4G technology.

What is 5G-

5G technology is a breakthrough. The coming generation of telecom networks, the fifth generation, started beating the market in 2018 and will continue to increase worldwide. Elsewhere the speed of development and technology is predictable to unleash a massive 5G IoT (internet of things) ecosystem. Their networks can assist communication wants for billions of 5G technology driven by 8 specification connected devices, with the right trade between requirements.

Fifth Generation's next measure phase of mobile telecommunication and wireless systems is 10 times more capacity than others. Expected speed up to 1gbps. It Is faster and more reliable than 4G and 3G. With an increment, in the demand of the users exponentially, 4G can now be easily replaced with 5G with new advanced access technology. Lower cost than previous generations. Consistent quality and end-to-end latency have been lowered.

5G Network Architecture-

There was wide agreement on the fact that as compared to 4G network and 5G network should achieve the below benefits over it, a thousand times the system capacity, ten times the spectral effectiveness and Energy effectiveness, data rate, 25 times the average cell outturn drastic change in the policy of designing the 5G wireless cellular armature is demanded to meet the difficulty of the stoner and triumph over challenges that have been put forward in 5G system. The fifth-generation mobile systems model is an each- IP- grounded model for wireless and mobile network interoperability The - IP Network (AIPN) can fulfill the added demands of the cellular dispatch request. It's a common platform for all radio access technologies. The AIPN uses packet switching and its nonstop elaboration provides optimized performance and cost. In fifth generation Network Architecture consists of a stoner terminal (which has a pivotal part in the new armature) and several independent, independent radio access technologies (RAT). In 5G Network Architecture all IP- grounded mobile operations and services similar to Mobile doors, Mobile commerce, Mobile health care, Mobile Government, Mobile banking, and others, are offered via Cloud Computing coffers (CCR). pall computing is a model for accessible on-demand network access to configurable computing coffers (e.g., networks, waiters, storehouses operations, and services). pall computing allows consumers to use operations without installation and access their data on any computer with internet access. CCR links the Reconfigurable Multi Technology Core (RMTC) with remote reconfiguration data from RRD attached to Reconfiguration Data models. The main challenge for an RMTC is to deal with adding different radio access technologies. The core is a confluence of nanotechnology, pall computing, and radio, and is grounded on the All- IP Platform. Core changes its communication functions depending on the status of the network and/ or stoner demands. RMTC is connected to different radio access technologies ranging from 2G/ GERAN to 3G/ UTRAN and 4G/ EUTRAN, in addition, to802.11 x WLAN and 802.16 x WMAN. Other norms are also enabled similar to IS/ 95, EV- DO, CDMA2000.etc. Interoperability process criteria and mechanisms enable both terminal and RMTC to elect from miscellaneous access systems.

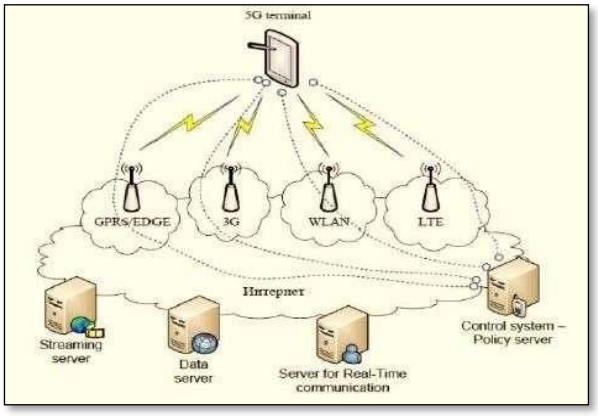

Fig. 5G Network Architecture

FUTURE SCOPE

5G Network Technology will reveal a new era in mobile communication technology. The upcoming 5G will offer higher qualities of services, lower latencies, and higher bandwidth which will help improve the User experience both in the consumer and business space from Cloud gaming to telehealth use cases. Several types of research and discussions are going on across the world among technologists, researchers, academicians, operators, and governments about the innovations, implementation, and security concerns of 5G. The 5G network will reform the internet of things (IoT) but it will take some years for the technology to cover most of the planet. As proposed, loaded with multiple advanced features starting from super high-speed internet service to smooth ubiquitous service, 5G will unlock many of the problems. In many countries, the original frequency band for 5G is 1 GHz, 1-6 GHz, and above 6 GHz, and similar frequency to the remaining mobile and Wi-Fi networks. The low-band frequencies include 600 MHz to 2500 MHz while the mid-band frequency is 3300 MHz lastly, the spectrum also includes a high-band frequency of up to 72 GHz, known as mm-wave. The high-band 5G uses frequencies of 24–47 GHz in India. 5G technology will provide supper and perfect utilization of cellular communication in the future. Embedded Technology will evolve.

Advantages of 5G Technology-

1. More active and effective
2. Easily manageable with previous generations.
3. Technology to wrinkle the network on one platform.
4. High determination and bi-directional large bandwidth shaping.
5. Possible to afford a uniform, uninterrupted, and unfailing connectivity across the world.
6. The 5G technology provides a billing limit in

advance that is one of the most beautiful and successful of the modern era.

7. The information from the data transfer technology 5G organizes a more accurate and reliable result.

III. CONCLUSION

In this paper, we have discussed the being and unborn wireless mobile communication generations and cellular systems focusing on the main key factors like switching schemes, bandwidth, data rates, evolution, and radio access, also 5 G's main development advantages. Explain the necessity for 5G and the future scope of the 5G network. We conclude that the 5G network is very fast and reliable. The fifth generation is based on 4G technology. It is expected that the initial Internet philosophy of keeping the network as simple as possible and giving more functionalities to the end nodes, will become reality in the future generation of mobile networks. 5G technologies include all types of innovative structures which make 5G mobile technology the most important and will be in huge demand soon.

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Avoiding Phishing Attack Using Visual Cryptography

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Abstract – **Phishing is one amongst the foremost common social engineering attacks that users over the web fall for. Associate degree example is balloting systems, and since such systems ought to be correct and error free, phishing interference techniques square measure crucial. Visual Cryptography (VC) is employed for economical electoral system authentication to solid votes. VC is one amongst the foremost secure approaches for privacy protection because it ensures the confidentiality of the electoral system. This paper discusses planned phishing interference strategies and compares totally different proposed strategies.**

Keywords: Remote Voting System (RVS), Voting System (VS), Shares Ballots, Commons Attribution International Authentication, Visual Cryptography, Phishing, Captcha..

I. INTRODUCTION

Elections are control round the world, voters in democratic countries have the power to elect a representative for his or her party to settle things in an exceedingly democratic way. However, voters should solid their ballots at a polling location. This might weaken citizen support, so, web-based ballot makes this process easier. Electronic ballot systems supply numerous options that build them different from ancient ballot strategies, as they conjointly increased legal system features over ancient ballot strategies as well as quality, privacy, simplicity, accuracy, and flexibility. On the opposite hand, ballot systems may be exposed to a fresh threat like phishing that affects the system security. When fraudsters gain your personal info, they will use it to commit numerous varieties of identity fraud, jeopardizing voters, and name. Having a secure and reliable choice system, crypto graphical and steganographic techniques ought to be applied. One among the suggested solutions is VC. Systems square measure won't to safeguard into from hackers. It's a mechanism for encrypting visual knowledge that may be decrypted by the human sensory system while not the utilization of computers.

II. LITRATURE SURVEY

2.1) Online voting system using biometric verification

2.1.1) Features

This paper offers the info concerning the system that's wholly automatic, unbiased and on-line forecasting the tactic of choice, increasing security and reducing the count time. The system is split into a pair of sections those area unit elector registration section and actual choice section. At intervals the elector registration technique the data of the elector area unit saved at intervals the repository beside the voter's distinctive identification and finger prints knowledge. Throughout actual choice the user area unit verified with the help of a biometric device. The biometric device checks the info of the user saved in repository by local area network communication and if the user is documented the user is approved to vote. This technique is straightforward to implement and straightforward to

2.1.2) Disadvantages:

1)In gift day situation, EVM results may be tampered by the program keep in EVM and by putting in a glance alike part which may be taught to tamper results.

2)Errors square measure a part of all human beings; it's impossible for humans to be 100% economical in knowledge entry.

3)The obscurity of the citizen is preserved and there are no thanks to link the citizen to the vote casted by the voter.

2.2) An efficient and securable online voting system

2.2.1) Features:

An online electoral system that involves the procedures like registration of voters, polling, vote count and declaring the results would represent a decent answer to switch current system and also the planned system during this provides the knowledge concerning their own system or organized by government the system contains totally different ways for ballot like electronic ballot that helps the voters to solid votes in AN electronic approach means that in computerized instrumentality. The system additionally includes the pc within which electronic ballot machines trying like ATM or personal computers wont to solid the votes by bit screen or a pointer.

2.2.2) Disadvantages:

1)The process of collecting data and entering the data into database takes too much time and is expensive to conduct.

2)The process involves too much paper work and paper storage.

3)The system is totally insecure as malicious user can easily attack by doing any changes throughout the system.

2.3) Title: Online voting system using mobile

2.3.1) Features:

The traditional electoral system will be modified to a more modern and effective approach termed as mobile option.The mobile electoral system provides the convenient, simple and economical thanks to vote eliminating the defect a conventional approach. during this paper the planned to create the E- electoral system that is essentially an internet electoral system through the good phones or web site. to attain the protection they're victimization just the one time password (OTP) principle. The system will be used anytime and from anyplace by

the voters. nobody will forged votes on behalf of others and multiple votes. It saves time and having distinctive identification by victimization aadhar card or elector id.

2.3.2) Advantages:

1) There's no documentary proof and tangible results for election.

2) It's potential for hackers to access and modify the results once obtaining any user id.

III TYPES OF SECURITY ATTACK

Before planning this technique we have a tendency to studied completely different attacks which may be done on the legal system. The attacks area unit as follows

A. Phishing Attack:-Phishing attack could be a technique during which the malicious user will produce a pretend web site as kind of like the first web site to get info of elector.

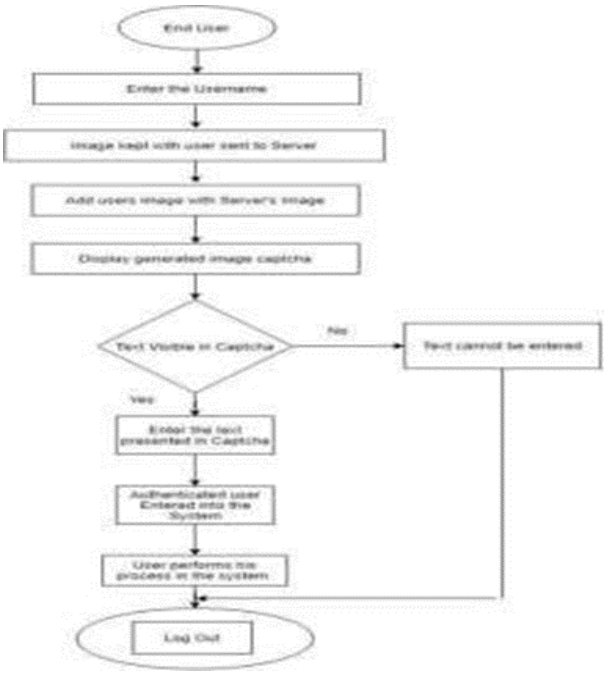
B. Pharming Attack:-In pharming attack malicious user can send the first web site.

C. SQL injection:-In this malicious user can destroy all the information of original web site by mistreatment sql question.

D. Password Attack:-Password attacks are often enforced mistreatment many ways, as well as brute-force attacks, worm programs, IP spoofing, key loggers, packet sniffers, and wordbook attacks. Though packet sniffers and informatics spoofing will yield user accounts and passwords, word attacks sometimes check with continual makes an attempt to spot a user account, password, or both. These continual makes an attempt area unit referred to as brute force attacks.

E. Man in the middle Attack:-A complex sort of informatics spoofing is named man-in-the middle attack, wherever the hacker monitors the traffic that comes across the network and introduces himself as a stealing intermediator between the sender and also the receiver

IV. PROPOSED ONLINE VOTING SYSTEM



In this system, first off the phishing detection are going to be done as explained in section three. The hindrance are going to be exhausted the system as show within the figure. The choice method are going to be divided into 2 parts. Initial the registration part then the particular choice part. In the registration part, the image can divided into 2 halves and shared between the user and therefore the server. Throughout choice part, the user can enter its username. The a part of the image unbroken with the user are going to be sent to server. This user's half are going to be superimposed with server's image and generated captcha image are going to be displayed. If the text is visible in captcha then the user is AN documented user and he/she is allowed to enter the system by coming into the text in captcha. Else if the text isn't visible then the text in captcha cannot be entered and user cannot enter the system.

V. CONCLUSION

Voting plays a vital role for any democratic country. If this planned system is enforced, then the citizen doesn't got to go to the choice center. this method is extremely helpful for those peoples World Health Organization live in other countries conjointly for the peoples World Health Organization square measure physically disabled. Since Visual Cryptography Technique is employed, user will ready to conclude whether or not he's in phishing web site or original web site simply. planned on-line legal system is extremely effective and it'll helpful for voters and organization in some ways and it will scale back the price and time.

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Review On Security Issues And Challenges In Cloud Computing

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Abstract – **Cloud computing services enabled through data communication technology delivered to a client as services over the net on a hired basis have the potential to increase up or down their service necessities or desires. during this model, the infrastructure is in hand by a 3rd party merchant and therefore the cloud computing services square measure delivered to the requested customers. Cloud computing model has several blessings together with measurability, flexibility, elasticity, efficiency, and supports outsourcing non-core activities of a company. Cloud computing offers Associate in Nursing innovative business conception for organizations to adopt IT enabled services while not advance investment. This model allows convenient, on-request network accessibility to a shared pool of IT computing resources like networks, servers, storage, applications, and services. Cloud computing may be quickly provisioned and discharged with negligible management effort or service supplier interaction. despite the fact that organizations get several advantages of cloud computing services, several organizations square measure slow in acceptive cloud computing service model due to security issues and challenges related to management of this technology. Security, being the main problems that hinder the expansion of cloud computing service model thanks to the availability of handling confidential information by the third party is risky specified the shoppers got to be a lot of attentive in understanding the risks of knowledge breaches during this new setting. during this paper, we've mentioned the protection problems, the challenges and therefore the opportunities within the adoption and management of cloud computing services model in a company.**

Keywords: Cloud Computing, Cloud Security Issues, Cloud Deployment model, Cloud Computing Services.

I. INTRODUCTION

The Internet has been used on system graphs since many years by a cloud image once Associate in Nursing assortment of recently other innovation began to hap that permissible computing resources to be accessed over the web termed as cloud computing technology. Cloud computing is principally involved with accessing on-line package applications, knowledge storage and process power of the system. Cloud computing supports the organizations to reinforce their capability dynamically while not investment in new infrastructure, coaching new IT personnel, or buying new authorized package that area unit needed for the automation of assorted processes. It extends the capabilities of data Technology. throughout recent years, cloud computing model has developed from being a promising business construct to 1 of the quick rising innovations of the IT business. Since all info of people and firms area unit placed on the cloud, the priority starts to grow regarding security problems. Cloud computing has profited several organizations by decreasing IT expenses and allowing them to specialize in their core business competency and skills instead of IT infrastructure. Cloud-based services area unit ideal for the organizations with growing or unsteady information measure demands from shoppers. reckoning on the requirement of the user, it's attainable to expand cloud services capability so it's attainable to scale down once more thanks to the rationale that the ability is baked into the cloud service. This level of lightness will provide organizations utilizing cloud computing a true advantage over contenders.Despite several benefits of the cloud computing model, customers area unit still hesitant to deploy their business operations on the cloud owing to security issues of business knowledge. Since Cloud services area unit net based mostly and should serve many purchasers day by day, they'll become inundated and should even return up against technical blackouts. this will cause suspension of business processes briefly at the purpose once net association is disconnected, and thus the user won't have the capability to urge to any of his applications, server or info from the cloud. the protection might improve owing to knowledge centralization and security on resources however the issues continue regarding the loss of management over bound sensitive knowledge and also the security of hold on info handed over to the cloud service suppliers. If those suppliers haven't supplied with the economical security system in their own environments, the shoppers might be in problem. activity the standard of security measures enforced by the cloud suppliers is tough as a result of several cloud suppliers won't expose their infrastructure facilities to customers. Section a pair of narrates the literaturereview on connected works on security problems in cloud computing. Section three analyses security problems in cloud computing birthing accentuation on package as a service, Platform as a service and Infrastructure as a service and cloud computing readying ways. Section four addresses the challenges of the organizations on cloud computing resource management and section five conclude the complete work

II. CHARACTERISTIC OF CLOUD COMPUTING

2.1 Broad Network Access: Capabilities out there in cloud are often accessed by wide variety of devices. Tablets, sensible phones, Laptops and desktop are often wont to access the resources. Devices used for accessing could have thin/thick shopper platforms.

2.2 Speedy physical property: Cloud computing give the good physical property capabilities by providing the unlimited resources. Users will demand the resources offered at the time of needed and same may be discharged once the necessity is over. even supposing, providers even have the restricted re sour consumers it seems as unlimited resources area unit offered. ces except for.

2.3 Measured service : consumers should be measured for the request purpose. Cloud systems give the

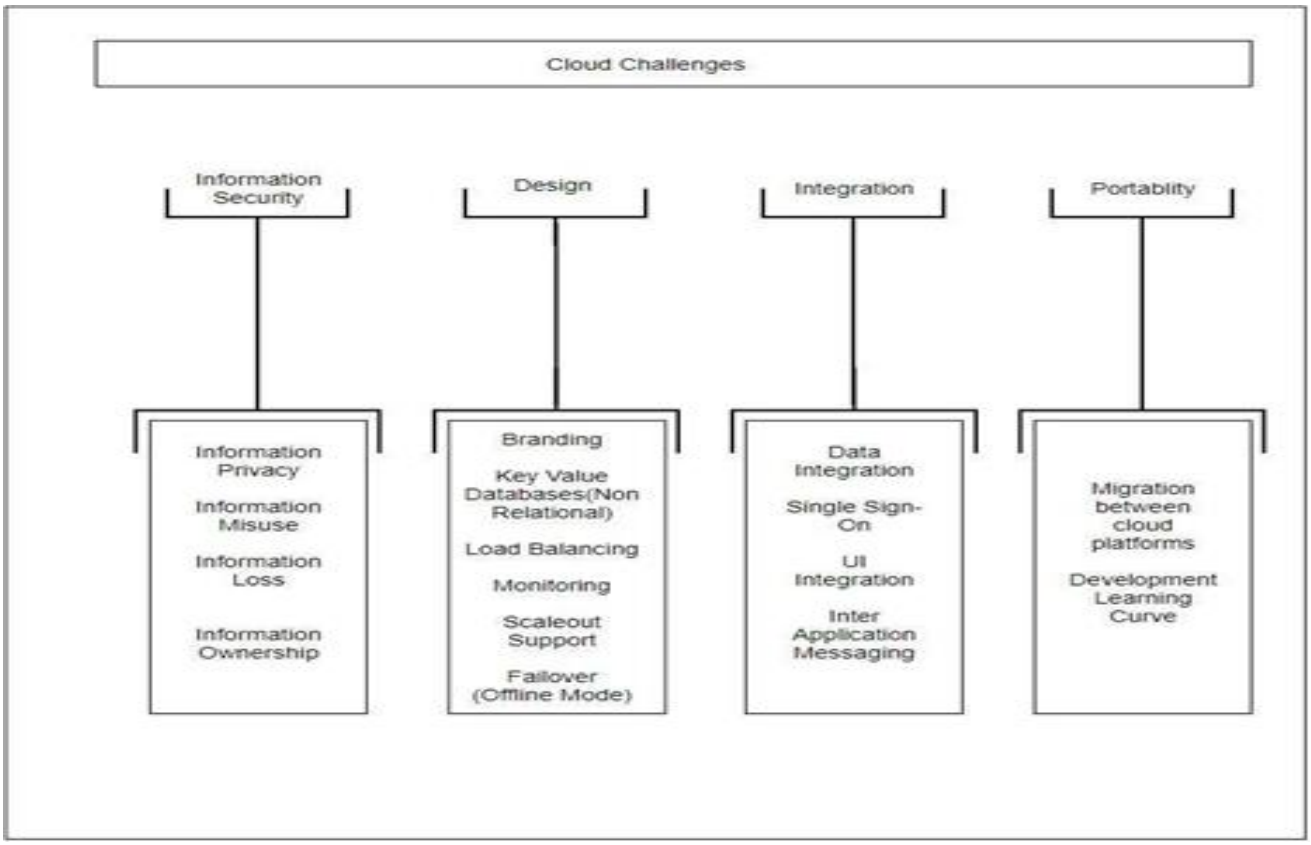
aptitude to live the quantity of resources used. Majority of the services offered are measure the resources like Virtual machine, Memory, storage, range and kind of mainframe accessed and the period of their usage. This measuring helps in generating the bill as per the usage according. Measured services should be clear for each the user and therefore the provider to avoid any quite competition, later on.

2.4 Agility : Cloud computing is way sought-after within the business circle due to its nimbleness. In ancient primarily based system procuring the resources need a protracted procedure of obtaining the requirement approved, attractive the quotation, choosing the best quotation, ordering and delivering. just in case of cloud computing resources are often demanded at any time and therefore the same are out there to the users. users in hours instead of in week and month just in case of ancient system. This rapid provisioning of the resources is is aware of as nimbleness and it reduces time period and useful in up the customers satisfaction and growing business advantage.

2.5 Resource Pooling : Cloud computing works on distributed model wherever resources area unit distributed throughout the information center. In case of excessive would like of resources, they'll be pooled with totally different physical and virtual resources to serve multiple customers. These resources area unit assigned and reassigned per client demand. Locations, from wherever resources area unit pooled aren't notable to the consumer, user will solely specify location at higher level of abstraction (e.g. country, state or information center). samples of resources that may be pooled embody storage, processing, memory and network information measure.

III. CHALLENGES OF CLOUD COMPUTING

Despite the potential gains achieved from the cloud computing, the organizations area unit slow in acceptive it thanks to the following limitations: information loss, information cleanup, account hijacking, less management over the method, corporate executive attacks by the auditability, less QoS .These limitations result in the problems or challenges like –security, ability, virtualization, information leak, resource sharing, load equalization ,multi-tenancy, and repair Level Agreement (SLA). There area unit several advantages as mentioned higher than, although cloud computing has several challenges. whereas moving from owning web site to cloud area, firms should aware of the advantages and challenges of cloud computing. While analyzing these challenges, security of information is that the most tedious add cloud computing. consistent with a survey carried out by Gartner quite seventieth of Chief Technical Officers believed that the first reason for not exploitation cloud computing services is that of the info security and privacy considerations. Convincing the organizations particularly little ones about security concern could be a tedious work; they're not able to throw away their infrastructure and immediate move to cloud. Most of the organizations area unit closely looking this issue and not able to shift to cloud area, this can be main reason in the lack of maturity the other unauthorized user sharing the appliance or platform within the cloud, this cause the integrity failure. As information area unit the bottom for providing cloud computing services, like information as a Service, code as a Service, Platform as a Service, keeping information integrity could be a basic task.



IV. CLOUD SECURITY ISSUES

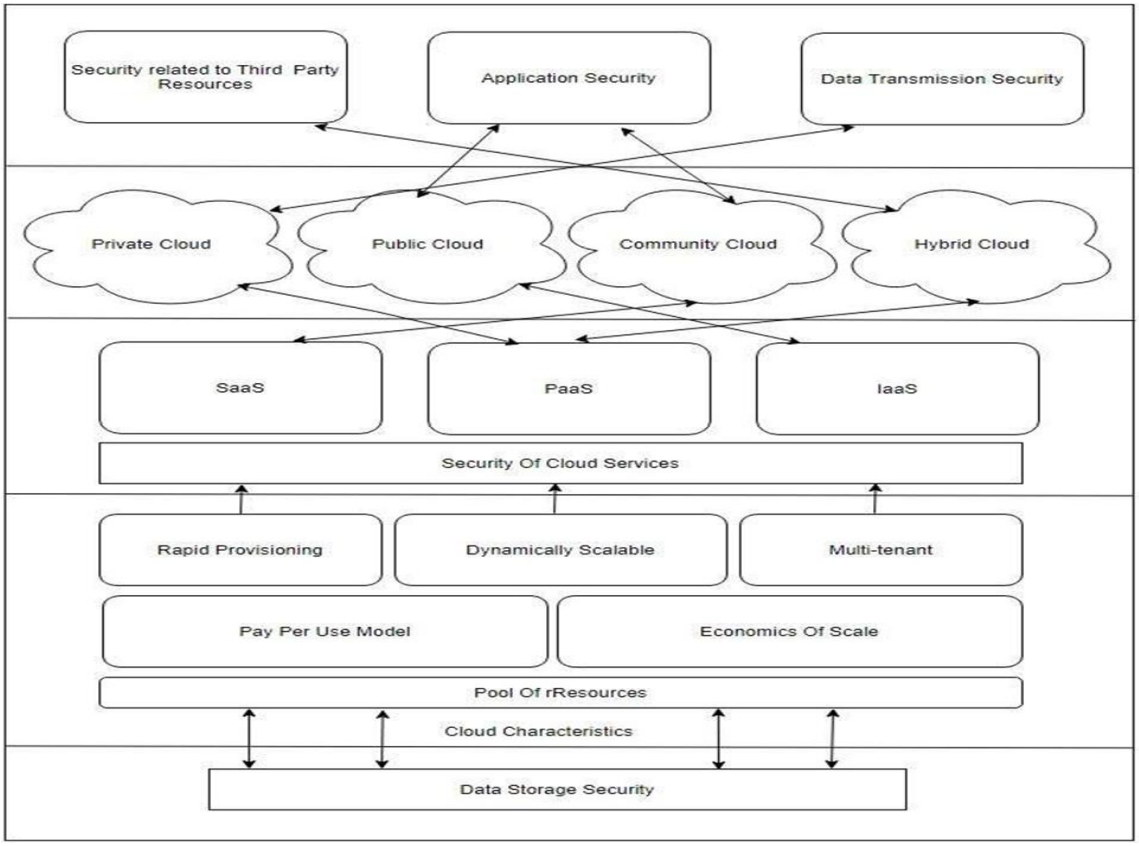
4.1 Cloud Deployments Models :

In the cloud readying model, networking, platform, storage, and package infrastructure square measure provided as services that resale or down betting on the demand as delineate in figure a pair of. The Cloud Computing model has 3 main readying models that are:

4.1.1 Private cloud:Private cloud may be a new term that some vendors have recently accustomed describe offerings that emulate cloud computing on personal networks. it's established inside Associate in Nursing organization's internal enterprise data center. within the personal cloud, climbable resources and virtual applications provided by the cloud merchant square measure pooled along and offered for cloud users to share and use. It differs from the general public cloud therein all the cloud resources and applications square measure managed by the organization itself, just like computer network practicality. Utilization on the personal cloud will be a lot of more secure than that of the general public cloud due to its given internal exposure. Only the organization and selected stakeholders could have access to control on a particular personal cloud.

4.1.2 Public cloud : Public cloud describes cloud computing within the ancient thought sense, whereby resources are dynamically provisioned on a fine-grained, self-service basis over the net, via web applications/web services, from Associate in Nursing off-site third-party supplier WHO shares resources and bills on a fine-grained utility computing basis. it's usually supported a pay-per-use model, just like a prepaid electricity metering system that is versatile enough to cater for spikes in demand for cloud improvement. Public clouds square measure less secure than the opposite cloud models as a result of it places an extra burden of making certain all applications and information accessed on the general public cloud are not subjected to malicious attacks.

4.1.3 Hybrid cloud : Hybrid cloud may be a personal cloud joined to 1 or a lot of external cloud services, centrally managed, provisioned as one unit, and circumscribed by a secure network. It provides virtual IT solutions through a combination of each public and personal clouds. Hybrid Cloud provides safer management of data} and applications and permits varied parties to access information over the Internet. It conjointly has Associate in Nursing open design that enables interfaces with alternative management systems. Hybrid cloud will describe configuration combining an area device, like a Plug PC with cloud services. It also can describe configurations combining virtual and physical, collocated assets -for example, a largely visualized atmosphere that needs physical servers, routers, or other hardware like a network appliance acting as a firewall or spam filter.



4.2 Cloud Computing Services :

Following on the cloud preparation models, successive security thought relates to the assorted cloud computing service delivery models. The 3 main cloud service delivery models are: Infrastructure-as-a-Service (IaaS), Platform-as-a Service (PaaS) and Software-as-a-Service (SaaS).

4.2.1 Infrastructure as a Service (IaaS) : Infrastructure as a Service could be a single tenant cloud layer wherever the Cloud computing vendor's dedicated resources are solely shared with contracted shoppers at a pay-per-use fee. This greatly minimizes the requirement for Brobdingnagian initial investment in computing hardware like servers, networking devices and process power. They additionally permit varied degrees of economic and functional flexibility not found in internal information centers or with collocation services, because computing resources is superimposed or free rather more quickly And cost-effectively than in an internal information center or with a collocation service. IaaS and alternative associated services have enabled startups and alternative businesses target their core competencies without concern abundant about the provisioning and management of infrastructure. IaaS fully abstracted the hardware to a lower place it and allowed users to consume infrastructure as a service while not bothering anything regarding the underlying complexities. The cloud encompasses a compelling worth proposition in terms of value, however 'out of the box' IaaS solely provides basic security (perimeter firewall, load balancing, etc.) and applications stepping into the cloud can want higher levels of security provided at the host.

4.2.2 Platform as a service (PaaS) : Platform-as-a-Service (PaaS) could be a set of code and development tools hosted on the provider's servers. it's one layer on top of IaaS on the stack and abstracts away everything up to OS, middleware, etc. This offers AN integrated set of developer atmosphere that a developer will faucet to build their applications while not having any clue regarding what's occurring beneath the service. It offers developers a service that gives a whole code development life cycle management, from attending to style to putting together applications to preparation to testing to maintenance. Everything else is abstracted aloof from the "view" of the developers. Platform as a service cloud layer works like IaaS however it provides a further level of 'rented' practicality. Clients victimization PaaS services transfer even a lot of prices from capital investment to operational expenses however should acknowledge the extra constraints and probably some extent of lock-in posed by the extra practicality layers. The employment of virtual machines act as a catalyst in the PaaS layer in Cloud computing. Virtual machines should be protected against malicious attacks such as cloud malware. so maintaining the integrity of applications and well implementing accurate authentication checks throughout the transfer of knowledge across the whole networking channels is elementary.

4.2.3 Software-as-a-Service (SaaS): Software-as-a-Service could be a code distribution model during which applications are hosted by a vendor or service supplier and created out there to customers over a network, generally the web. SaaS is changing into AN progressively current delivery model as underlying technologies that support internet services and service-oriented design (SOA) mature and new biological process approaches become well-liked. SaaS is additionally typically related to a pay-as-you-go subscription licensing model. Meanwhile, broadband service has become progressively out there to support user access from a lot of areas round the world. SaaS is most frequently enforced to supply business code practicality to enterprise customers at a coffee value whereas permitting those customers to get a similar advantages of commercially commissioned, internally operated code without the associated quality of installation, management, support, licensing, and high initial cost. The design of SaaS-based applications is specifically designed to support several concurrent users (multi-tenancy) directly. code as a service applications ar accessed victimization web browsers over {the internet|the internet|the net} so application program security is vitally necessary. Info security officers can got to think about varied ways of securing SaaS applications. Web Services (WS) security, long language (XML) coding, Secure Socket Layer (SSL) and out there choices that ar utilized in implementing information protection transmitted over the Internet.

V. CONCLUSION

Cloud computing is AN Internet-based computing service provided by the third party permitting share of resources and data among devices. it's wide utilized in several organizations today and changing into a lot of common as a result of it changes the means of however the data Technology (IT) of a company is organized and managed. It provides several benefits like simplicity and lower prices, virtually unlimited storage, least maintenance, straightforward utilization, backup and recovery, continuous convenience, quality of service, machine-driven package integration, measurability, flexibility and reliability, quick access to data, elasticity, fast readying and lower barrier to entry. during this new era the employment of cloud computing service is increasing speedily, however the safety problems with the cloud computing became a challenge. Cloud computing should be safe and secure enough to make sure the privacy of the users. during this paper first off we've got illustrated the architecture of the cloud computing, then discuss the foremost common security problems with victimization cloud then we've got proposed a knowledge recovery algorithmic rule for cloud computing setting. The heading of the Acknowledgment section and the References section must not be numbered. Causal Productions wishes to acknowledge Michael Shell and other contributors for developing and maintaining the IEEE LaTeX style files which have been used in the preparation of this template.

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Cloud Security for Securing Data using Technology

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Abstract – **Security is one of the main issues hindering the growth of cloud The idea of handing off important data to another company worries me. Consumers should therefore be vigilant to understand the risks of data breaches in this new environment. This white paper provides an in-depth analysis of cloud computing security issues and challenges, focusing on types of cloud computing and types of service offerings. Cloud computing is a set of IT services provided to customers over a network on leased bases, allowing the service requirements to be scaled up or down. Cloud computing services are typically provided by a third party that owns the infrastructure. Notable benefits include scalability, resilience, flexibility, efficiency, and outsourcing of non-core activities. Cloud computing offers organizations an innovative business model for adopting IT services with no upfront investment. Despite the potential benefits to be gained from cloud computing, security issues and related challenges have delayed the adoption of cloud computing by organizations..**

Keywords:Cloud Security,Community,Data Portability,Hybrid

I. INTRODUCTION

Cloud computing is considered service oriented rather than application-oriented. This Service oriented nature of cloud computing not only reduces infrastructure overhead and operating costs, but also provides flexibility and improved performance for end users. Security and privacy are the main concerns when adapting the cloud to data. This is very important for cloud services to ensure data integrity, privacy, and protection. To this end, several service providers use different policies and mechanisms, depending on the type, nature and size of the data. One of the advantages of cloud computing is the ability to share data between different organizations. However, this advantage itself brings risks to your data. To avoid potential risks to your data, you should protect your data store. Cloud security, also known as cloud computing security, is a collection of security measures designed to protect cloud-based infrastructure, applications, and data. These measures ensure user and device authentication, data and resource access control, and data protection.

II. LITERATURE SURVEY

In order to understand the basics of cloud computing and storing data securing on the cloud, several resources have been consulted. This section provides a review of literature to set a foundation of discussing various data security aspects. Over the past decade, cloud computing has played an important role. Cloud computing is a computing, software, data access, and storage service that does not require end-user knowledge of the physical location and configuration of the systems that provide the services. Cloud computing is the fastest new paradigm for delivering on-demand services over the Internet and can be described as Internet-centric software. Cloud computing represents a new add-on, consumption, and delivery model for IT services based on internet protocols, typically involving the provisioning of dynamically scalable and often virtualized resources. This is a by-product and result of access to remote computing sites served by the Internet. This often takes the form of a web-based tool or application that users can access through a web browser and use like a program installed locally on their computer. This document has covered all the basic concepts of cloud computing. Doing research in this area is very beneficial.

III. RELATED PROPOSED WORK DEPENDS ON EXISTING WORK

We can refer to the following topics on security in cloud computing. These are the trending Issues in security so we will do In Our Proposed work in the field.

Anomaly Classification in Multi-Cloud Dynamic Programming and Scheduling in Cloud.

Secure Multi-Party Computation by Agent. Cyber Security Threats Detection.

Secure Data Storage.

A.Data Modernization.

DDoS Attacks Detection. This clearly shows that there is a lot of room for future research in the area of cloud computing security. So we can count on us for complete research support. Here are some key points to include in your cloud computing security research proposal:

Research proposals on topics such as "Data Deduplication Security" should include the top threats to data deduplication. Your research goal itself is to overcome these threats. The threats to users in the case of data deduplication are: Cloud storage servers (encryption and decryption of data) Malicious users (getting sensitive data from sources) These threats are very easy to defeat with our expert guidance. we can do it. Grow your potential resource base with the large amount of reliable resources we provide. Our extensive performance in leading cloud security research projects means we have a wealth of ideas, resources, and advice for your research. Here, we elaborate on the research gaps in cloud security.

II. LITERATURE SURVEY

In order to understand the basics of cloud computing and storing data securing on the cloud, several resources have

been consulted. This section provides a review of literature to set a foundation of discussing various data security aspects. Over the past decade, cloud computing has played an important role. Cloud computing is a computing, software, data access, and storage service that does not require end-user knowledge of the physical location and configuration of the systems that provide the services. Cloud computing is the fastest new paradigm for delivering on-demand services over the Internet and can be described as Internet-centric software. Cloud computing represents a new add-on, consumption, and delivery model for IT services based on internet protocols, typically involving the provisioning of dynamically scalable and often virtualized resources. This is a by-product and result of access to remote computing sites served by the Internet. This often takes the form of a web-based tool or application that users can access through a web browser and use like a program installed locally on their computer. This document has covered all the basic concepts of cloud computing. Doing research in this area is very beneficial.

III. RELATED PROPOSED WORK DEPENDS ON EXISTING WORK

We can refer to the following topics on security in cloud computing. These are the trending Issues in security so we will do In Our Proposed work in the field.

Anomaly Classification in Multi-Cloud Dynamic Programming and Scheduling in Cloud.

Secure Multi-Party Computation by Agent. Cyber Security Threats Detection.

Secure Data Storage.

A.Data Modernization.

DDoS Attacks Detection. This clearly shows that there is a lot of room for future research in the area of cloud computing security. So we can count on us for complete research support. Here are some key points to include in your cloud computing security research proposal:

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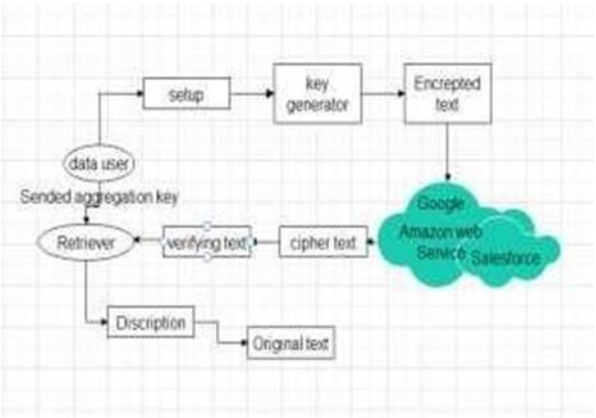

Fig.1. Overivew Of Cloud Computing

A. Amazon Web Services:

Amazon Web Services is an online platform that provides scalable and cost-effective cloud computing solutions. AWS is a widely used cloud platform that provides multiple on-demand operations such as compute power, database storage, and content delivery to help your business scale and grow.

B. Microsoft Azure:

Azure Firewall is a cloud-native, intelligent network firewall security service that protects cloud workloads running in Azure from threats. It is a fully stateful firewall-as-a-service with built-in high availability and unlimited cloud scalability.

C. Google:

Google Cloud Storage is an enterprise-grade public cloud storage platform for large unstructured datasets. Organizations can purchase storage for primary or infrequently accessed data. Storage customers can access data through a web browser or command line interface. Customers can also choose the geographic location where their data resides. Storage service within Google Cloud Platform. Provides a unified object store for live or archived data. Objects stored in Google Cloud Storage are grouped into buckets. A bucket is a container in the cloud that can be individually assigned to a storage class.

Salesforce Cloud:

Cloud computing technology allows users to access storage, files, software, and servers from Internet-connected devices (computers, smartphones, tablets, and wearables). Cloud computing providers store and process data separately from end users. Basically, cloud computing refers to the ability to store and access data and programs over the Internet instead of on your hard drive. This means businesses of all sizes can leverage powerful software and IT infrastructure to become bigger, leaner, more agile, and compete with much larger companies. Unlike traditional hardware and software, cloud computing helps businesses stay at the forefront of technology without making large investments in purchasing, maintaining, and servicing equipment

V. PURPOSE: SERVICES OF CLOUD SECURITY

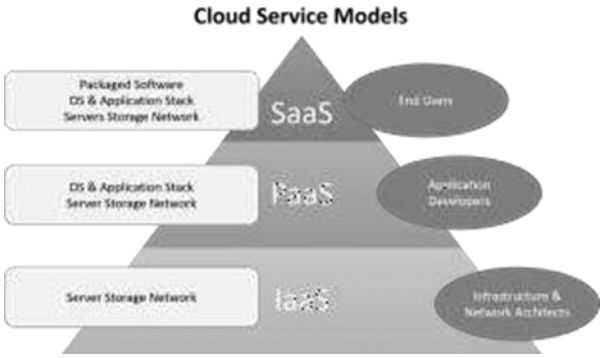

Fig.2. Services Provided By Cloud Computing Security

A. Application and Information clouds Software as a Service (SaaS):

The opportunity presented to consumers is to use the provider's applications running on cloud infrastructure. Applications can be accessed from a variety of client devices through thin client interfaces such as: Web browser. You have access to web-based email. Consumers do not manage or control the underlying cloud infrastructure such as networks, servers, operating systems, storage, or even individual application functions.

B. Development data clouds Platform as a Service (PaaS):

The ability provided to consumers is to deploy consumer-created or purchased applications built using providersupported programming languages and tools on cloud infrastructure. Consumers do not manage or control the underlying cloud infrastructure, such as networks, servers, operating systems, or storage, but they do control the configuration of deployed applications and, in some cases, the application hosting environment.

C. Infrastructure clouds computing Infrastructure as a Service (IaaS):

The functions provided to consumers are to provide processing, storage, networking, and other basic computing resources so that consumers can deploy and run any software, including operating systems and applications. Consumers do not manage or control the underlying cloud infrastructure, but they do control the operating system.

VI .DESIGN and ARCHIECTURE OF CLOUD SECURITY

While there are many security concerns associated with cloud computing, these issues fall into two broad categories: security issues faced by cloud providers and security issues faced by their customers.

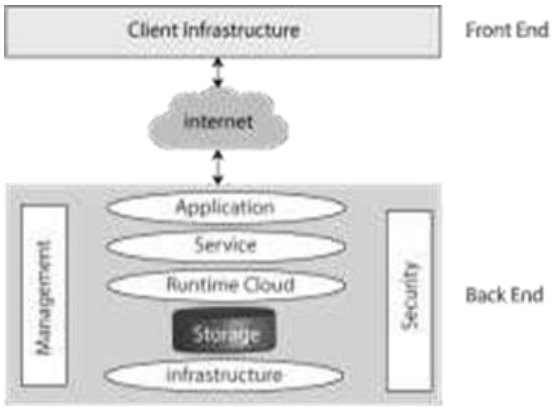

Fig.3.Architecture of Cloud Security

Providers now need to ensure that their infrastructure is secure and that their customers' data and applications are protected, but customers are responsible for ensuring that providers have appropriate security measures in place to protect that information. I need to make sure I'm taking it. Safety has always been paramount. A cloud security architecture is only effective if the right defenses are implemented. An effective cloud security architecture must be aware of the issues that arise in security management. Cloud Security Management addresses these security management issues. These controls are in place to protect against vulnerabilities in your system and to mitigate the effects of attacks. There are different types of controls behind any cloud security architecture, but they typically fall into one of the following categories:

A Deterrence Control:

These controls are put in place to prevent intentional attacks against cloud systems. Like fences and property warning signs, these controls do not mitigate actual vulnerabilities in your system.

B. Preventive Controls:

These controls increase the strength of the system by managing vulnerabilities. Proactive controls protect against vulnerabilities in your system. In the event of an attack, preventative controls are put in place to cover the attack and reduce damage and system security breaches.

C. Detective Controls:

Detective Controls are used to detect possible

attacks on your system. In a case of attack, detective control signals preventive or corrective control to address the problem.

VII. ADVANTAGES

The following are some of the major advantages of cloud computing: A.Elasticity:

Elastic nature of the infrastructure allows rapidly allocating and de-allocating massively scalable resources to business services on a demand basis.

B.Virtualization:

Virtualization is defined as decoupling and separation of the business service from the infrastructure needed to run it.

C. Cloud computing benefits are:

- Expand scalability

•Lower infrastructure costs

- Improve end-user productivity
- Improve reliability
- Increase security

VIII. DISADVANTAGES

Loss of control dependency.

CONCLUSION

We have identified several security risks related to cloud computing. Data manipulation and loss is one of the identified risks. Consumer trust, data offload, and associated risks are the key challenges identified in this SLR. This SLR identified commercial cloud service providers and highlighted the security issues faced during the deployment and implementation of cloud services. Cloud user trust is a challenge for consumers of commercial cloud service providers. In addition to the above issues, An data unavailability, inadequate security measures and vendors dependencies and the lack of interoperability and standards have been identified. Additionally, we found that Tweeter data were generated and used to evaluate the proposed Cloud Computing approach. This SLR found that researchers used little Facebook or Instagram And other Social media data to evaluate the proposed strategy. During Cloud Computing deployment and implementation, data security and privacy are concerns that cloud adopters must consider before using cloud services. A literature review supported our claims, and we propose to propose appropriate implementations of security policies and standards for cloud computing. that can be practiced and implemented in future work.

ACKNOWLEDGEMENT

These Research of Cloud Security For Securing data Using Technology. paper was partially supported and Gratefully Acknowledge received from Shri Sai College of Engineering And Technology, Dr. Babasaheb Technological University, Lonere India. I would like to show our Gratitude to Prof. L.N.Yadav HOD of CSE Department & Prof. N.B.Jiwane of Cse Department for Sharing Their Pearl of wisdom with us during course of this Research paper.

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A Review OnVirtualization in Cloud Computing

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Abstract – **Virtualization refers to the act of one thing as well as virtual laptop makes a unreal image of the storage space devices servers or network resources in order that they'll be used on multiple machines at a similar time. With the latest growth in cloud computing technologies, security of the info becomes necessary. it's Associate in Nursing modify technology allowing the look of Associate in Nursing intelligent abstraction layer that hides the density of underlying computer code or hardware virtualization technology that may build things easier operations yet as enable data Technology organizations to react quicker to dynamical business demands. It permits multiple virtual computers to run on prime of 1 physical computer and to share the hardware resources, like printers, scanners, and modems.**

This will increase the economical use of {the laptop\the pc} by low prices since only 1 physical computer is required and running. Cloud computing technology is one of the biggest milestones in leading United States to next generation technology and winning up business and data Technology field. It helps to rise higher than the matter for the loss of information, accessing knowledge whenever needed and knowledge security. This technology is especially service familiarised and focuses on reduction in low value, hardware reduction and pay just for service conception.

Keywords: Virtualization, Cloud Computing, VM, Data security

I. INTRODUCTION

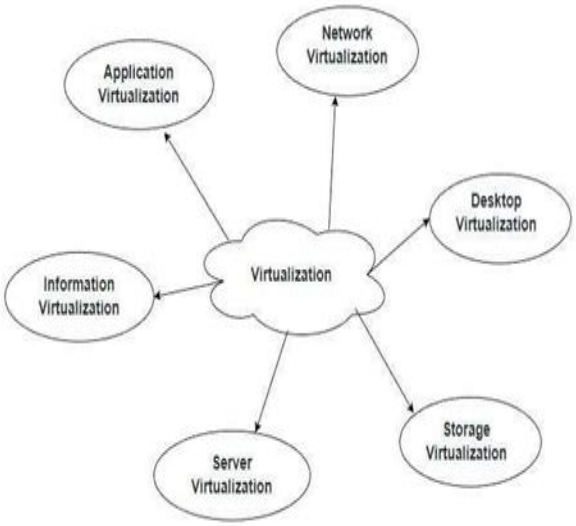
Virtualization is that the growing technology within the IT world. it's getting used by a growing variety of organizations to merge their workloads, to form their IT surroundings ascendable and a lot of versatile.

In computing, virtualization is that the creation of a virtual quite than real report of a resource or device, sort of a server, associate software package, a memory device or network. It simply provides high accessibility for important applications also as streamlines application use& migrations. It has the aptitude to run multiple virtual machines on a specific a part of hardware.

The hardware runs code which allows you to line up multiple in operation systems that square measure ready to run at the same time and severally, in their own secure setting, with token reduction in performance.

Cloud computing technology is predicated on 3 types- grid computing, utility computing and automatic computing. All the information is hold on on the servers and may be accessed just by authenticate with the assistance of the net any place within the world. Apple, Google, Microsoft, etc. square measure the most important cloud service suppliers offer terribly massive storage to its users and creating the work easier.

II. TYPES OF VIRTULIZATION



a) Application Virtualization: Application virtualization helps a user to possess remote access of Associate in Nursing application from a server. The server stores all personal data and different characteristics of the appliance however will still run on a neighborhood digital computer through the net. Example of this is able to be a user World Health Organization must run 2 completely different versions of a similar computer code. Technologies that use application virtualization area unit hosted applications and packaged applications.

b) Network Virtualization: The ability to run multiple virtual networks with every features a separate management and information set up. It co-exists along on high of 1 physical network. It may be managed by individual parties that probably confidential to every different. Network virtualization provides a facility to form and provision virtual networks—logical switches, routers, firewalls, load balancer, Virtual personal Network (VPN), and employment security among days or maybe in weeks.

c) Desktop Virtualization: Desktop virtualization permits the users' OS to be remotely keep on a server within the information centre. It permits the user to access their desktop just about, from any location by a special machine. Users World Health Organization wish specific operational systems aside from Windows Server can got to have a virtual desktop. Main edges of desktop virtualization area unit user quality, movability, simple management of computer code installation, updates, and patches.

d) Storage Virtualization: Storage virtualization is Associate in Nursing array of servers that area unit managed by a computer memory system. The servers aren't attentive to specifically wherever their information is keep, and instead operate additional like employee bees

in a very hive. It makes managing storage from multiple sources to be managed and utilised as one repository. storage virtualization computer code maintains sleek operations, consistent performance and a nonstop suite of advanced functions despite changes, break down and variations within the underlying instrumentality.

e) Server Virtualization: This is a form of virtualization within which masking of server resources takes place. Here, the central-server(physical server) is split into multiple completely different virtual servers by ever-changing the identity variety, processors. So, every system will operate its own operational systems in isolate manner. wherever every subserver is aware of the identity of the central server. It causes a rise within the performance and reduces the budget items by the readying of main server resources into a sub-server resource. It's useful in virtual migration, scale back energy consumption, scale back infrastructural value, etc.

f) Information virtualization:

This is the sort of virtualization within which {the information|the info|the data} is collected from varied sources and managed that at one place while not knowing additional concerning the technical information like however data is collected, keep & formatted then organized that information logically in order that its virtual read may be accessed by its interested folks and stakeholders, and users through the assorted cloud services remotely. several huge big corporations area unit providing their services like Oracle, IBM, At scale, Cdata, etc

III. CHARACTERISTICS OF VIRTUALIZATION

Virtualization offers many options or characteristics as listed below: –

a) Distribution of resources: Virtualization and Cloud Computing technology guarantee end-users develop a singular computing setting. it's achieved through the creation of 1 host machine. Through this host machine, the end-user will limit the amount of active users. By doing thus, it facilitates straightforward of management. they will even be wont to bring down power consumption.

b) Accessibility of server resources: Virtualization delivers many distinctive options that guarantee no would like for physical servers. Such options guarantee a lift to period, and there's less fault tolerance and availableness of resources. Resource Isolation: Virtualization provides isolated virtual machines. every virtual machine will have several guest users, and guest users may be either in operation systems, devices, or applications. The virtual machine provides such guest users with associate degree isolated virtual setting. This ensures that the sensitive info remains protected, and, at similar time, guest users stay inter-connected with each other.

c) Security and authenticity: The virtualization systems guarantee continuous period of systems, and it will automatic load reconciliation and ensures there's less disruption of services.

d) Aggregation: Aggregation in Virtualization is achieved through cluster management computer code. This computer code ensures that the uniform sets of computers or networks area unit connected and act united unified resource.

IV. POSITIVE EFFECTS OF VIRTULIZATION SECURITY

a) Granular Access Control: IT groups and admins have way more management over network access than with a access hardware-based infrastructure. groups will use micro-segmentation techniques to grant user access to specific applications or resources at the employment level.

b) Application Isolation: A key security advantage of virtualization is that the ability to isolate applications from each other on the network. Keeping apps isolated will defend information from being shared across them, or from malware or viruses which will have infected alternative components of the system. Isolation is usually accomplished via containerization and sandboxing.

c) Increased management Over Desktop and Application Updates: operative systems (OSs) and applications ar perpetually surfing security patches, however your workers may not be maintaining with these updates on their devices. By virtualizing desktops, it'll have full management to confirm OSs and applications ar updated.

d) Virtual Machine (VM) Isolation: Running many virtual machines on one server permits for a high level of isolation. If security is compromised inside one server, this separation provides protection for the opposite virtual servers. Network Isolation and Segmentation: freelance workloads or apps on a network is divided and shared across metameric virtual networks that ar isolated from one another. This ensures that data and access aren't shared across the complete network

e) Hypervisor Maintenance: Hypervisors that make and run VMs usually need fewer resources than hardware-based solutions, giving them a smaller attack surface. Plus, hypervisors typically update mechanically.

V. ADVANTAGES OF VIRTUALIZATION

- Virtualization offers many edges, like it helps in price reduction and boosting productivity towards the event method.
- It will away with the requirement to possess a extremely advanced IT infrastructure.
- It facilitates remote access to resources and ensures that it promotes quicker quantifiability.
- It is extremely versatile, and it permits the users to execute multiple desktops in operation systems on one commonplace machine.
- It removes the risks concerned in terms of system failures, and it conjointly boosts versatile knowledge transfer between completely different virtual servers.
- The operating method in Virtualization is very efficient and agile, that ensures that the users work and operate most economically.

VI. DISADVANTAGES OF VIRTUALIZATION

- The transition of the prevailing hardware setup to a virtualized setup needs an intensive time investment, and thence this will be thought to be a time-intensive method.
- There is a scarcity of availableness of good resources that helps in terms of transition of existing or actual setup to virtual setup.
- Since there's a limitation in terms of getting less good resources, the implementation of Virtualization necessitate high-cost implementations.
- If the transition method isn't handled meticulously, it conjointly poses a security risk to sensitive knowledge.

VII. VIRTUALIZATION AS AN INSPIRATION OF CLOUD COMPUTING

In cloud computing, Virtualization facilitates the creation of virtual machines and ensures the graceful functioning of multiple in operation systems. It conjointly helps produce a virtual scheme for server in operation systems and multiple storage devices, and it runs multiple in operation systems.

Cloud Computing is known as associate degree application or service that involves a virtual scheme. Such associate degree scheme may be of public or non-public nature. With Virtualization, the requirement to possess a physical infrastructure is reduced. The terms Cloud Computing and Virtualization area unit currently getting used interchangeably, and that they area unit being unified quickly.

Virtualization and Cloud Computing work hand in hand to make sure that you simply can get advanced and complex levels of computing. It ensures that applications is shared across multiple network threads of various enterprise and active users.

VIII. ROLE OF VIRTUALIZATION IN CLOUD COMPUTING

In Virtualization, a smart or proper noun is aligned with the physical server. The pointers area unit then directed towards that physical server, that is finished on demand. Virtualization facilitates the execution of applications that area unit uniform.

It conjointly provides a virtual and isolated networking, storage, and memory space setting. The Virtualization is achieved through a number machine and guest machine. a number machine is outlined because the machine on that a virtual machine is developed, and also the virtual machine thus developed is termed as a guest machine.

Hardware virtualization plays a essential role by delivering infrastructure as a service answer most expeditiously and effectively below a Cloud Computing method.

This type of Virtualization ensures movability. The guest machine is prepacked as a virtual instance of a picture, and such virtual pictures is removed simply as and once the requirement arises.

IX. CONCLUSION

To have each physical and not real controls within the surroundings of cloud computing one should keep information by implementing robust encrypting techniques victimisation protected connections and be valid information loss rejection policies. Right of entrance management policies square measure to be recognized and shopper identity square measure to be checked. information middle platforms, communications and shopper devices square measure to be safe by trustworthy laptop policies. permit safe migration from non-public cloud surroundings to public cloud suppliers. while not virtualization, cloud computing is accomplishable however it'll be inefficient and hard. It provides flexibility, quantifiability and low value benefits to cloud computing. There square measure several levels and many types to implement virtualization.

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Review Paper on Network Security

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Abstract – **: Network security has become major crucial to personal computer users, bureaucratic, and the services. With the arrival of the internet, security became a crucial anxiety as well as the past of security approve a better understanding of the disclosure of security technology. The internet complex itself allows for many securities risks to happen. If the architecture of the internet is adapted, it can bring to the possible attacks that can be sent over the network. Aware the attack methods allow us to emerge with proper security**

Keywords: Firewall, Threats, Network Security, Network Security Architecture.

I. INTRODUCTION

The world is fetching more interconnected due to Internet and new networking technology. There is a big amount of personal, commercial, military, and government data on networking infrastructures worldwide. Network security is fetching of greatest importance because of intellectual property that can be easily developed through the internet. There can be breach in intellectual property. Network Security defends your network and data from breaches, intrusions and additional threats. This is a huge and overarching term that describes hardware and software solutions as well as procedures or rules and configurations relating to network use, accessibility, and overall threat protection.

II. NETWORK SECURITY

Network Security keeps your network and data since breaches, intrusions and other threats. This is a huge and overarching term that describes hardware and software solutions as well as procedures or rules and configurations relating to network use, accessibility, and overall threat protection.

Network Security contains access control, virus and antivirus software, application security, network analytics, types of network-related security (endpoint, web, wireless), firewalls, VPN encryption and more. System and network technology is a key technology for a extensive variety of applications. Networks and applications essential security. While, network security is a serious requirement, there is a significant lack of security systems that can be implemented easily.

III. NETWORK SECURITY ARCHITECTURE

Networks essential have security embedded into their very design. A network security architecture provides a basis for an organization's cyber defences and helps to protect all of the company's IT assets. Now, we debate the components of a network security architecture, how it benefits businesses, and dissimilar models for generating a secure network architecture.

Elements of a Network Security Architecture

A network security architecture contains both network and security elements, such as the subsequent:

- Network Elements: Network nodes (computers, routers, etc.), communications protocols (TCP/IP, HTTP, DNS, etc.), connection media (wired, wireless), and topologies (bus, star, mesh, etc.).
- Security Elements: Cybersecurity devices and software, secure communications protocols (e.g., IPsec VPN and TLS), and data privacy technologies (classification, encryption, key management, etc.).

The Purpose of a Network Security Architecture

A well-designed cybersecurity architecture allows businesses to keep resiliency in the face of a cyberattack or a disaster of one or additional components of their infrastructure. The architecture should be enhanced for daily use through normal business operations and make the company to handle reasonable bursts, spikes, or surges in traffic and to properly manage potential cyber threats to the organization.

The labels a process for developing a network security architecture that contains four primary phases:

- Assess: This phase of the procedure is for business and architecture reviews. The key phases in this phase include data capture, business modelling, and risk assessments.
- Design: This phase is proposed to develop a response to the requirements and to build customized logical design blueprints and approvals.
- Implement: This phase is for professional services, partners, etc. to enhance low-level design specifics and deliver statement-of-works for real-world solutions.
- Manage: This phase is pitched towards continuous development and incremental improvements of the security posture.

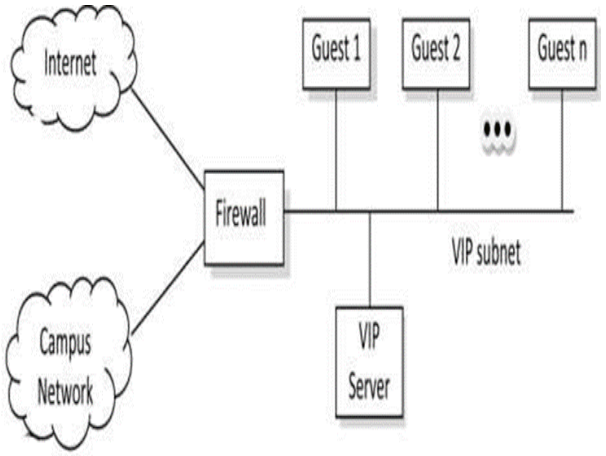

Fig.: Network Security Architecture

IV. FIREWALL

A Firewall is a network security device that monitors and filters incoming and outgoing network traffic founded on an organization's previously recognised security policies. At its maximum basic, a firewall is essentially the barrier that sits between a private internal network and the public Internet. A firewall's key purpose is to agree non-threatening traffic in and to possess dangerous traffic out.

The Different Types of Firewalls

There are numerous types of firewalls, and one of the major tasks that companies face when trying to protected their sensitive data is finding the right one. First off, a firewall – a network firewall – is a network appliance designed to express and enforce a perimeter. They can be organised at the connection between an organization's internal network and the public Internet or internally inside a network to perform network segmentation.

Hardware Firewalls: These firewalls are executed as a physical appliance deployed in an organization's server room or data centre. While these firewalls have the benefit of running as "bare metal" and on hardware designed specifically for them, they are also embarrassed by the limitations of their hardware (number of network interface cards (NICs), bandwidth limitations, etc.).

Software Firewalls: Software firewalls are executed as code on a computer. These firewalls contain both the firewalls built into common operating systems and virtual appliances that contain the full functionality of a hardware firewall but are implemented as a virtual machine.

Cloud Firewalls: Organizations are gradually moving serious data and resources to the cloud, and cloud-native firewalls are designed to follow suit. These virtual appliances are explicitly designed to be deployed in the cloud and may be accessible as either standalone virtual machines or as a Software as a Service (SaaS) offering.

Individually of these different firewall form factors has its advantages and disadvantages. While a hardware firewall has contact to optimized hardware, its abilities can also be constrained by the hardware it uses. A software firewall may have a little lower performance but can be easily updated or extended. A cloud firewall, but, takes advantage of all of the profits of the cloud and can be deployed near to an organization's cloud-based properties.

V. THREATS

Information Security threats can be several like Software attacks, theft of intellectual property, identity theft, theft of equipment or information, sabotage, and information extortion.

Threat can be whatever that can take benefit of a vulnerability to breach security and negatively alter, erase, harm object or objects of interest.

Software attacks resources attack by Viruses, Worms, Trojan Horses etc. Numerous users believe that malware, virus, wombats are all similar things. But they are not similar, only similarity is that they all are malicious software that acts differently.

Malware is a combination of 2 standings- Malicious and Software. So, Malware essentially means malicious software that can be an intrusive program code or anything that is designed to perform malicious operations on system.

Types of security threats

The NIST definition above conditions that a threat can be an event or a condition. An incident, in this case, also contains natural disasters, fire, and power outage. It is a same general concept. In cybersecurity, it is extra common to talk round threats such as viruses, trojan horses, denial of service attacks.

Phishing emails is a social engineering threat that can reason, e.g., loss of passwords, credit card numbers and further sensitive data. Threats to information properties can cause loss of confidentiality, integrity or availability of data. This is likewise known as the CIA triad.

The CIA triad, together with three other well-known security concepts, is the origin for the STRIDE threat model. When listing possible threats, it is convenient to use an existing classification as a starting point. STRIDE is the most recognised classification, proposed by Microsoft in 1999. The name comes from the initial letters of the dissimilar categories, which also kinds it easier to recall them.

VI. CONCLUSION

Network security is a significant field that is increasingly gaining attention as the internet expands. The security threats and internet protocol were analysed to determine the necessary variations in security technology. The security technology is frequently software based, but many common hardware devices aroused. The current development in network security is not very remarkable.

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Smart College Campus Enabled with IoT: For E- Campus Environment

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Abstract – **Technology used like IoT increasing day by day in today's world. This article put a light on what is meant by E-campus Environment. How it is useful for student and teachers to enables campus from anywhere. By operating during this manner access and communication with the various type of gadgets and devices like camera, audio recorder, sensible watches, google glass, digital broad displays, sensors …. etc. The IoT will nurture the development of learning circumstance that make use of the large subject Information generated by those objects to provide dynamic services to lecturers, learners and even to contain developers in trendy field, sensible field permits us to North American country IoT methodologies to create it accessible for room notes everyplace within network space our objectives. Square measure to create simply shareable notes share victimisation web-based environment s/w which permit North American country to share via IoT enabled to accesses among network limit. We and to don't have any IoT enabled resources in school and university campuses for this purpose thus far in learning setting.**

Keywords: IoT, E-Campus, Sensors, Camera, Audio recorder, Sensible watches etc..

I. INTRODUCTION

Internet of Things (IoT) may be a new communication paradigm that refers to and envisions the concept of connecting everyday are assembled with microcontrollers, transceivers to support communication. they're con Fig. with protocol stacks that will understand the interaction of the objects with each other to arrive at common objectives while not the intervention of humans. Thus, IoT makes the web a lot of immersive and pervasive [1-5]. This paradigm offers a platform for sensors and devices to speak seamlessly among a wise environment and supports data sharing across platforms during a convenient approach [6]. The strength of this paradigm comes from the actual fact that it's interacting with a wide range of devices like drones, robots, security alarms, surveillance cameras, observation sensors, actuators, household appliances, sensible vehicles, workplace instrumentality, displays, power generation systems, heating and air conditioning systems, etc., that generates huge knowledge to provide new service to folks and company bodies [1-2].IoT can be applied to many domains, such as, industrial automation, mobile care, care observation and assistance devices, medical aids, home automation, smart grids, automotive, intelligent energy management, elderly assistance, water and waste management, traffic management, among others [1-2][7]. Smart field is a crucial analysis direction in urban IoT. this is often as a result of on paper a field may be a settlement. Therefore, the applying of IoT to sensible field provides valuable insight for the applying of urban IoT [1]. This concept is in gear towards developing a field that utilizes resources expeditiously, delivers top quality services to the campus community with extremely reduces operational prices. Furthermore, sensible field provides the subsequent further benefits: 1) provision of interactive and inventive setting for students and school members, 2) provision of secured payment systems, 3) provision of clear pick systems,4) promotion of sensible energy management, 5) giving of Realtime incidence warnings and effective police investigation systems, 6) provision of machine-driven maintenance and business processes, and 7) maintenance of economical parking and access control management, etc. [1]

This paper may be abstract paper on net of Things (IoT) for sensible field. It shows the applications of IoT to smart field, the usage of IoT on sensible field and provides the open challenges facing IoT for sensible field whereas proffering the potential approach forward out of those challenges.

This paper is organized as follows: half II examines sensible campus construct and services, half III provides sensible field architecture, half IV shows the open challenges facing IoT for smart field and provides the approach forward, and half V ends the paper with a conclusion.

II. SMART CAMPUS SERVICE

The services we can provide to the smart campus include all the facilities in campus is available to everyone. The effects of the services delivered is not restricted to only academics or the academia, but also to environmental, financial, and social areas of the campus [1]. IoT for smart campus is inevitable. A typical smart campus incorporates the following: smart grid, water and waste management, learning environment, intelligent buildings, parking, transportation and traffic, business processes, location services, safety and security, housing and dinning, social and sports activities, health and fitness, and special needs services, etc.

A. Smart learning

Smart Learning Environments seeks tutorial articles on the problems associated with the reform of the ways in which of teaching and learning through advancing current learning environments towards good learning environments. It provides opportunities for discussions and constructive dialogue among varied stakeholders on the restrictions of existing learning environments, would like for reform, innovative uses of rising pedagogic approaches and technologies, and sharing and promotion of best practices, resulting in the evolution, style and implementation of good learning environments.The aim of the journal is to assist varied stakeholders of good learning environments higher perceive different |one another}'s role within the overall method of education and the way they will support every other.

B. Smart Governance

IoT improves the internal and external efficiency of the university campus governance. It enables the campus community (staff and students) and other relevant persons to access official documents and policies. IoT ensures that public services work efficiently and enable the monitoring and managing of public safety. It helps in responding quickly and effectively in emergency situations on campus. IoT enables e-governance and transparency in governance on campus.

C. Water and Waste management

Using IoT, waste and water management, 2 essentials, but costly services rendered by a university to its community, will be price effective. previous analysis within the space of waste management suggests the planting of sensors at waste bins, and waste trucks for the gathering of period data for analysis will enhance sensible waste management.Sequel to the analysis, the system can recommend clean-up schedules that area unit higher. it'll additionally recommend a cost-effective and higher route for waste contractors. in line with the authors, this method was efficient as compared to the traditional waste management methodology [1] [16-18]. Another space wherever IoT has verified to be helpful is in water management. Its application will increase potency and productivity.It automates knowledge assortment and manages and coordinates several alternative subsystems [1][19]. additionally, a user-centric sensible water management system that monitors consumption and analyses collected knowledge and presents results graphically for improved readability [1][20]. this sort of system may be enforced on field to produce users with data regarding water consumption. moreover, a description was fabricated from a property model for sensible metering devices and therefore the associated network. The experimental project was double-geared towards building a metering device that's property [21]. There was another experiment on water management system. It targeted on the observation of water distribution on a medium field scale victimisation ultrasonic water level sensing element to live water levels and communication network. although the gathered knowledge was for short term observation, the observation system showed results.

D. Energy Consumption

Along with air quality observance service, IoT can be utilized to watch the energy consumption of a complete campus. this permits field authorities and community to get a transparent and careful read of the quantity of energy required by the various services (public lighting, transportation, traffic lights, management cameras, heating/cooling of buildings, etc.) Thus, this makes it potential to spot the most energy consumption sources and to line priorities so as to optimize their behaviour. so as to get such a service, power draw monitoring devices should be integrated with the ability grid in the field [2]. as an example, the sensors square measure to blame for checking all the occasions that emerge in their current circumstance and causation the info to a capability framework.

The framework stores the info during a personal cloud wherever all the information is handled and altered to introduce quality information for the subsequent stage [56]. The large information architecture is answerable for selecting and analyse the info,through analysis method, it provides the grounds the knowledge important to make a decision. As an example, on a hot day, the sensor framework screens the temperature and also the atmosphere of every one of the school rooms [56]. A mixture of current technologies with property and environmentally friendly resources along will solely act because the catalyst to reshape the present academic institutes by the construct of good cities in general and good field especially

E. Smart Parking

IoT are often utilised to dramatically modification the approach cars are parked on field to a wise parking one. The good parking service is predicated on road sensors and intelligent displays that direct motorists on the most effective path for parking within the field [2][24]. This service results in a quicker time to find a parking slot and this suggests a fewer carbon-dioxide emission from a happier field community and guests. what is more, by victimization short-range communication technologies, like frequency permits in slots reserved for field residents or disabled hence providing an improved service to the field community, dwellers and guests that may lawfully use.A proof-of-concept system that uses unbearable sensing technology and info system employed in distribution parking spots to students living in dorms supported their preference was implemented in KFUPM [1][25]. this method, however,works just for cars that are pre-known. this is often as a result of the system needs that car and drivers' data are keep in the info.

III. ARCTITECTURE OF SMART CAMPUS

The proposed model is composed of sensors and actuators which is embedded for campus environment monitoring and control management, smart services platform, data integration, intelligent guideline and service applications, etc. Smart campus system integrates hardware and software devices also cloud storage is responsible for store collected data from sensing devices.Smart field design. We imagine that the engineering of good field visible of IoT is made out of 3 level of process that are Trace, Knowledge and Application. The design underneath these three processes composed four completely different layers, i.e., sensing and interconnecting layer, information layer and repair layer.

IV. OPEN CHALENGES AND FUTURE DIRECTION

The realization of IoT networks is faces with 2 main challenges: initial, the IoT novelty and heterogeneous nature portend some technical difficulties thanks to the dearth of best practices; second, the dearth of approved and complete business model that encourages investment additionally presents some business difficulties [1][31-

32]. what is more, the good field implementation is featured and challenged by 3 forms of obstacles, namely,technical, money and political. These challenges area unit almost like those faces by good town implementation [1-2][34].Technical: Barriers during this perspective include: interoperability, standardization and configuration, privacy, security and safety [1][35]. Any technology that may be adopted for the promotion field services should be safe for public use on field. The usage of low energy devices, intensive communication, and therefore the heterogeneous field environment makes meeting the safety and privacy requirements for good field somewhat tough. On the other hand, the ability and standardization in an exceedingly heterogeneous setting just like the field leave the evaluation and comparison of devices, competition between manufacturers, promote the introduction of the device into the campus scheme, and ultimately maximize the advantages of all user groups within the field [1]. However, the adoption of IoT on field can cause the employment of a whole bunch and even Configuring manually is a colossal burden. Hence, there is the need for thorough investigation of latest ways in which machine-driven configuration of IoT devices [1][36-37].Financial: With relevancy money barriers, the limitation the economy of the globe and therefore the shrinking investments in public services hinders good field markets coming back into fruition and reality, regardless of immature experiences encountered up to now. a transparent business model is lacking. However, a potential reply of the challenge is to initial development those services that conjugate social utility with terribly clear come on investment such good building and good parking. this may act as a catalyst for different intercalary values services [1-2].Political: potential obstacle is occasioned by the attribution of higher cognitive process power to the various stakeholders [2]. Even though political obstacles might not be as powerful as financial and technical barriers as a result of the decision maker of the university will in most cases resolve such crises as they present themselves, it's all the same a challenge. the dearth of collaboration between completely different departments and faculties, the business method re-engineering, and therefore the opposition of antitechnology staff similarly as official red tapes area unit potential obstacles and challenges that require to be resolved [1].

V. CONCLUSION

IoT provides a platform for sens (objects) to interface and communicate seamlessly inside a smart field setting. It allows a convenient sharing of information across platforms. additionally, wireless technologies and therefore the opportunities offered by the web technology places IoT because the next revolutionary technology. IoT provides varied edges for a wise field through the integration of intelligent systems like good offices, smart buildings, good parking, good water and waste management, good control, good care, and smart energy consumption, etc., inside a wise field environment [6] [3940]. to form keen good field services, it's basic to interrupt {the different |the varied} between various real factors, completely different service supplier and various information sources [57].within the in the meantime, field will utilize their advanced framework to convey completely different applications and administrations that raise life on grounds. Once the field has connected gadgets, sensors, applications and investigation over a typical framework, they can counter like means finding and site primarily based services, good parking and traffics, associated lighting and building management frameworks, and the sky is that the limit from there secure and safer with associated intelligence operation cameras, savvy locks and edge controls. controls to diminish power and water utilization consumption sensors and grounds framework to preserve power and reduce carbon impression.This paper mentioned conceptually the web of Things (IoT) for good field. It examined good field construct and services, and provided potential good field architecture. It showed the applications of IoT to good campus, and IoT usage on a wise field setting. for college kids and employees in good field, these varieties of Smart field applications raise the scholastic involvement in effective ways in which. Students will learn and educators will instruct within the means that's best for them. field would a lot of be ready to effectively exploit of the universe of knowledge and fingertips and alter them to search out new voices and bits of information that they ne'er approached.Students in associate degree assortment of subjects will utilize information from their own specific lives and conditions to make their course work a lot of important, fascinating and locks in. what is a lot of, with universal movability and network, students would a lot of be ready to effectively incorporate examination and cooperative work into their lives and reinvest time that typically could are lost. The paper additionally provides some open challenges facing IoT for smart field and additionally offered some potential means forward.

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Social Media: Impact And Changing Communication Patterns

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Abstract – **: Given the pace, at which we are encountering new media as a democratic means of communication, the prospect of NICs being the most indispensable part of our lives is not far away. From this perspective, the paper attempts to study the changing communication patterns of the 21st-century tech-savvy generation. It has been claimed that new media has brought sea changes in intrapersonal, interpersonal, group, and mass communication processes and content. Once upon a time, traditional media was setting the agenda of public discourse observing forward to new media for breaking news. In the absence of a proper content regulatory authority, new media is diminishing the gatekeeping function in media, making it more participatory yet less authentic in content. In the virtual world, youth is existing a virtual life rather than proper life. The paper explores how new media is redefining social roles that are more vulnerable to dissolution as interpersonal communication is scheduled on public platforms. In the crowd of hundreds and thousands of friends on social media, youths find themselves alienated from the real world. The author concludes that in the age of announcement, a new kind of social order is being developed, establishing public and mass communication but weakening interpersonal communication. The next part of the thing is dedicated to the clarification of the elementary ideas of social media studies, emphasizing such concepts as new media, new new media. And The paper will observe how the use of social media has presented uncertainty in channels of communication and its influence on organizations. The paper will also discourse the implications of the occurrence of social media and discourse on the properties it has had on the excellence of organizational communication management.**

Keywords: Reasons of social media is effective, communication levels, communication studies, Communication Management..

I. INTRODUCTION

What's an app? Follow me on Twitter! Check my status on my Facebook page! These are the buzzwords of today's age group. In the age of Material and Communiqué Knowledge, whosoever is ignorant of these relations is considered illiterate or outdated. Once obsessed with capital-intensive mass broadcasting technologies expansion developers over and above publicists are finding new means and tools to reach out to their tech-savvy target audience. Educators are engrossed in new means to use the updated technology in their classrooms. In an age when there are one billion users interconnected through Facebook, this is one of the most influential participatory mediums of communiqué. In this situation, whosoever is cultured and is having means to use this humble knowledge can't overlook it.

In India, the number of people actively using Social Media is about 467.0 million but then it is growing faster with the availability of cheaper broadband connections and internet-enabled handsets at actual short prices. Social media is transforming the contours of social attraction. Sentiments like love, bond, household attachment, familiarity, also language are finding various platforms and forms of expression. No other media has become so popular in such a short period as social media. Credit for this tremendous success goes to the user-friendly features of Social Media.

The next part of the thing is dedicated to the clarification of the elementary ideas of social media studies, emphasizing such concepts as new media, new new media. And remaining part is about Social Media and Communication Management and Opportunities of Social Media.

II. REASONS OF SOCIAL MEDIA IS EFFECTIVE

If you have slightly doubted whether non-social media is basically an objective flash in the pan or the upcoming internet advertising before remain reading. Nowadays, if you've previously made your mind up about social media don't abandon ship. You might discover that there's more than meets the lens.

A. Meets Human Needs: People want communication and joining with other people. This is the core goal why social media has become so popular over the last decade. Through social media, brands can generate chances to stake and distinguish faithful supporters with higher recompenses and inducements. These movements kind clients a sense of superiority and it displays to them that they're treasured by the product. Thus, how does this translate into the screening that social media is effective? Well, unique recognition and preferred treatment stayed detected by Hitwise in 2009 during Black Friday holiday shopping festivities. This study revealed that 4.3% of Facebook operators and 2.3% of Twitter users made an online official visit to the main vendor after they visited their social media site.

B. Cost-Effective Marketing: Social media isn't free, but it is significantly cheaper than traditional advertising methods, which don't include feedback from people regarding their personal experiences. Mayhap this is why design media has been anguish completed the previous rare years. Newspaper revenue has fallen 26% during the past year bringing the total loss since 2006 to 41%. Formerly there was the publishing business which said 367 U.S. journals nearby up shop and stop all production. Not nearly as bad as the more than 500

publications that so-called its daytime in 2008. The uncertainty of outdated publicizing has twisted consumers into skeptics. Fortunately, the Internet makes it easy to read up and review just about anything and everything before committing to purchase, subscribe, or otherwise. Online advertising is definitely more affordable and it allows for more targeted reach. Combine that with a brand's social media attendance and people can investigate what others are proverb about a brand very rapidly, positive they can query them unswervingly for supplementary material

C. Builds Brand Loyalty: Based on 2009 data testified from comScore and GroupM search, social media plays an imperative role in paid and organic search. Click Through Rates (CTR) increase by 50% when consumers are unprotected from a brand's social media profile. Additionally, when a consumer has been obtainable with a brand's social media movement the study discovered that they're 2.4 times more likely to click on organic links to the brand's site. Using this research, you can see how social media directly underwrites building brand appreciation and loyalty. Knowing that social media can have a helpful result on the bottom line is one more reason for businesses to integrate a social media movement into their marketing efforts.

III. IMPACT ON VARIOUS COMMUNICATION LEVELS

When the telegram was invented, the importance of pigeon couriers started undermining. In the same way, when television arrived in the communication foray, radio went backstage. History of communication demonstrates that when any innovative intermediate arrives on the communication stage it affects the communication patterns of the world.

A. Intrapersonal communication: Social media has become an imperative tool for self-expression and self-presentation. Whatever we think is important we are collaborating with others. Be it a birthday party, marriage ceremony, outing, dinner, or level shopping. This expression to build an image in the eyes of others is foremost to narcissism. We want to project we are existing the best life irrespective of realism we keep on posting actual, created, or edited pictures of ourselves and our surroundings. The desire for self-gratification is foremost to peer pressure. The desire for placement and inspection comments after every moment is the creation of youth addicted to social media. The presence and affordability of smartphones are catalyzing this phenomenon of addiction.

B.)Group communication: In the past, there used to be only just 15-20 friends a person with whom he used to interact regularly, but with the development of social media, the number of friends whose updates one can have is running into hundreds. Something that was joint amongst friends in the internal circle, the very information gets disclosed instantly. Earlier relationships were maintained in secrecy and breakups were having silent tones. With changing society has an ongoing commitment to Facebook and that commitment is cracked in Facebook the situation. Previously these all were a matter of embarrassment and people used to hide such instances. Today people announce them on Facebook with elaboration. Now the concept of Interpersonal communication is fading as people have created many groups on Facebook. Anything and everything is communicated among all the group members.

C.)Public communication: Indian TV channels have underway election movements on TV freshly. But Narender Modi became the first leader who effectively connected with its youth voters on the Internet. He gave a live chat on Google Plus that attracted youth and middle-class net users. Not only is he a lively user of social networking sites he tells the ability of new media and how to use it in its favor while molding the opinion of the masses. Nowadays when there is a boundary between innovative and outdated media, politicians have an ongoing thought of the reputation of being present in new media. Altogether the main political parties and leaders have their Facebook pages and they keep on positioning their messages on Twitter.

d) Mass communication: In comparison to the age of mass communication which is more than four centuries old, social media is in Its infancy. Despite this fact, it is influencing traditional mass media in every aspect – programmed formats, content, treatment, and language. Most of the large newspapers, TV channels, and radio channels display the content of prevalent social networking sites Facebook and Twitter to get the newest apprise happening around the world. The 24X7 inform of information on numerous news sites is giving enormous competition to outmoded media.

IV. SOCIAL MEDIA AND COMMUNICATION STUDIES

The current chapter is dedicated to the explanation of a few important ideas in the field of modern communication studies, such as new new media (the repetition of the period is non a typewriting error here) by means of Paul Levinson, the network society the Facebook philosophy.

A. The new media: New media likes five individual characteristics: digitality – dematerialization of media transcript; converging – new media converges the forms and, purposes of information, media, electronic communication, and electronic computing; interactivity - liberty in manufacturing and repeating the contented and form of the information during the interaction; hyper textuality - new life experience for human beings, which in turn will lead to the transformation of economic events, educational patterns, interactional flairs, and other aspects of humanoid society; virtuality –formation of virtual communal that marks all the limitations of a humanoid society absolutely will task the way we observe truth and have usually defined identity.

B. The new new media: The idea, planned by Paul Levinson in his book "New new media" at the opening sight may seem a tiny puzzling, still, the author highlights that it bears a superior significance, that is, in terms of the new modes and tackles of communication that include

interactivity and mutuality (in this logic it can be associated to McLuhan's beginning of cool media), they have looked within the last five years and they are newer than traditional new media in the method of email and Web sites. What are the elementary underlying moralities of the new new media? Let us remark on some of them: (1) Every consumer is a producer. (2) Non professionalism. (3) The free choice of medium.

(4) Free of charge. (5) Competition and compatibility. (6) The social character.

V. SOCIAL MEDIA AND COMMUNICATION MANAGEMENT

Communications management is the methodical planning, implementation, monitoring, and review of all the channels of communication within an association, and among an association and other administrations or customers. Organizational communication expressions at communication and administrative behavior and is worried about the symbolic usage of language, how organizations occupation, and what their goals are. The discipline of organizational communication attentions on administrations and their communication progressions which are used to equally "designate and explain an association" and an approach to "communication as a marvel" in organizations. From the abovementioned points, we can achieve that social media is a very feeble form of communication. Feeble communication is often an outcome of a lack of preparation, unclarified suppositions, semantic alteration, poorly expressed messages, communication barriers in international environments, poor listening, premature assessment, impersonal communication, suspicion, fear, an unsatisfactory period for adjustment to change, and information overwork. Social media leaves significant room for all these features to interfere with operative communication.

VI. OPPORTUNITIES OF SOCIAL MEDIA

Social media has become an important portion of integrated organizational communication tactics, mainly due to its reasonable and instinctive means of sharing user-produced material. The usage of social media within an association can have a positive effect on the customer's experience since of its active capability, permitting for adjustment affording to their needs which change ended time. When the conversation becomes more interpersonal, the emotional ties become stronger, and clients become advocates for vendors in communications with other clients and non-clients.

Dissimilar outmoded marketing techniques, this exchange of information between customers and user-generated content has improved both fulfillment and advocacy and constructed stronger customer appointments for organizations that have accepted the use of social media as a marketing policy. The best samples of this are customer assessments and other content like pictures and videos shared online about countless products and services.

VII. CONCLUSION

A large source of material, edification, communication, and path entertainment social media is working to be The next large contest for the dissimilar features of our social and private lives. Social media is making a new caring of social order, it is the establishment of social networks but failing interpersonal relations. If the pattern of new media reveals five characteristic features as digitality, converging, hyper textuality, interactivity, and virtuality, the idea of the new new media mentions the social character, free optimal of media, authorship, and free-of-custody use. The Facebook way of life states the next: social media affects how we use the word "friends"; social media affects how we think about our disconnected social networks. It would be treasured for forthcoming investigations to explore measuring the monetary impact of social media on an association – defining how administrative communication management deviations due to the acceptance of social media affected incomes and profits.

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Customer Churn Prediction In Telecom Industry Using Machine Learning

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Abstract – **Every day, the telecom business is expanding quickly. The term "churning" refers to clients who cease utilising certain services or cancel their contract and subscription with a business in order to work with a rival. There are various causes and influences for customer churn. These factors include service quality and cost. Data is essential in this circumstance for understanding client behaviour. Market dynamics and competition are very strong. Customers can change service providers quickly and easily in search of better costs or services. Every year, 20–40% of clients leave telecommunications businesses. Companies are aware that acquiring new clients is far more expensive than maintaining existing ones.**

I. INTRODUCTION

One of the key sectors in developed nations is now telecommunications. The degree of competition has increased due to technology advancements and an increase in operators. Businesses are putting a lot of effort into surviving in this cutthroat market by utilising a variety of techniques. To boost revenue, three key tactics have been suggested: (1) gaining new clients, (2) upselling to current clients, and (3) lengthening client retention. The third strategy, which proves that keeping an existing customer costs much less than acquiring a new one and is also considered to be much easier than the upselling strategy, is the most profitable strategy, according to a comparison of these strategies that took the value of return on investment (RoI) of each into account.Customer turnover is a serious issue in service industries that are highly competitive.

On the other hand, if done early on, identifying consumers who are likely to quit the business could offer a sizable new revenue source. Numerous studies have shown that machine learning technology is very effective at predicting this circumstance. Applying this method involves learning from prior data.

II. LITERATURE SURVEY

[1]It was used by Senthilnayaki, Swetha, and Nivedha Random Forest has the highest cross validation score (96.3%), followed by KNN and Logistic Regression with scores of 88.8% and 81.72%, respectively.

[2]In their study of the issue of unbalanced datasets in churn prediction models, Burez and Van den Poel examined the effectiveness of Random Sampling, Advanced UnderSampling, Gradient Boosting Model, and Weighted Random Forests. To assess the model, they used (AUC, Lift) measures. According to the results, the under sampling strategy performed better than the other examined techniques.

[3]In order to anticipate which consumers are most likely to terminate their subscriptions, Kavitha V et al., Hemanth G, Mohan S.V, and Harish M employed a Decision Tree, Random Forest, and XGBoost. This allowed them to provide these clients with better services and lower the churn rate. The data set for training and testing is prepared by preprocessing and feature selection. To improve the effectiveness and accuracy of the aforementioned algorithm, some feature engineering is required.

[4]Our machine learning models were implemented in Python by Yasin Osman and Benjamin Ghaffari utilising a variety of data analysis packages, including NumPy, Pandas, and Scikit- learn. A Python programme called Scikit-learn is used to analyse predictive data and includes built-in functions for training, implementing algorithms, and evaluating results. XGBoost, an algorithm that uses boosting, and Random Forest, an approach that uses bagging. From a commercial standpoint, the two responsibilities that make up churn management as a component of customer relationship management. Identifying retention techniques comes after predicting which customers are likely to leave.

[5]At order to address the issue of customer churn in a significant Chinese telecom firm with 5.23 million users, He Y, He Z, and Zhang D [5] proposed a model for prediction based on the Neural Network algorithm. The overall accuracy rate, which was used as a measure of forecast accuracy, was 91.1%.

III. CHALLENGES

1.Marketers and customer success experts must be able to foresee which consumers will leave your firm and set up a plan of marketing actions that will have the highest retention impact on each client in order to be successful at retaining customers who are prepared to do so. Being proactive and interacting with these clients is crucial in this situation. Though straightforward in theory, accomplishing this "proactive retention" goal is rather difficult in practise.

2.Marketers and customer success experts must be able to foresee which consumers will leave your firm and set up a plan of marketing actions that will have the highest retention impact on each client in order to be successful at retaining customers who are prepared to do so.

3.Being proactive and interacting with these clients is crucial in this situation. Though straightforward in theory, accomplishing this "proactive retention" goal is rather difficult in practise.

4. Rather of using static data to calculate the probability of churning, your churn prediction model should rely on (nearly) real-time data. Even with static data, you will be able to identify a certain percentage of clients who are at danger, but your projections will be off.

5. The raw data was transformed into features that could be used in machine learning techniques. Because there

were so many columns, this operation took the longest to complete.

IV. PROBLEM DEFINITION

The purpose of this kind of study in the telecom industry is to assist businesses in increasing their profits. It is well known that one of the most significant revenue streams for telecom firms is churn prediction. Therefore, the goal of this research was to develop a system that can forecast client attrition.

Thus, our dataset comprises 21 columns and 7043 rows. As this model makes use of a large data platform and machine learning, there are 17 categorical features. The sample data is split into 30% for testing and 70% for training in order to test and train the model. Because it has the highest F1 score and 90% accuracy, we choose the random forest machine learning model, which we deployed using Flask.

V. EXISTING SYSTEM

The method begins with the test process, which then develops a comprehensive strategy to evaluate the particular features and general functionality on a variety of platform combinations. The methods are rigorously quality monitored.

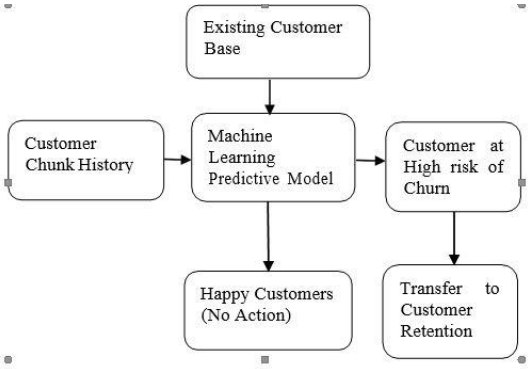

Fig 1. Existing System Architecture

In Fig 1. A model is trained using previous customer churn data (event period for X features and performance window for target variable). Active customer data is sent each month to a machine learning predictive model, which then calculates the likelihood that each client will leave. The customer retention teams will start engaging with the consumer to stem the churn, typically by offering some form of incentive or gift card to lock in a few more years after the list is sorted from highest to lowest probability value. Customers who have a very low likelihood of leaving (or, more accurately, those for whom the model forecasts 0% churn) are content ones. Nothing is done regarding them.

We examine the previous research on attrition prediction from three different angles: datasets, approaches, and measures for the banking industry. First, we provide information on machine learning. Customer Chunk History Customers at High Risk of Churn Existing Customer Base Predictive Model Happy Customers (No Action)

Inform Customer Retention Department about the public datasets that are accessible and the types of customer information that are contained in each dataset for predicting customer churn. Then, we quantitatively assess the performances of the various predictive modelling approaches that have been utilised in the literature to forecast customer churners using various types of customer information. Finally, we provide a summary of the performance indicators that have been applied to assess the effectiveness of the current churn prediction techniques. For telecom firms to design a more effective churn prediction system, it is imperative to analyse all three perspectives. [1]

VI. PROPOSED SYSTEM

The steps in the proposed system are as follows: gathering datasets, extracting features, training a model, testing it, and model optimization. A dataset will be used by our suggested system. Additionally, we will scrape information from available sources.

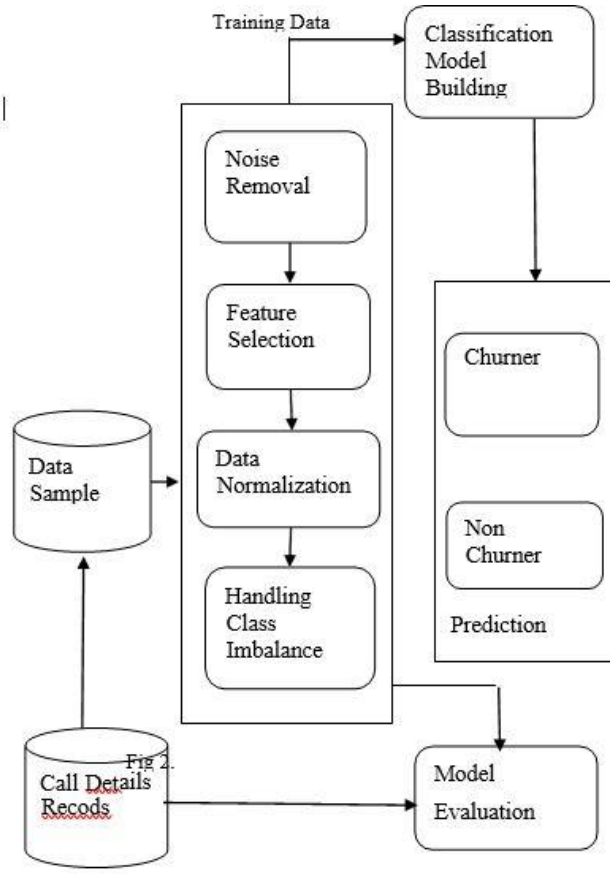

Fig 2. Flowchart of Proposed System

1.Handling Missing Value: To fill in a missing value in a dataset, count the number of missing values and list the columns that contain those values. Then, give the dataframe to the helper function get cols split to obtain the column categories. For some sets of columns, missing values appear to indicate that the data is unavailable. by giving them a value of 0. Some of the date columns have missing values. But let's leave that alone for the time being; we'll use it later.

2.Exploratory Data Analysis: Because of data imbalance, the dataset as a whole has a low churn rate. A column of key features is analysed in order to make the necessary

corrections. The top percentile of these columns appears to contain outliers, which are handled according to the outliers treatment.

3.Model Generation: With the class now evenly distributed, the dataset is divided into train (70%) and test (30%) sets.

4.Model Evaluation: Assessing the models using the proper evaluation measures, such as accuracy, precision, and recall, which are more crucial to effectively identifying churners than nonchurners. This problem is approached with two machine learning algorithms. Decision Tree & Random Forest

The dataset consists of 21 columns and 7043 rows. There are 17 distinct characteristics:

1CustomerID: Each customer has a different Customer ID.

2 gender: Whether or whether the client is a man or a woman

3 Senior Citizen: Determine whether the client is a senior citizen (1, 0)

4 Partner: Whether or not the client has a partner (Yes, No)

5 Dependent: Whether or not the client has dependents (Yes, No)

6 Phone Service: Whether or not the client has a phone service (Yes, No)

7 Multiple Lines: Whether the consumer has numerous lines or not is indicated by the number (Yes, No, No phone service)

8 Internet Service: Internet service provider for the client (DSL, Fiber optic, No)

9 Online Security: The customer's access to online security (Yes, No, No internet service)

10 Online Backup: The customer's availability of an online backup (Yes, No, No internet service)

11 Device Protection: To what extent does the consumer have device protection? (Yes, No, No internet service)

12 TechSupport: The availability of tech help for the customer (Yes, No, No internet service)

13 StreamingTV: Whether a consumer has streaming TV (Yes, No, No internet service)

14 StreamingMovies: Whether the customer has streaming movies or not is determined by (Yes, No, No internet service)

15 Contract: The customer's contract duration (Month-to-month, One year, Two years)

16 No paper Billing: The length of the customer's contract (Month-to-month, One year, Two years)

17 Payment Method: The chosen payment method by the customer (credit card, automatic bank transfer, electronic check, paper check)

18 Tenure: The length of time the customer has been a client of the business.

19 Monthly Charges: The monthly sum that the client is charged.

20 TotalCharges: The sum of all charges made to the customer. There is also a prediction feature: Churn:

The state of a customer's churn (Yes or No)

These features can also be subdivided into:

1 Customer demographic data: Gender, Senior Citizen, Partner, Dependents.

2 Few of the services each customer has signed up for: PhoneService, MultipleLines, InternetService, OnlineSecurity, OnlineBackup, DeviceProtection, TechSupport, StreamingTV, StreamingMovies .

3Information about the customer account: tenure, contract, paperless billing, payment method, monthly charges, and total charges.

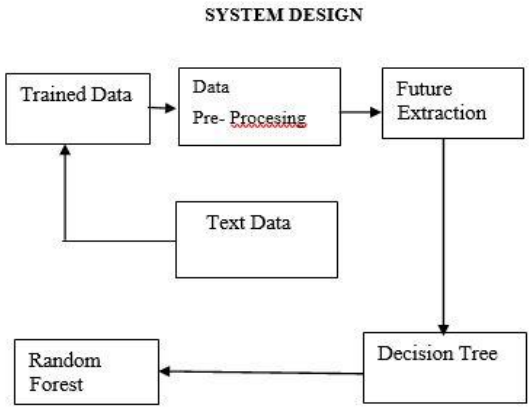

Fig 3. System Architecture

In Fig 3. Making the data usable is vital since undesirable or null values may result in results that are less accurate or unsatisfactory. The data set contains a large number of erroneous and missing values. We examined the entire dataset and only included the useful features in our list. When features are listed, accuracy can be improved, and only useful aspects are included so that particular information, such as the owner, registration location, and address, can be generated. A critical step in choosing the necessary elements from the data set based on the knowledge is feature selection.

The dataset that was used in this study has a large number of features, from which we selected the ones that were most important to improving performance assessment and helping us make decisions. If the dataset contains only valuable and highly predictable variables, classification performance improves. Thus, limiting the amount of irrelevant attributes and using just significant features improves classification performance. For the purpose of predicting customer churn in the telecom sector, numerous methodologies have been put forth.

Here, we can forecast the likelihood that a client will cancel their subscription by using Decision Tree and Random Forest, and we can assess the models using performance measures like accuracy, precision, and recall score.

VII. RESULTS

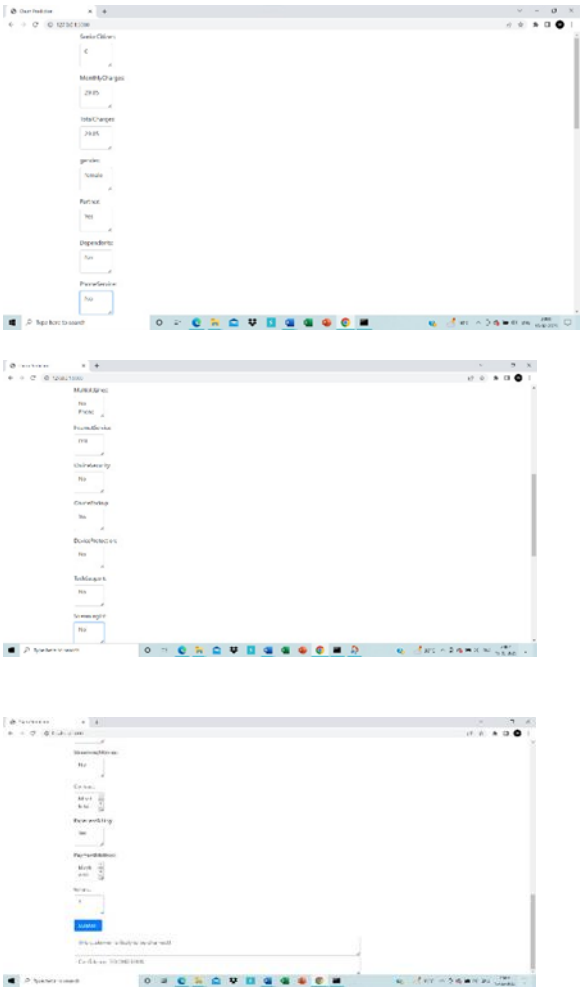

Fig 4. Output

By entering the provided data information in Fig. 4, it may be predicted if the consumer is likely to make a purchase or not. An essential metric for subscription-based businesses is churn rate. Managers can learn about weak points in products or pricing strategies, operational problems, and consumer preferences and expectations by identifying unhappy customers. Knowing all of that makes it simpler to implement proactive churn reduction strategies.The System metrics are explained below**:**

Accuracy: Classification When we say something is accurate, we usually mean it to be accurate. It measures the proportion of accurate predictions to all input samples. It is the proportion of accurate predictions to all observations.

Precision - The proportion of accurately predicted positive observations to all expected positive observations is known as precision. Precision equals TP/TP + FP.

F1 score - The weighted average of Precision and Recall is the F1 Score. Therefore, both false positives and false negatives are considered while calculating this score. F1 is not intuitively as simple to understand as accuracy, but F1 is typically more practical.

F1 Score = 2*(Recall * Precision) / (Recall + Precision).

VIII. CONCLUSION

Telecom Companies can have a clear vision and offer them some exciting offers to stay in that service. The acquired results demonstrate that our suggested churn model performed better and generated better results when applying machine learning techniques. In order to improve accuracy and performance, removing even more features in the future will be required.

IX. ACKNOWLEDGEMENT

We truly appreciate **Prof. Poonam Narkhede's** direction in helping us complete our project, which was made possible by her encouragement and inspiration. Our project manager keeps us going strong with her knowledgeable direction, considerate counsel, and timely encouragement that assisted us in choosing our project.

We would like to express our gratitude to **Prof. Reena Deshmukh,** our project coordinator, for providing us with all the assistance we required. We also like to extend our sincere gratitude to our HOD, Dr. Uttara Gogate, for her kind assistance in making our project in the lab successful by making computer resources available to us. Without his thoughtful and diligent assistance, our project would have been completely halted.

Finally, we want to thank the principal of our college. Dr. **P.R. Rodge** for providing lab space and granting permission for our experiment to continue. We also want to express our gratitude to our colleagues who supported us through the project, either directly or indirectly.

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Twitter Sentiment Analysis

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Abstract – **In this paper, we investigate the utility of linguistic features for detecting the sentiment of Twitter messages. We evaluate the usefulness of existing lexical resources as well as features that capture information about the informal and creative language used in microblogging. We take a supervised approach to the problem, but leverage existing hashtags in the Twitter data for building training data.**

I. INTRODUCTION

In the past few years, there has been a huge growth in the use of microblogging platforms such as Twitter. Spurred by that growth, companies and media organizations are increasingly seeking ways to mine Twitter for information about what people think and feel about their products and services. Companies such as Twitter (twitrratr.com), tweetfeel (www.tweetfeel.com), and Social Mention (www.socialmention.com) are just a few who advertise Twitter sentiment analysis as one of their services.While there has been a fair amount of research on how sentiments are expressed in genres such as online reviews and news articles, how sentiments are expressed given the informal language and message-length constraints of microblogging has been much less studied. Features such as automatic part-of-speech tags and resources such as sentiment lexicons have proved useful for sentiment analysis in other domains, but will they also prove useful for sentiment analysis in Twitter? In this paper, we begin to investigate this question.Another challenge of microblogging is the incredible breadth of topic that is covered. It is not an exaggeration to say that people tweet about anything and everything. Therefore, to be able to build systems to mine Twitter sentiment about any given topic, we need a method for quickly identifying data that can be used for training. In this paper, we explore one method for building such data: using Twitter hashtags (e.g., #bestfeeling, #epicfail, #news) to identify positive, negative, and neutral tweets to use for training threeway sentiment classifiers.

II. RELATED WORK

Sentiment analysis is a growing area of Natural Language Processing with research ranging from document level classification (Pang and Lee 2008) to learning the polarity of words and phrases (e.g., (Hatzivassiloglou and McKeown 1997; Esuli and Sebastiani 2006)). Given the character limitations on tweets, classifying the sentiment of Twitter messages is most similar to sentence-level sentiment analysis (e.g., (Yu and Hatzivassiloglou 2003; Kim and Hovy 2004)); however, the informal and specialized language used in tweets, as well as the very nature of the microblogging domain make Twitter sentiment analysis a very different task. It'san open question how well the features and techniques used on more well-formed data will transfer to the microblogging domain.Just in the past year there have been a number of papers looking at Twitter sentiment and buzz (Jansen et al. 2009; Pak and Paroubek 2010; O'Connor et al. 2010; Tumasjan et al. 2010; Bifet and Frank 2010; Barbosa and Feng 2010; Davidov, Tsur, and Rappoport 2010). Other researchers have begun to explore the use of part-of-speech features but results remain mixed. Features common to microblogging (e.g., emoticons) are alo common, but there has been little investigation into the usefulness of existing sentiment resources developed on non-microblogging data.Researchers have also begun to investigate various ways of automatically collecting training data. Several researchers rely on emoticons for defining their training data (Pak and Paroubek 2010; Bifet and Frank 2010). (Barbosa and Feng 2010) exploit existing Twitter sentiment sites for collecting training data. (Davidov, Tsur, and Rappoport 2010) also use hashtags for creating training data, but they limit their experiments to sentiment/non-sentiment classification, rather than 3-way polarity classification, as we do.

III. DATA

We use three different corpora of Twitter messages in our experiments. For development and training, we use the the hashtagged data set (HASH), which we compile from the Edinburgh Twitter corpus1, and the emoticon data set (EMOT) from http://twittersentiment.

	Positive	Negative	Neutral	Total
HASH	31,861 (14%)	64,850 (29%)	125,859 (57%)	222,570
EMOT	230,811 (61%)	150,570 (39%)	–	381,381
ISIEVE	1,520 (38%)	200 (5%)	2,295 (57%)	4,015

Table 1: Corpus statistics

Hashtag	Frequency	Synonyms
#followfriday	226,530	#ff
#nowplaying	209,970	
#job	136,734	#tweetajob
#fb	106,814	#facebook
#musicmonday	78,585	#mm
#tinychat	56,376	
#tcot	42,110	
#quote	33,554	
#letsbehonest	32,732	#tobehonest
#omgfacts	30,042	
#fail	23,007	#epicfail
#factsaboutme	19,167	
#news	17,190	

#random	17,180	
#shoutout	16,446	

Table 2: Most frequent hashtags in the Edinburgh corpus

appspot.com. For evaluation we use a manually annotated data set produced by the iSieve Corporation1(ISIEVE). The number of Twitter messages and the distribution across classes is given in Table 1.

Hashtagged Data Set

The hashtagged data set is a subset of the Edinburgh Twitter corpus. The Edinburgh corpus contains 97 million tweets collected over a period of two months. To create the hashtagged data set, we first filter out duplicate tweets, nonEnglish tweets, and tweets that do not contain hashtags. From the remaining set (about 4 million), we investigate the distribution of hashtags and identify what we hope will be sets of frequent hashtags that are indicative of positive, negative, and neutral messages. These hashtags are used toselect the tweets that will be used for development and training.Table 2 lists the 15 most-used hashtags in the Edinburgh corpus. In addition to the very common hashtags that are part of the Twitter folksonomy (e.g., #followfriday, #musicmonday), we find hashtags that would seem to indicate message polarity: #fail, #omgthatsotrue, #iloveitwhen, etc.To select the final set of messages to be included in the HASH dataset, we identify all hashtags that appear at least 1,000 times in the Edinburgh corpus. From these, we selected the top hashtags that we felt would be most useful for identifying positive, negative and neutral tweets. These hashtags are given in Table 3. Messages with these hashtags were included in the final dataset, and the polarity of each message is determined by its hashtag.

Positive	#iloveitwhen, #thingsilike, #bestfeeling, #bestfeelingever, #omgthatssotrue, #imthankfulfor, #thingsilove, #success
Negative	#fail, #epicfail, #nevertrust, #worst, #worse, #worstlies, #imtiredof, #itsnotokay, #worstfeeling, #notcute, #somethingaintright, #somethingsnotright, #ihate
Neutral	#job, #tweetajob, #omgfacts, #news, #listeningto, #lastfm, #hiring, #cnn

Table 3: Top positive, negative and neutral hashtags used to create the HASH data set

Emoticon data set-

The Emoticon data set was created by Go, Bhayani, and Huang for a project at Stanford University by collecting tweets with positive ':)' and negative ':(' emoticons. Messages containing both positive and negative emoticons were omitted. They also hand-tagged a number of tweets to use for evaluation, but for our experiments, we only use their training data. This set contains 381,381 tweets, 230,811 positive and 150,570 negative. Interestingly, the majority of these messages do not contain any hashtags.

iSieve data set

The iSieve data contains approximately 4,000 tweets. It was collected and hand-annotated by the iSieve Corporation. The data in this collection was selected to be on certain topics, and the label of each tweet reflects its sentiment (positive, negative, or neutral) towards the tweet's topic. We use this data set exclusively for evaluation.

Preprocessing

Data preprocessing consists of three steps: 1) tokenization,2) normalization, and 3) part-of-speech (POS) tagging. Emoticons and abbreviations (e.g., OMG, WTF, BRB) are identified as part of the tokenization process and treated as individual tokens. For the normalization process, the presence of abbreviations within a tweet is noted and then abbreviations are replaced by their actual meaning (e.g., BRB– > be right back). We also identify informal intensifiers such as all-caps (e.g., I LOVE this show!!! and character repetitions (e.g., I've got a mortgage!! happyyyyyy"), note their presence in the tweet. All-caps words are made into lower case, and instances of repeated charaters are replaced by a single character. Finally, the presence of any special Twitter tokens is noted (e.g., #hashtags, usertags, and URLs) and placeholders indicating the token type are substituted. Our hope is that this normalization improves the performance of the POS tagger, which is the last preprocessing step.

IV. FEATURES

We use a variety of features for our classification experiments. For the baseline, we use unigrams and bigrams. We also include features typically used in sentiment analysis, namely features representing

n-gram features-

To identify a set of useful n-grams, we first remove stopwords. We then perform rudimentary negation detection by attaching the the word not to a word that preceeds or follows a negation term. This has proved useful in previous work (Pak and Paroubek 2010). Finally, all unigrams and bigrams are identified in the training data and ranked according to their information gain, measured using Chi- squared. For our experiments, we use the top 1,000 n-grams in a bagof-words fashion.3

Lexicon features-

Words listed the MPQA subjectivity lexicon (Wilson, Wiebe, and Hoffmann 2009) are tagged with their prior polarity: positive, negative, or neutral. We create three features based on the presence of any words from the lexicon.

Part-of-speech features-

For each tweet, we have features for counts of the number of verbs, adverbs, adjectives, nouns, and any other parts of speech.

Micro-blogging features-

We create binary features that capture the presence of

positive, negative, and neutral emoticons and abbreviations and the presence of intensifiers (e.g., all-caps and character repetitions). For the emoticons and abbreviations, we use the Internet Lingo Dictionary (Wasden 2006) and various internet slang dictionaries available online.

V. EXPERIMENTS AND RESULTS

Our goal for these experiments is two-fold. First, we want to evaluate whether our training data with labels derived from hashtags and emoticons is useful for training sentiment classifiers for Twitter. Second, we want to evaluate the effectiveness of the features from section for sentiment analysis in Twitter data. How useful is the sentiment lexicon developed for formal text on the short and informal tweets? How much gain do we get from the domain-specific features?For our first set of experiments we use the HASH and EMOT data sets. We start by randomly sampling 10% of the HASH data to use as a validation set. This validation set is used for n-gram feature selection and for parameter tuning. The remainder of the HASH data is used for training. To train a classifier, we sample 22,2474 tweets from the training data and use this data to train AdaBoost.MH (Schapire and Singer 2000) models with 500 rounds of boosting.56 We repeat this process ten times and average the performance of the models.

The number n-grams to include as features was determined empirically using the training data. 4

This is equivalent to 10% of the training data. We experimented with different sample sizes for training the classifier, and this gave the best results based on the validation data. 5

The rounds of boosting was determined empirically using the validation set. 6

We also experimented with SVMs, which gave similar trends, but lower results overall.

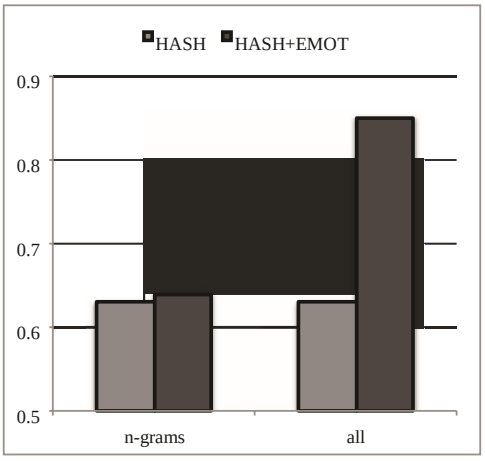

Figure 1: Average F-measure on the validation set over models trained on the HASH and HASH+EMOT data

Because the EMOT data set has no neutral data and our experiments involve 3-way classification, it is not included in the initial experiments. Instead, we explore whether it is useful to use the EMOT data to expand the HASH data and improve sentiment classification. 19,000 messages from the EMOT data set, divided equally between positive and negative, are randomly selected and added to the HASH data and the experiments are repeated.

To get a sense for an upper-bound on the performance we can expect for the HASH-trained models and whether including the EMOT data may yield improvements, we first check the results of the models on the validation set. Figure 1 shows the average F-measure for the n-gram baseline and all the features on the HASH and the HASH+EMOT data. On this data, adding the EMOT data to the training does lead to improvements, particularly when all the features are used. Turning to the test data, we evaluate the models trained on the HASH and the HASH+EMOT data on the ISIEVE data set. Figure 2 shows the average F-measure for the baseline and four combinations of features: n-grams and lexicon features (n-gram+lex), n-grams and part-of-speech features (n-gram+POS), n-grams, lexicon features and microblogging features (n-grams+lex+twit), and finally all the features combined. Figure 3 shows the accuracy for these

same experiments.

Interestingly, the best performance on the evaluation data comes from using the n-grams together with the lexicon features and the microblogging features. Including the partof-speech features actually gives a drop in performance. Whether this is due to the accuracy of the POS tagger on the tweets or whether POS tags are less useful on microblogging data will require further investigation.Also, while including the EMOT data for training gives a nice improvement in performance in the absense of microblogging features, once the microblogging features are included, the improvements drop or disappear. The best results on the evaluation data comes from the n-grams, lexical and Twitter features trained on the hashtagged data alone.

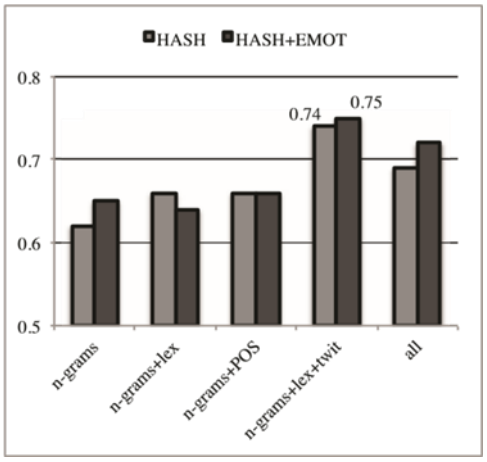

Figure 2-Average accuracy on the test set over models trained on the HASH and HASH+EMOT data

VI. CONCLUSIONS

Our experiments on twitter sentiment analysis show that part-of-speech features may not be useful for sentiment analysis in the microblogging domain. More research is needed to determine whether the POS features are just of poor quality due to the results of the tagger or whether

POS features are just less useful for sentiment analysis in this domain. Features from an existing sentiment lexicon were somewhat useful in conjunction with microblogging features, but the microblogging features (i.e., the presence of intensifiers and positive/negative/neutral emoticons and abbreviations) were clearly the most useful.

Using hashtags to collect training data did prove useful, as did using data collected based on positive and negative emoticons. However, which method produces the better training data and whether the two sources of training data are complementary may depend on the type of features used. Our experiments show that when microblogging features are included, the benefit of emoticon training data is lessened.

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Challenges of Virtualization of Cloud Computing

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Abstract – **: Virtualization is used to make simulated environment through a physical hardware system. The software that controls cloud technology is virtualization, while cloud computing is a digital facility. Virtualization and cloud computing knowledges share a exclusive relationship and often work together. The virtualization process in cloud computing is where a name is allotted to the physical storage and is available on demand. A single dedicated hardware can do a great job in virtualization. There is a host machine and a visitor machine**

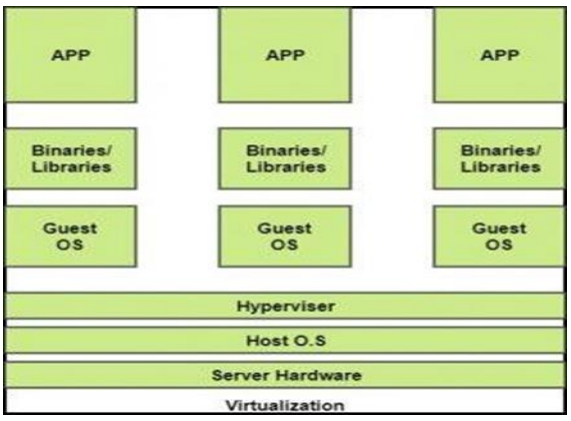
Keywords: Virtualization cloud computing host.

I. INTRODUCTION

Virtualization of cloud computing primarily stems from the need to split up resources to make them more efficient and add security layers to silos of computing power. For instance, you can segment server capacities into small parts to allow for the distribution of the server's capabilities among several environments and users. Virtualization of Cloud Computing is a broad term that refers to the abstraction of computer resources. Essentially, it creates a virtual resource successively on a layer abstract from physical hardware. Cloud computing is one of the more common use cases. Virtualization Hides the physical characteristics of computing resources from there users, be they application, or end users. This includes making a single physical resource. Virtualization allows a computing environment to simultaneously run several independent systems also called virtual machines. These virtual machines (VMs) share the same physical IT infrastructure and are accomplished and coordinated by an extra software interface named hypervisor.

II. ARCHITECTURE

The architecture in virtualization is defined as a model that describe virtualization of cloud computing conceptually.



III. VIRTUALIZATION

Virtualization can be defined as a procedure that enables the manufacture of virtual version of desktop, operating system, network resources, or server. In other word, Virtualization is a technique, which allows to share single physical instance of an application or resource among multiple organizations or tenant's customer. It does so by assigning a logical name to a physical resource and providing a pointer to that physical resource on demand. The invention of virtualization was intated during the era of mainframe practice, and as time evolved with progression in new-age knowledges, virtualization was achieved with the mean of specific software. The technology that works behind virtualization is known as a virtual machine monitor or virtual manager which separates compute environments from the actual physical infrastructure. There are mainly four types of virtualization hardware virtualization, operating system virtualization, server virtualization, storage virtualization.

IV. TYPES OF VIRTUALIZAION OF CLOUD COMPUTING

a) Operating system virtualization:

In operating system virtualization of cloud computing, the virtual machine software installs in the operating system of host rather than directly on the hardware system.

b) Hardware virtualization:

Hardware virtualization of cloud computing used in server platform as it is flexible to use virtual machine rather than physical machines.

c) Server virtualization:

In server virtualization of cloud computing, the software directly installs on the server system and use for a single physical server can divide into many servers can divide into many serers on the request basis and stability the load.

d) Storage virtualization:

In storage virtualization of cloud computing, a grouping is done of physical storage which is from multiple network storage devices this is done so it looks like a single storage device.

V. BENEFITS OF VIRTUALIZATION OF CLOUD COMPUTING

Virtualization of cloud computing has numerous benefits lets discuss them one by one:

a. Security:During the procedure of virtualization security is one of the significant concerns. The security can be providing with the help of

firewalls, which will help to prevent illegal access and will keep the data intimate.

b. Flexible operations:With the help of virtualization of cloud computing technical problems can solve in physical systems. It removes the problem of recovering the data from stopped or corrupted devices and hence saves time.

c. Economical:Virtualization of cloud computing, save the cost for a physical system such as hardware and servers. It stores all the data in the virtual server, which are quite economical.

d. Removes the risk of system disaster:While performing virtually task there are chances that the system might crash down at the wrong time. this failure can reason damage to the company but the virtualizations help you to perform the same task in multiple devices at the similar time.

e. Flexible transfer of data:The data can allocation to the virtual server and retrieve anytime. The customers or cloud earner don't have to waste time discovery out hard drives to find data. With the help of virtualization, it will very easy to detect the required data and handover them to the allotted authorities.

VI. ROLE OF VIRTUALIZATION IN CLOUD COMPUTING

In cloud computing technology virtualization perform very critical role. Characteristically, users share the data in the clouds such as applications but with virtualization operators share the organization.The primary purpose of virtualization technology is to spring typical versions of applications to cloud users; if the next version of that application is released, the cloud earner must give those users the freshest version, which is officially feasible because it is classier. Cloud earner employ virtualization create situations that can fulfill each user's unique needs. Cloud providers can spin up more virtual instances to meet request as more users come in. Virtualization is an effective way of managing computing resources, maximizing utilization and minimizing interruption.

VII. CLOUD COMPUTING AND VIRTUALIZATION

Virtualization is a technique of have to separate a service from the underlying physical delivery of that service. It is the procedure of creating a virtual version of something like mainframe hardware. In computing, virtualization refers to the act of crating computing resources that have no physical presence, that is, they are virtual. These virtual resources are essentially pieces of software that act like their concrete counterparts. It includes using particular software to create a virtual or software created version of a computing resource rather than the actual version of the same resource. with the help of virtualization, multiple operating system and applications can run on same machine and its same hardware at the same time, increasing the flexibility of hardware [3].

VIII. CLOUD COMPUTING

A cloud mentions to a distinct IT environment that is designed for the purpose of remotely provisioning scalable and measured IT resources. The term originated as a metaphor for the internet which is, in essence, a network of network providing remote access to a set of decentralized IT resources. Cloud computing can be both public cloud services provide their services over the internet for a fee . private cloud services, on the other hand, only provide service to a certain number of people. These services are a scheme of networks that source hosted service. there is also a hybrid option, which combines basics of both the public and private facilities. Cloud computing taken all the heavy lifting involved in crunching and processing data away from the device you carry around are sit and work at. It similarly transfers all of that work to huge computer groups far away in cyberspace.

IX. DEPLOYMENT MODELS

There are several forms of clouds, each of which is changed from the other. Public clouds suggestion their facilities on servers and storage on the internet. These are worked by third-party companies, who handle and control all the hardware, software, and control all the hardware, software, and the general infrastructure. hybrid cloud is, as the name indicates, a mixture of both public and private services. This form of model allows the user extra flexibility and benefits optimize the operator's infrastructure and security.

X. CHARACTERISTIS OF CLOUD COMPUTING

There are basically five types of characteristics of cloud computing.

i. On -demand self-services
ii. Broad network access
iii. Rapid elasticity
iv. Resource pooling
v. Measured service

1.On -demand self-services:the cloud computing services does not require any human managers, user themselves are able to facility, monitor and succeed computing resources as wanted.
2. Broad network access:The computing service are generally provided over standard networks and heterogeneous devices.
3. Rapid elasticity:The computing service should have IT properties that are clever to scale out and in quickly and on as needed basis.

Whenever the user requires services, it is provided to him and it is scale out as soon as its must gets over.

4. Resource pooling:The IT resource (e.g., network, servers, storage, applications, and services) present are shared across multiple application and occupant in an uncommitted manner.
5. Measured service:The resources utilization is tracked for each application and occupant it will provide both the user and the resource provider with an account of what has been used. This is done for various reasons like monitoring promoting and effective use of resource.

XI. CONCLUSION

Virtualization of cloud computing is a great technique for any organization that wants to build its cloud security . definitely, its implementation is easy but it is not a cakewalk also. The organizations essential to strategize, appreciate and , be ready before the implementation . It is becoming more of a need than a choice for any business that aims to establish cloud security thus creating virtual resources is the new go-to choice for businesses The virtualization is a part of cloud computing where manual management is done for interacting with a hypervisor virtualization essentially means running numerous operating systems on a single machine while sharing all hardware resources.

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Communication Between Two Cloud Using Depsky and Program Data Processors System

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Abstract – **In today's life cloud, computing plays important role for the computing environment for reducing the cost of the computational cost and resources cost of the computing methods such as to storing the data and using the computing resources. It enables the use of the inter cloud communication for accessing the various information or data from different cloud. Inter cloud or multi cloud is term related to cloud of cloud, which provides the huge amount of data within the same cloud by adding the different cloud within single cloud. This method provides the service availability, storage of data and services within the same unit. Which provide the security to the whole data within the cloud by using the third-party auditing method, which requires applying the encryption key on data only one time, which can reduce the attacks on the cloud data? This paper also introduces the new method of multi cloud storage technique to store the data on the different small cloud within the system, which allows reducing the redundancy of data within the cloud.**

Keywords: Cloud Computing, Cloud Services, DepSky

I. INTRODUCTION

The use of cloud computing has increased rapidly in many organizations including because these services provide fast access to their applications and reduce their infrastructure costs [1, 2]. This paper focuses on the issues related to the data security aspect of cloud computing. As data and information will be shared with a third party, cloud computing users want to avoid anentrusted cloud provider [3]. Protecting private and important information, such as credit card details or a patient' s medical records from attackers or malicious insiders is of critical importance. In addition, the potential for migration from a single cloud to a multi-cloud environment is examined and research related to security issues in single and multi-clouds in cloud computing are surveyed. Cloud computing describe as " a model for enabling convenienton-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" . Although cloud service providers can offer benefits to users, security risks play a major role in the cloud computing environment [4]. Users of online data sharing or network facilities are aware of the potential loss of privacy. According to a recent IDC survey [5] the top challenge for 74% of CIOs in relation to cloud computing is security. Protecting private and important information such as credit card details or patients' medical records from attackers or malicious insiders is of critical importance. Moving databases to a large data centre involves many security challenges such as virtualization vulnerability, accessibility vulnerability, privacy and control issues related to data accessed from a third party, integrity, confidentiality, and data loss or theft. In different cloud service models, the security responsibility between users and providers is different. According to Amazon, their EC2[6] addresses security control in relation to physical, environmental, and virtualization security, whereas the users remain responsible for addressing security control of the IT system including the operating systems, applications and data. the way the responsibility for privacy and security in a cloud computing environment is shared between consumers and cloud service providers differs between delivery models. In SaaS, cloud providers are more responsible for the security and privacy of application services than the users. This responsibility is more relevant to the public than the private cloud environment because the clients need more strict security requirements in the public cloud. In PaaS, users are responsible for taking care of the applications that they build and run on the platform, while cloud providers are responsible for protecting one user' s applications from others. In IaaS, users are responsible for protecting operating systems and applications, whereas cloud providers must provide protection for the users' data.

II. SECURITY RISKS IN CLOUD COMPUTING

The impact of security issues in the public cloud is greater than the impact in the private cloud. For instance, any damage which occurs to the security of the physical infrastructure or any failure in relation to the management of the security of the infrastructure will cause many problems. In the cloud environment, the physical infrastructure that is responsible for data processing and data storage can be affected by a security risk.

In addition, the path for the transmitted data can be also affected, especially when the data is transmitted to many third-party infrastructure devices [7]. As the cloud services have been built over the Internet, any issue that is related to internet security will also affect cloud services. Resources in the cloud are accessed through the Internet; consequently, even if the cloud provider focuses on security in the cloud infrastructure, the data is still transmitted to the users through networks which may be insecure. As a result, internet security problems will affect the cloud, with greater risks due to valuable resources stored within the cloud and cloud vulnerability. The technology used in the cloud is similar to the technology used on the Internet. Encryption techniques and secure protocols are not sufficient to protect data transmission in the cloud. Data intrusion of the cloud through the Internet by hackers and cybercriminals needs to be addressed and the cloud environment needs to be secure and private for clients [8].

One of the most important issues related to cloud security

risks is data integrity. The data stored the cloud may suffer from damage during transition operations from or to the cloud storage provider. The examples of the risk of attacks from both inside and outside the cloud provider, such as the recently attacked Red Hat Linux' s distribution servers.

According to Garfinkel [19], another security risk that may occur with a cloud provider, such as the Amazon cloud service, is a hacked password or data intrusion. If someone gains access to an Amazon account password, they will be able to access all the account' s instances and resources. Thus, the stolen password allows the hacker to erase all the information inside any virtual machine instance for the stolen user account, modify it, or even disable its services. Furthermore, there is a possibility for the user' s email (Amazon username) to be hacked (see [18] for a discussion of the potential risks of email), and since Amazon allows a lost password to be reset by email, the hacker may still be able to log in to the account after receiving the new reset password.

Another major concern in cloud services is service availability. Amazon [6] mentions in its licensing agreement that it is possible that the service might be unavailable from time to time. The user' s web service may terminate for any reason at any time if any user' s files break the cloud storage policy. In addition, if any damage occurs to any Amazon web service and the service fails, in this case there will be no charge to the Amazon Company for this failure. Companies seeking to protect services from such failure need measures such as backups or use of multiple providers [19]. Both Google Mail and Hotmail experienced service down- time recently [12]. If a delay affects payments from users for cloud storage, the users may not be able to access their data. Due to a system administrator error, 45% of stored client data was lost in LinkUp (Media Max) as a cloud storage provider

III. MULTI-CLOUDS: PRELIMINARY

The term " multi-clouds" is similar to the terms " inter clouds" or " cloud-of-clouds" that were introduced by Vukolic [11,15]. These terms suggest that cloud computing should not end with a single cloud. Using their illustration, a cloudy sky incorporates different colors and shapes of clouds which leads to different implementations and administrative domains.

Recent research has focused on the multi-cloud environment [3],[8],[10],[11] which control several clouds and avoids dependency on any one individual cloud.

Cachin et al. [11] identify two layers in the multi- cloud environment: the bottom layer is the inner cloud, while the second layer is the inter-cloud. In the inter- cloud, the Byzantine fault tolerance finds its place. We will first summarize the previous Byzantine protocols over the last three decades.

BFT protocols are not suitable for single clouds. Vukolic argues that one of the limitations of BFT for the inner-cloud is that BFT requires a high level of failure independence, as do all fault- tolerant protocols. If Byzantine failure occurs to a particular node in the cloud, it is reasonable to have a different operating system, different implementation, and different hardware to ensure such failure does not spread to other nodes in the same cloud. In addition, if an attack happens to a particular cloud, this may allow the attacker to hijack the particular inner-cloud infrastructure.

IV. DEPSKYARCHITECTURE

The DepSky architecture [8] consists of four clouds and each cloud uses its own particular interface. The DepSky algorithm exists in the clients' machines as a software library to communicate with each cloud (Figure 1). These four clouds are storage clouds, so there are no codes to be executed. The DepSky library permits reading and writing operations with the storage clouds. DepSky Data model. As the DepSky system deals with different cloud providers, the DepSky library deals with different cloud interface providers and consequently, the data format is accepted by each cloud. The DepSky data model consists of three abstraction levels: the conceptual data unit, a generic data unit, and the data unit implementation. DepSKy System model. The DepSky system model contains three parts: readers, writers, and four cloud storage providers, where readers and writers are the client' s tasks. Bessani et al. [8] explain the difference between readers and writers for cloud storage. Readers can fail arbitrarily (for example, they can fail by crashing, they can fail from time to time and then display any behavior) whereas writers only fail by crashing. Cloud storage providers in the DepSky system model. The Byzantine protocols involve a set of storage clouds (n) where n = 3 f +1, and f is maximum number of clouds which could be faulty. In addition, any subset of (n – f) storage cloud creates byzantine quorum protocols [8].

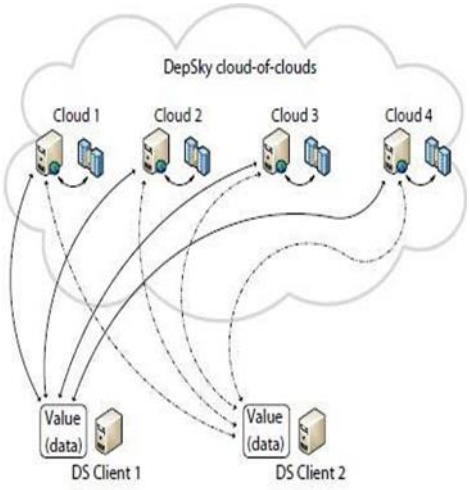

Figure 1. DepSky Data model.

PDP in DepSky. The efficient PDP scheme is the fundamental construct underlying an archival introspection system that we are developing for the long-term preservation of data. Efficient PDP schemes will ensure that the computational requirements of remote data checking do not unduly burden the remote storage sites. Provable data possession (PDP), which is a cryptographic technique for verifying the integrity of data without

retrieving it at an un-trusted server, can be used to realize audit services. Introduction of PDP in DepSky eliminate the extra n additional auditing requirement for each cloud data separately. By using the single PDP system and a single key for encryption the system can encrypt the data from the different cloud. The data can then decrypt or access by the user according to the inter cloud identification. While storing the data into the DepSky, which uses the different internal cloud using the hash method for dividing the same data into number of different blocks of same size, and store in the cloud. This method lets to increase the services availability by accessing the data from the different inter cloud. When storing the data, it adds some header information to identify the data block and access the data.

V. CURRENT SOLUTIONS OF SECURITY RISKS

To reduce the risk in cloud storage, customers can use cryptographic methods to protect the stored data in the cloud [12]. Using a hash function [35] is a good solution for data integrity by keeping a short hash in local memory. In this way, authentication of the server responses is done by recalculating the hash of the received data which is compared with the local stored data [12]. If the amount of data is large, then a hash tree is the solution . Many storage system prototypes have implemented hash tree functions, such as SiRiUS [20] and TDBthis is an active area in research on cryptographic methods for stored data authentication. Cachinet al. [12] argue that although the previous methods allow consumers to ensure the integrity of their data which has been returned by servers, they do not guarantee that the server will answer a query without knowing what that query is and whether the data is stored correctly in the server or not. Proofs of Retrievability (PORs) and Proofs of Data Possession (PDP) are protocols introduced by Juels and Kaliski and Ateniese et al. [7] to ensure high probability for the retrieval of the user' s data. Cachinet al. [12] suggest using multiple cloud providers to ensure data integrity in cloud storage and running Byzantine-fault-tolerant protocols on them where each cloud maintains a single replica [14]. Computing resources are required in this approach and not only storage in the cloud, but such a service also provided in Amazon EC2, whereas if only storage service is available, Cachin et al. [12] suggest working with Byzantine Quorum Systems by using Byzantine Disk Paxos[2] and using at least four different clouds to ensure users' atomicity operations and to avoid the risk of one cloud failure.

VI. CONCLUSION

Although the use of cloud computing has rapidly increased, cloud computing security is still considered the major issue in the cloud computing environment. Customers do not want to lose their private information as a result of malicious insiders in the cloud. In addition, the loss of service availability has caused many problems for many customers recently. Furthermore, data intrusion leads to many problems for the users of cloud computing. The purpose of this work is to survey the recent research on single clouds and multi-clouds to address the security risks and solutions. We have found that much research has been done to ensure the security of the single cloud and cloud storage whereas multi- clouds have received less attention in the area of security. We support the migration to multi-clouds due to its ability to decrease security risks that affect the cloud computing user.

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Design of Virtual-Real Software-Defined Network for Cloud

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Abstract – **In the construction of network simulation experiment scenarios, complex physical terminals are challenging to realize virtual simulation, and physical terminals need to be accessed. However, the existing access methods are difficult to deploy, have bottlenecks in network performance, and cannot be applied to large-scale network scenarios. To effectively solve the above problems, a virtual-real fusion network simulation construction method based on SDN (software defined-network) is proposed, using the SDN controller combined with the flow table construction algorithm to realize the link management and data connection of the virtual and real network and design A prototype system for virtual-real fusion network simulation has been developed. Through the SDN controller, the virtual instance in the cloud platform and the physical terminal outside the cloud can be jointly networked to build a virtual-real fusion network simulation experiment scene. Using this prototype system, experiments have proved that the SDN-based network simulation method can realize efficient large-scale networking of virtual instances and physical terminals in the cloud platform and has good network performance.**

Keywords: Cloud Computing, Software Defined-Network, Virtual-Real Fusion Network, Large-Scale Networking, Data Connection

I. INTRODUCTION'

The network simulation experimental field has become an essential scientific device in the field of network security, which can provide support means for the observation, measurement and analysis of network space behavior in a safe and controllable environment and provide support for the testing and evaluation of network attack and defense behavior[1-2], network security tools Flexible and efficient hardware and software infrastructure is provided for professional testing and verification, and technical and tactical training drills for professionals. Currently, the mainstream network simulation experiment field mainly relies on digital simulation, virtualization and other technologies to build simulation entities in virtual environments [3]. There is no virtual simulation model or image, and some complex terminals (such as various secret-related target information systems and customized special terminals) are challenging to build virtual simulations. Therefore, it is urgent to integrate physical terminals with virtual networks. Flexible integration jointly creates a virtual and real fusion network simulation experiment field and provides a highly realistic scene environment for network attack and defense drills [4-6].

Software-defined networking is a network technology that has emerged in recent years. It provides network devices with a forwarding layer based on hardware and a control plane based on software control by separating the control plane and the data forwarding plane [7-10]. The SDN controller realizes the power and management of the global network. Given the SDN separation of management and control characteristics, the network has better flexibility and scalability.

This article proposes a method for constructing a virtual-real fusion network simulation experiment field based on SDN. The core idea is to realize the joint networking of virtual instances and physical terminals in creating network simulation scenarios so that the constructed network simulation scenarios are more comprehensive, realistic, and better[11-13]. Experiments have found that the SDN-based network simulation experimental field construction method can quickly realize the construction of virtual-real fusion scenarios. Compared with traditional construction methods, it can meet the needs of large-scale complex network scene generation and effectively avoid network node link congestion and other phenomena [14]. Connecting physical terminals to the virtual network environment through SDN can effectively reduce the construction cost of complex networks; realize the flexible expansion of network scale, and natural and effective network simulation [15-18].

The main contributions of the article include three aspects:

(1)Based on SDN, a method for constructing a virtual-real fusion network simulation experiment field is proposed. A prototype system for virtual-real fusion network simulation is designed and developed.

(2)Based on the Ryu controller, a flow table generation algorithm is proposed to realize the interconnection between virtual and real devices.

(3)Through experiments, it is proved that the construction method of the SDN- based virtual-real fusion network simulation experiment field and the flow table generation algorithm are practical and feasible.

II. SDN-based virtual and actual network architecture design

It mainly introduces the construction of a virtual-real fusion network simulation experiment field based on SDN software and hardware switches. This design relies on the overlay network and realizes the access of physical terminals by building vxlan tunnels. The Vxlan network has similar functions to the vlan

network and can provide Layer 2 Ethernet services, but vxlan has better flexibility and scalability than vlan. It uses a 24-bit tag vxlan_id to support more Layer 2. The network has reached more than 16 million layer-2 network segments, so it can meet the needs of building network scenarios in large-scale and complex cloud platforms [19-20].

2.1 Trend of virtual instance data in the cloud platform

In the OVS cloud platform, the data packet transmission of the virtual instance will pass through a series of virtual bridge devices. The following is a detailed description of the data packet direction of the virtual model in the computing node[21-25].

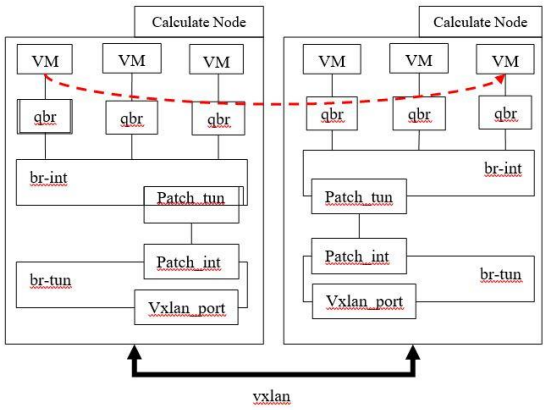

Figure 1 Example data trend

As shown in Figure 1, the virtual instance in the cloud platform transmits the data packet through the br-int bridge of OVS to the br-tun bridge through the virtual network card and other devices. When the data packet reaches the br-tun bridge of OVS, it will Forwarding is performed according to the multi-level OpenFlow flow table rules in the bridge, and the flow table forwarding rules are shown in Figure 2.

The functions of each OpenFlow flow table in Figure 2 are:

table0: Do splitting processing, according to the source of the message, is the br-int bridge inside the cloud platform or outside the cloud platform (the data sent

from the outside means that the data is transmitted from other nodes or devices to this node, not through the virtual instance in this node. The data packets transmitted by the br-int bridge) are forwarded to different flow tables for subsequent processing. The data packets sent by the internal br-int bridge are forwarded to Table 2 for processing. The data packets sent from the outside, It is delivered to table4 for processing;

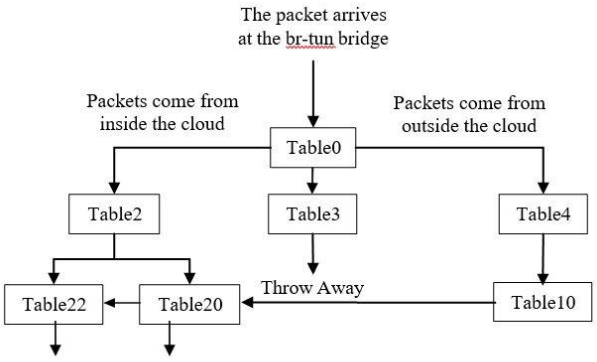

Figure 2 The direction between flow tables

table2: For the data packets that the virtual instance is going to send out, if it is a unicast packet, it will be transferred to table20; if it is a multicast packet, it will be transferred to table22 for processing;

table3: directly discard the data packets that meet the matching conditions of the flow table;

table4: used to process the data packets sent from the outside, specifically strip the tun-id of vxlan, add vlan tag, realize the mapping conversion between vxlan and vlan inside the cloud platform, and transfer it to table10 for processing;

table10: This flow table is a self-learning flow table, which realizes the learning of the mac address table in the data message, and puts the learned content into table20;

table20: According to the matching field of the message (vlan, destination mac, etc.), strip the vlan_id, add the tun-id of vxlan, and forward it from the specified vxlan port. If the corresponding match cannot be achieved, go to table22 for processing;

table22: Also according to the matching field of the message (vlan, destination mac, etc.), the vlan_id is stripped, the tun-id of vxlan is added, and then flood broadcast is performed to send the data message to all vxlan tunnels to realize the

data message Transmission between different nodes in the cloud platform. Through the above forwarding rules of the OpenFlow flow table, mutual communication among the virtual instances in the cloud platform is realized.

3 Key technologies of SDN-based virtual-real fusion network simulation

III. Construct vxlan tunnel

The Vxlan tunnel [26-28]is the bridge of the entire virtual-real fusion system. The controller has complete control over the physical SDN switch, and through the vxlan tunnel, the link between the physical SDN switch and the brut tunnel bridge in each computing node OVS of the cloud platform is opened, which is also realized. The prerequisite for the connection and interaction between the cloud platform and the physical terminal. The specific implementation steps are:

•**Step 1** Add corresponding vtep_port port pairs on the br-tun tunnel bridge and the physical SDN switch of the OVS virtual switch of each computing node on the cloud platform.

•**Step 2** Through OVS-related commands, use the vtep_port port pair in step 1 to create a vxlan tunnel to realize the connection between the physical SDN switch and the br-tun tunnel bridge in the OVS of each computing node on the cloud platform and then realize the virtual instance in the cloud platform Link connectivity with entity terminals.

•**Step 3** Add a daemon process to the br-tun tunnel bridge of each computing node on the cloud platform, and add the newly added vtep_port information into the flow tables at all levels of the br-tun tunnel bridge.

IV. Experiments and Results

The proposed virtual-real fusion solution's performance will be tested through many simulation experiments, and the solution will be evaluated in terms of connectivity, isolation, packet-sending delay, and throughput.

4.1Correctness test of flow table construction results

According to the virtual-real fusion network simulation [29-30] the flow table automatic configuration code is designed based on the SDN controller flow table generation algorithm. First, the physical terminal node is pinged from the virtual instance node, and the Ryu controller will automatically Construct and issue flow table rules. After the virtual and real nodes are successfully pinged, log in to the physical SDN switch to view the configuration of the switch flow table

information; on the computing node server where the virtual instance node is located, use the command to view the flow table rules, as shown in table 1.

Table 1 Connectivity test results of some instances

Source host	Destination host	Is itconnected?
192.168.16.197	VM 1	yes
192.168.16.198	VM 2	yes
192.168.16.199	VM 3	yes
VM4	192.168.16.97	yes
VM5	192.168.16.98	yes
VM6	192.168.16.99	yes

From the above flow table information, it can be seen that through the designed flow table structure and distribution algorithm, the generated flow table can enable the virtual instance and the physical terminal to realize the seamless intercommunication of virtual and actual links.

4.2Network Isolation Test for Virtual Reality Convergence

In actual network experiments, there are often multiple virtual and real network scenarios with the same network configuration parameters belonging to different vxlan networks. Still, in these different scenarios, the IPs of the virtual instances belong to the same network segment. Combined with the network creates a virtual network of 192.168.16.0/24 under different vxlans and generates multiple virtual instances with IP segments of 192.168.16.0/24. The vxlan_ids of the two networks are vxlan100 and vxlan200, respectively, and the IP devices of physical terminals 1 and 2 are 192.168.16.199 and 192.168.16.200, respectively. Physical terminals 1 and 2 are isolated through the flow table to realize the network interconnection between physical terminal 1 and vxlan100 intercommunication, the physical terminal 2 and vxlan200 network interconnection and intercommunication. The experimental isolation test results are shown in Table 2.

Table 2 Isolation test results

Source host	vxlan to which the destination host belongs	Is it connected?
Entity Terminal 1	vxlan100	yes
Entity Terminal 1	vxlan200	no
Entity terminal 2	vxlan100	no
Entity terminal 2	vxlan200	yes

Based on the automatic construction and delivery of the previous flow table algorithm, a new group of virtual-real fusion networks with the same network segments except for vxlan is added to the scene.

4.3 Network Performance Test for Virtual Reality Convergence

To verify the actual network performance of the proposed scheme in virtual and real networks, different numbers of virtual instances are generated in the same virtual and real network for experimental testing. In this experiment, the Flavor configuration parameters of virtual models in OpenStack were divided into three levels, namely trim (RAM=512 MB, Root Disk=5 GB), medium (RAM=2 GB, Root Disk=10 GB), Large (RAM=4 GB, Root Disk=20 GB), the scale ratio of small, medium and large virtual instances is selected as 5:3:2, and for the generated virtual and real network scenarios of different scales, the communication delay, throughput, packet loss rate, etc. The network performance test is carried out on the aspect, and the test results are shown in Figures 3-5

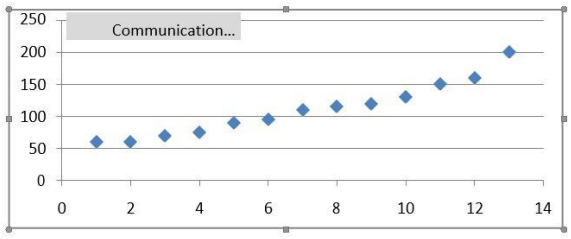

Figure 3 Relationship curve between network delay and number of virtual instances

Figure 3 is a curve diagram of the relationship between the communication delay of the virtual and real networks and the number of virtual instance nodes in this paper. For each number of virtual instances, the test is performed ten times, and the average value is taken. It can be seen from the figure that as the number of virtual nodes increases, the communication delay of the method in this paper also increases slightly.

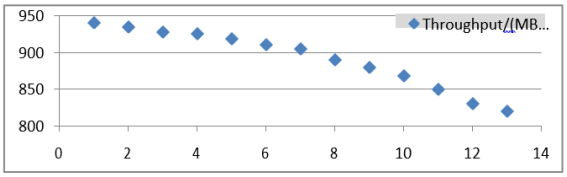

Figure 4 The relationship between throughput and the number of virtual instances

Still, the overall uncertainty remains at a superficial level. Figure 4 is a graph of the relationship between the throughput of the virtual and real network and the number of virtual instance nodes. The same test is performed ten times for each method, and the average value is taken. Since the servers and physical terminals in the experimental environment work should be close to 1000 Mb/s. The method described in this article is based on the vxlan network model.

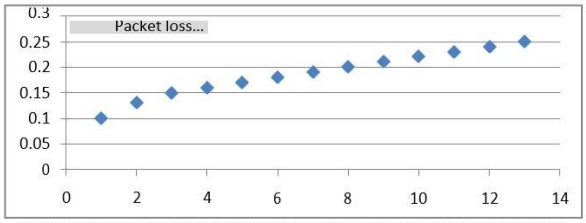

Figure 5 The relationship between the packet loss rate and the number of virtual instances

The data packets of the virtual instance are sent directly from the network card of the computing node and directly communicate with the physical terminal through the physical SDN switch. Since there are three computing nodes in the experiment, it can be seen from the figure the throughput is less affected by the size of the virtual instance. Figure 5 shows is virtual and real relationship curve between the packet loss rate of the network and the number of virtual instance nodes. In the packet loss rate test, the network bandwidth is determined by continuously sending UDP packets between the virtual instance and the physical terminal and constantly adjusting the sending bandwidth of the source host, the bottleneck.

V. Conclusion

A virtual-real fusion network simulation construction method based on SDN is proposed. Through the physical SDN switch and the Ryu controller, the physical terminal and the virtual instance constructed by the OpenStack cloud platform are used to integrate the network. The experiment proves that the SDN-based method can be effectively applied to large-scale The construction of large-scale virtual and real network scenarios has better performance than traditional methods in terms of network connectivity, delay, throughput, and packet loss rate. Furthermore, this method does not transmit all virtual and real traffic through network nodes in the

cloud platform, eliminating the possibility of network node congestion. At the same time, this method realizes network isolation based on vxlan, which ensures high reliability of virtual and real scenarios and solves the problem of limited scale.

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Support Vector Machine for Multiclass Classification of Redundant Instances

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Abstract – **: In recent years, support vector machine has become one of the most important classification techniques in pattern recognition, machine learning, and data mining due to its superior classification effect and solid theoretical base. However, its training time will increase dramatically as the number of samples increases, and training will become more sophisticated when dealing with problems involving multiple classifications. A quick training data reduction approach MOIS appropriate for multi-classification tasks is presented as a solution for the aforementioned issues. While eliminating redundant training samples, the boundary samples that play a vital role are chosen in order to considerably reduce training data and the problem of unequal distribution between categories. The experimental results demonstrate that MOIS may maintain or even improve the classification performance of support vector machines while substantially enhancing training efficiency. On the Opt digit dataset, the suggested method improves classification accuracy from 98.94% to 99.05%, while training time is reduced to 15% of the original; in HCL2000, the proposed method improves classification accuracy from 98.94% to 99.05%. When the accuracy rate is marginally increased (from 99.29% to 99.30%) on the first 100 categories dataset, the training time is dramatically reduced to less than 6% of the original. Additionally, MOIS has a high operational efficiency.**

Keywords:Machine Learning, Pattern Recognition, Data Mining, Classification, Multi-Classification

I. INTRODUCTION

In pattern recognition, machine learning and data mining, Support Vector Machine (SVM) [1] has become a high-profile classification method in recent years due to its excellent classification effect and solid theoretical foundation. Structural risk minimization and convex quadratic programming make SVM more robust classification performance than other classification methods. The kernel method makes SVM also have an excellent classification effect on nonlinear separable problems. SVM has been successfully applied to text recognition [2], image classification [3], financial prediction [4], medical diagnosis [5] and many other scientific and technological fields.

However, the application of quadratic programming in the training process makes the SVM training complexity increase significantly with the rise in the number of training samples. In general, for a training set containing n samples, the time for SVM training on it is complex. The degree is O (n3). In addition, SVM is proposed for the two-class problem. For multi-class problems, the usual practice is to convert the multi-class problem into multiple two-class issues in a one-to-one or one-to-many manner. The one-to-one conversion method requires training an SVM classification model between two classes, and the classification process is more complicated. The one-to-many approach requires much fewer models to be taught, and the classification process is more straightforward, but each model is trained on a severely imbalanced dataset. The model training will be more complicated no matter which transformation method is adopted.

In recent years, with the development of information technology, the scale of data sets is also increasing, among which multi-classification problems exist widely. High training complexity has become the main bottleneck of SVM in many practical applications. How to improve the training efficiency of SVM, Especially for multi-classification problems, is an important and urgent research topic. To reduce the training complexity of SVM, researchers mainly explore two ways: to improve the efficiency of quadratic programming and sample selection. To improve planning efficiency, researchers try to decompose the quadratic planning process on the entire training set into a series of small-scale optimization processes. The typical algorithms in this regard are SMO (Sequential Minimal Optimization) [6], SOR (Successive Over Relaxation) [7], Chunking [8], LIBSVM (LIBrary for SVM)[9] and other algorithms. The method based on sample selection is to select the samples that play a decisive role in the training results from the training set to form a smaller training subset and train the SVM classification model on it. Since the training complexity of SVM is highly dependent on the number of training samples, the method of sample selection has a more significant effect on improving the training efficiency. Because of this, this paper will follow this idea, take the cluster centre as the reference point, and construct an SVM acceleration algorithm suitable for multi-classification problems through sample selection. This paper first summarizes the related research on improving the efficiency of SVM through sample selection; then introduces the proposed algorithm and verifies its effectiveness through experiments; finally, it outlines the work and suggests further research ideas.

II. II.Related work

In the training process of SVM, only the boundary samples as support vectors affect the training results [10]. The remaining samples are either redundant samples that do not work or noise samples that damage the training results. Based on The SVM acceleration method of sample selection is to delete redundant and noisy

instances and select boundary samples that may be support vectors. Based on this idea, author [11] proposed the SVM-KM algorithm. The algorithm first clusters the training samples.

If a cluster only contains samples of the same class, the cluster centre of the cluster replaces all samples in it; if a collection contains samples of different types; all models in the collection are retained. SVM-KM has a higher [12] proposed training sample deletion algorithm. First, an initial SVM was obtained by training a small-scale sample subset, and then the original sample set was separated from the initial SVM. The training samples that are far from the classification hyperplane are deleted. This method can delete some pieces irrelevant to the classification, but the selection effect depends on the initial SVM. author [13] proposed a fast sample selection method NPPS (Neighborhood Property Based Pattern Selection Algorithm), using the neighborhood information of training samples for analysis, NPPS selects selections near the classification hyperplane to form the final training set. This method can significantly improve the training speed, but noise data quickly disturbs election results. Angiulli (ConsistentSub-Set) gave a sample selection algorithm FCNN (Fast Condensed Nearest Neighbor Rule) [14]. This algorithm reduces the sample size to a large extent, which is easy to reduce the classification accuracy. Author [15] used the class distribution information and geometry of the K nearest neighbors of the sample. The feature gives the BEPS (Border Edge Pattern Selection) algorithm to select critical samples. This algorithm can fully use the distribution information of the pieces in the training set. Still, it is easy to choose more samples, and the values of 4 hyper parameters need to be given, increasing the algorithm's application. [16] Randomly selected a certain proportion of samples from the training set to form multiple training subsets, trained an SVM model on each subgroup, and then used these models to evaluate each sample based on the evaluation results selection of samples. Since the evaluation result of each piece is generated by the SVM trained on a randomly selected subset of models, the selection result inevitably has a certain degree of randomness.

The above research has achieved apparent results in improving the efficiency of SVM for binary classification problems. However, for multi-classification problems, these algorithms often find it difficult to achieve satisfactory results in terms of efficiency and effect. To solve this problem, this paper constructs a suitable fast sample selection method MOIS (Multi-class-fication Oriented Instance Selection). This algorithm has apparent advantages over existing algorithms in terms of efficiency and effect for multi-classification problems.

III. MOIS ALGORITHM

3.1 MOIS Algorithm Framework

As mentioned above, to use SVM for multi-classification problems, the original problem needs to be transformed into multiple binary classification problems. Compared with the one-to-one conversion method, the one-to-many approach not only trains the model much less but also makes the classification process Simpler and more efficient, just solving the imbalance between positive and negative classes caused by this method. Therefore, the MOIS algorithm will use a one-to-many conversion method.

Assume that the training set A is composed of L types of samples, the total number of samples in A is N, and the number of c ($1 \le c \le L$) type samples is Mc. Then, according to the one-to-many transformation method, each type of sample in A takes turns to be a positive class sample, and the rest of the samples are taken as the current negative class sample. In the following, we consider the boundary sample selection process when the lth ($1 \le l \le L$) class is used as the current positive class, where Tl represents the result of the selection.

First, use a specific clustering method (k-means clustering method is used in this paper) to cluster the current positive samples, the lth class samples, and assume that the k cluster centers are D1, D2, .., Dk. Then, for each Di ($1 \le i \le k$), calculate its distance e(x, Di) to each sample x. Finally, select a proportion of the more significant d(x, Di) from the lth class positive class samples. At the same time, a certain proportion of negative class samples with minor e(x, Di) from each other class. The basis of this approach is:

For positive examples, the closer it is to the cluster centre of the positive class, the more likely it is an interior point; otherwise, the more likely it is a boundary point. For negative examples, the closer it is to the centre of a positive cluster, the more likely it is a boundary point Big.

3.2 Determination of parameters in MOIS

The following key question is how to determine the total sample selection ratio and the selection ratio of positive and negative samples.

3.2.1Determination of the selection ratio of the total sample and the number of clusters

This section presents a simple and effective method to determine the total sample selection ratio and the number of groups. This method allows the user to choose the appropriate balance and number of groups according to the computing resources and the size of the dataset. Generally, a small data set with fewer samples has higher sparseness and a higher proportion of selected models. On the contrary, for a data set with a large number of pieces but not a high dimension, due to the denser parts, a lower ratio is often selected, i.e. the ideal effect can be achieved. Therefore, we can first determine the range of the scale value according to the size of the data set and then select an appropriate value within this range to verify through experiments. For example, a small data set can be in {0. 2, 0.25, 0.3, 0.35, 0.4, 0.45, 0.5, 0.55, 0.6, 0.65, 0.7} through experimental verification to select an appropriate one value.

For the number of clusters k in the positive class, it is also selected according to the size of the positive course. When there are few positive class samples, the value of k is generally smaller; otherwise, a more significant deal of k

is required. It is found through experiments that the ideal selection effect can be obtained when the value of k is between 1 and 7.

3.2.2 Determination of the selection ratio of positive and negative examples

When determining the selection ratio of positive and negative examples, considering that the current negative class is composed of multiple courses other than the lth class, it is very likely that the number of positive samples is significantly less than the number of negative examples. The selection ratio should help to eliminate this high imbalance between positive and negative classes. At the same time, considering that the boundaries of antagonistic classes composed of multiple types are generally more complex, the number of negative examples should be appropriately selected more than positive models. For instance, in the MOIS algorithm, the number of negative cases is twice that of positive points.

Also, when selecting negative examples, should I choose from the entire negative class, or should I choose from each category that makes up the negative class? Since the multiple courses that make up the negative class tend to be of different sizes, we should choose from each negative example. The number of negative examples should be proportional to the class size. Assuming that the total number of negative criteria set is , then the negative examples chosen from the i-th (1≤i≤M, I≠l) class. The number M_i^s is:

$$M_i^s = \frac{M_-^s M_i}{\sum_{1\le c\le K, c\ne l} M_c} \quad (1)$$

Based on the above analysis, the steps of the MOIS algorithm are shown in Algorithm 1. Algorithm 1 MOIS Algorithm

Input: A training set U consisting of M samples divided into K classes, the sample selection ratio r Output: the selection result Sl when the l (1≤l≤K) class is the current positive class

Step 1: Cluster the lth (1≤l≤K) class samples as the current positive class, and obtain k cluster centers D1, D2, .., Dk Step 2: For each cluster centre Di(1≤i≤l), calculate the distance e(x, Di) to each sample x.

Step 3 Calculate the number of positive examples to be selected , *Ms* as follows:

$$M_+^s = \min\{\tfrac{1}{3}M \cdot r, M_1\}, M_-^s = \tfrac{2}{3}M \cdot r_{\circ}$$

Step 4: Select Ms samples with more significant e(x, Di) from the current positive class and put them in Tl. Step 5: Select Ms negative examples with small e(x, Di) from the i-th (1≤i≤K, i≠l) class

Enter Tl. Among them, Ms is determined by the formula (1).

By training SVM on the obtained selection result Tl, the l classification model can be obtained, and if l is set to 1, 2, .., K classification models will be accepted.

3.3 Complexity Analysis of MOIS Algorithm

In Step 1 of Algorithm 1, the complexity of the clustering process on the positive class is O(UkM/K). Among them, the value of l is not greater than 7, which is the number of cluster centers; U is the number of clustering centers in the clustering process the number of cycles. When k is set to 1, the complexity is reduced to O(M/K). The complexity of step 2 in algorithm 1 is O(lM). Steps 3 to 5 in algorithm 1 are mainly for each sample type. Sorting according to the distance metric, the complexity is O(kMlog(M/K). In summary, the complexity of MOIS is O(Mlog(M/K). It can be seen that MOIS has high efficiency. The following the effectiveness of the MOIS algorithm will be verified by experiments.

IV. Experimental verification

To verify the effectiveness of the MOIS algorithm, it is compared with the most representative three algorithms, NPPS [13], FCNN [14] and BEPS [15], in the experiment. These three algorithms are used to accelerate the SVM. , and achieved significant results. In the experiment, the above four algorithms involved in the comparison will be evaluated from the following aspects: 1) the impact on the classification effect; 2) the simplification of the data set;

3) the effect on the training efficiency 4) The execution efficiency of the algorithm itself.

4.1 Experimental dataset

Several standard multi-classification datasets and a practical handwritten Character recognition dataset are used in the experiment. Table 1 lists the number of samples (Size), number of features (#Fea), number of categories (# Cls), the number of training samples (#Trn), and the number of test samples (#Tes). Except for HCL2000, the rest of the datasets are from the UCI machine learning database [17], and each dataset has been divided into a training set and a

Test set. HCL2000 is a handwritten character set with 3755 classes; each class contains 1000 samples, 700 for training and 300 for testing. The test time is too long, so only the first 100 kinds of models are used for the experiment. By extracting the 8-directional gradient features, the number of elements of each sample is 512.

Table 1 Experimental dataset

Data set	Size	#Fea.	#Cls	#Trn.	#Tes.
Dermatology	368	44	16	292	86
Glass	224	19	16	178	56
HCL2000	100010	522	110	70010	30010
Iris	160	14	13	127	43
Isolet	7807	627	36	6248	1569
Letter	20010	26	36	16010	4010
Optdigits	5630	74	20	3833	1807
Pendigit	11002	26	20	7504	3508
USPS	9308	266	20	7301	2017

4.2 Experimental parameter settings

To avoid running too long on high-dimensional datasets,

the usual dimensionality reduction measures are adopted for high-dimensional datasets such as HCL2000, Iso-let and USPS. Among them, HCL2000 is reduced to 99 dimensions by the LDA method, and Isolate and USPS use PCA, respectively. Down to 150 and 80 sizes.

The kernel function of the SVM used in the experiment is always the Gaussian function defined by Equation (2).

$$(yi, yj) = \exp(-"yi - yj"2/2\sigma 2) \quad (2)$$

The error limit parameter on each dataset and the parameter σ in Eq. (2) is optimized through experimental verification. The selection ratio and the number of clusters in MCIS are set according to the instructions in Section

3.2. The NPPS algorithm the number of neighbors in lb, le, λ and γ in BEPS are all set according to the method in the original text. Here, only the FCNN algorithm does not need parameter settings.

4.3 Experimental results

To compare the performance of various algorithms on the experimental data set, Table 2-Table 5 lists the classification accuracy, sample selection ratio, model training time and sample selection time obtained by different algorithms on each data set. ." All" in the table indicates the case of using the entire training set for training.

Table 2 Classification accuracy on the experimental dataset

Data set	Algorithm				
	All	Beps	Fcnn	Mois	Npps
Dermatology	99	87.16	91.11	97.68	93.74
Glass	68.57	55.52	55.52	64.22	57.7
Hcl2000	98.29	98.17	98.02	98.3	97.28
Iris	99	99	89.91	99	62.64
Isolet	95.34	94.32	94.77	95.06	93.74
Letter	96.97	92.65	94.67	96.4	85.42
Optdigits	97.94	97.83	96.61	98.05	96.83
Pendigit	97.8	97.26	95.8	97.46	97.34
Usps	94.81	94.17	94.52	93.67	94.62

Table 3 Sample selection ratio on the experimental data set

Data Set	Algorithm			
	BEPS	FCNN	MOIS	NPPS
Dermatology	0.74	0.43	0.54	0.65
Glass	0.49	0.55	0.62	0.73
Hcl2000	1.088	0.17	0.17	0.27
Iris	0.41	0.25	0.53	0.42
Isolet	1.01	0.4	0.5	0.65
Letter	0.56	0.28	0.45	0.57
Optdigits	1.03	0.19	0.35	0.51
Pendigit	0.48	0.15	0.5	0.39
Usps	1.06	0.22	0.44	0.57

Table 4: Training time on the testing dataset

Data Set	Algorithm				
	All	Beps	Fcnn	Mois	Npps
Dermatology	0.2	0.16	0.11	0.08	0.14
Glass	0.17	0.05	0.03	0.06	0.08
Hcl2000	23.92	7616.8	1456.2	3378.6	-
Iris	0.03	0.03	0.03	0.01	0.01
Isolet	290.97	231.56	76.8	89.99	116.86
Letter	2139.5	885.29	228.06	596.42	713.03
Optdigits	65.03	59.13	4.23	9.75	25.22
Pendigit	36.22	12.88	2.06	12.73	12.36
Usps	197.78	142.23	14.53	43.42	78.49

Table 5: Running time of the four selection algorithms on the dataset

Data set	Algorithm			
	Beps	Fcnn	Mois	Npps
Hcl2000	970.59	6870.9	61.98	1088.5
Isolet	8.76	23.19	2.97	6.88
Letter	17.78	55.28	1.87	19.42
Optdigits	5.53	3.86	1.17	7.5
Pendigit	4.92	2.47	1.16	6.05
Usps	9.55	5.55	1.59	12.52

From Table 2, it can be found that among the four sample selection algorithms, MOIS maintains the highest classification accuracy on all experimental datasets except USPS, and even on HCL2000 and Optdigits datasets, MOIS makes the classification accuracy more elevated than the original. This is because the data set has been improved. Only on the USPS, MOIS has slightly lower classification accuracy than the other three algorithms. In contrast, the three different algorithms do not maintain classification accuracy very well.

Judging from the sample selection ratio listed in Table 3, the selection ratio of MOIS is only higher than that of FCNN in general but significantly lowers than that of NPPS and BEPS. It is worth noting that the high simplification of FCNN can easily lead to a significant drop in classification accuracy. Observing the SVM training time listed in Table 4, it can be found that the four sample selection algorithms can significantly shorten the training time. In contrast, MOIS's ability to shrink the training time is slightly inferior to that of FCNN and substantially better than NPPS and BEPS.

Since the running times of the four selection algorithms on small-scale datasets are very short, it is difficult to detect significant differences in their running times. Therefore, table 5 only lists the running times of these algorithms on larger-scale datasets. It can be found in Table 5 that the running time of MOIS is significantly

shorter than that of other algorithms, generally only a fraction or even several tenths of the different algorithms, which fully shows that the running efficiency of MOIS is significantly higher than that of other algorithms.

Conclusion As one of the most crucial classification methods in pattern recognition, machine learning and data mining, the support vector machine has an excellent classification effect. However, the model training time of this method will increase significantly with the increase of samples, especially when processing many In the case of classification problems, the model training will be more complicated. Therefore, not only does the number of trained models increase significantly, but the model's training effect needs to be improved. To solve the above problems, this paper presents a fast training data reduction algorithm MOIS suitable for multi-classification problems. The method first clusters the current positive class, then takes the obtained cluster centre as a reference point, removes redundant samples, selects the boundary samples that play a decisive role, and reduces the selection ratio by appropriately controlling the selection ratio of positive and negative examples unbalanced distribution among categories. Different from the previous data reduction methods based on clustering, MOIS clustering only one category of samples and the clustering speed is much faster than the previous algorithm. In addition, by deleting redundant pieces and selecting boundary samples by doing, the data reduction effect of MOIS is better. Compared with several algorithms with excellent performance in the past, it is found that MOIS is significantly better than other algorithms in maintaining the classification effect of support vector machines, and its operational efficiency is also considerably higher.

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Energy Efficient Lightweight Scheme to identify Selective Forwarding Attack on Wireless Sensor Networks

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Abstract – **To protect wireless sensor networks from selective forwarding attacks, a lightweight WSN selective forwarding attack detection technique (LSFAD) is presented. The proposed approach identify selective forwarding attack paths by based on the average packet loss rate (PLR). It compare the PLR of attacked path with its normal PLR, and it can detect and pinpoint malicious links by doing the same for each node. The LSFAD technique detects malicious pathways during regular data packet sending and receiving without disrupting the normal operation of the entire network. Its simple design eliminates the need for listening nodes and sophisticated evaluation models. According to the results of the security and performance investigation, the LSFAD scheme is secure against passive and active selective forwarding attacks launched by malicious nodes. The LSFAD method has a significantly lower communication overhead compared to similar schemes. Despite an average PLR of 0.125 on the link, the LSFAD method detected the selective forwarding attack path in experimental simulations. Identifying the malicious nodes that launch a selective forwarding attack is possible when the link's usual PLR is more than 0.025. It is effectively detected and localized, and the network's energy consumption for doing so is not significantly higher than under normal conditions.**

Keywords: Wireless Sensor Network, Selective Forwarding Attack, Energy Consumption, Data Packet, Lower Communication Overhead.

I. INTRODUCTION

Wireless sensor networks (WSNs) are employed in the military, environmental monitoring, transportation, agriculture, medical, and home furnishing [1]. Security issues have always been a study focus. WSNs are multi-hop networks of sensor nodes. Sensor nodes are vulnerable to internal and external attacks, including selective forwarding attacks [2]. It is a severe internal assault [3], and the wireless channel's instability makes it hard to identify the network link's average packet loss from the selective forwarding attack's malicious packet loss, which has high concealment. Thus, detecting, locating, and isolating rogue nodes that initiate forwarding attacks is critical.Recently, scholars have presented effective selective forwarding attack detection techniques. Multi-hop confirmation-based forwarding attack detection techniques were presented [4-8]. Multi-hop confirmation requires more confirmation packets, which increases communication costs and reduces network life. Trust evaluation- based detection techniques [9-13] can identify harmful network nodes. Most detection techniques have a static trust threshold and misinterpret regular nodes. Thus, malevolent nodes are frequently misidentified, requiring more monitoring nodes and increasing network overhead. Literature [14] proposed malicious node detection schemes based on learning automata. However, literature [15] did not perform well in detecting selective forwarding attacks that do not generate malicious data packets. Literature [16] proposes two abnormal node detection schemes to detect particular forwarding attacks effectively. Still, the reward and punishment parameters of the learning automata of these two schemes are fixed values artificially set according to the voting situation of node neighbors, and the detection method is not flexible. To solve this problem, literature [17] proposes a detection scheme that can dynamically adjust the reward and punishment parameters of the learning automaton, which improves the flexibility and applicability of the detection method. Still, this scheme needs to be determined by the number of confirmation packets replied to by the neighbor nodes. Defining the environment's feedback to the learning automaton consumes many network resources.The proposed LSFAD strategy is based on this crucial observation. When a malicious node is on a selective forwarding attack route, the base station (BS) receives far fewer data packets from the originating node. Based on this observation, the BS records each source node's total data packets and routing path. The average and regular Packet loss rate (PLR) are determined by it. If the course's average PLR is higher than the way's, the current form is under selective forwarding attack. Each intermediate forwarding node tracks the data packets provided by the forwarding source node to the BS to identify the malicious node or connection that starts the forwarding assault. If a selective forwarding attack is found, the BS will notify eac node of the quantity of data packets sent by the source node to the BS. The BS then estimates PLRs. The node with the highest average PLR is malevolent.

II. Related Work

Currently, the selective forwarding attack detection schemes proposed by scholars at home and abroad can be roughly divided into projects based on the multi-hop confirmation model, methods based on the trust evaluation model and strategies based on learning automata.Author [18] presented a two-hop acknowledgment detection system based on the confirmation node since each node is a confirmation node

and sends an Acknowledging packet every time it gets a data packet, which dramatically increases network message collisions and collisions. Author [19] presented a multi-hop confirmation detection technique. This approach can greatly reduce network message collisions if more than two malicious nodes are chosen. Malicious nodes collaborate to confirm the nodes, invalidating the plan. This difficulty was solved by the author [20]'s multi-hop confirmation mechanism system (per-hop acknowledgment-based method, PHACK). PHACK places all nodes on the forwarding path except for average forwarding data. A confirmation packet for each forwarded packet must be generated and sent to the source node over several paths to detect and find rogue nodes. Author [21] proposed a selective forwarding attack detection strategy using the multi-hop confirmation and trust evaluation model to reduce network overhead and enhance the detection rate of numerous malicious nodes on the path. Author [22] also developed a wireless ad hoc network-based selective forwarding attack detection technique that uses a hop-by-hop confirmation mechanism and an upgraded two-hop confirmation mechanism to detect demanding forwarding behavior to reduce resource overhead. The source node receives the confirmation packet over the original data forwarding mechanism.Author [23] proposed two wireless sensor network intrusion detection schemes based on learning automata. Since these two schemes are not malicious behaviors of detection nodes, although detecting malicious data packets is very effective, they are not suitable for generating malicious data packets. Selective forwarding of packages does not seem well.

III. System Model

(a)Network Model:-

The sensor network comprises a base station, ordinary nodes and malicious nodes. unique identity mark IDi is given to each node_i at beginning of deployment and a symmetric key Li,BS shared with BS. They assume that all nodes are no longer moving after the network is deployed to the target area. With BS as the root, all nodes form a tree structure; as the network runs, some nodes may die due to battery exhaustion, causing the network path changes, so every once in a while, BS will update the topology of the entire network in time. When I perceive the data, it will send it to BS in a multi-hop manner. While sending the data packet from source node I to BS, each intermediate forwarding node will record that it has forwarded the data transmitted by source node I. The number of packages BS will record the total number of data packets sent by each source node I and the forwarding routing path of these data packets. On the forwarding path of data packets, not only malicious nodes on the way will discard the data packets it should forward with a certain probability, but also because of the instability of the physical layer wireless channel and the collision of MAC (media access control) layer data packets, any A communication link between two intermediate forwarding nodes may also drop packets typically. Scholars at home and abroad have proposed many schemes for generating and fusion sensing data [19-20]. This paper will not describe this in detail here. This paper mainly focuses on detecting the selective forwarding attack path and locating the malicious node or node that initiates the attack malicious link. For the convenience of reading and explanation, Table 1 describes the symbols used in this paper.

(b)Attack Model and Security Goals:-

Assume that in the network, except for the BS, any other node may be captured by the enemy. Once captured, these nodes will become malicious nodes, and the enemy will obtain security information such as identities and keys, and use these nodes to launch a series of attacks, such as injecting false data attacks, wormhole attacks, cloning attacks, Sybil attacks, and selective forwarding attacks, etc. This paper considers only particular forwarding attacks initiated by malicious nodes. Special forwarding attacks can be divided into passive and active, selective attacks. A passive special forwarding attack means malicious nodes only discard regular data packets with a certain probability and ignore the demanding forwarding attack detection behavior in the network. On the other hand, the active, particular forwarding attack not only loses regular data packets with a certain chance but also interferes with the detection behavior of special forwarding attacks to avoid being detected. This paper's LSFAD technique resists malicious passive selective forwarding attacks and deliberate nodes' active, specialised forwarding attacks

IV. LSFAD Scheme

This study proposes a four-step LSFAD scheme: the source node generates the data packet, the intermediate node forwards it, and the BS detects the selective forwarding attack path and locates the malicious node.

(a)Generate Data Packets:-

After producing the data packet P, the source node I will create two fields to record the unique identifying tag of the data packet source node I and the sequence of the current data packet Number while sending sensing data to BS. Then, node I hold its identity tag IDi and data packet sequence number Seq_Numberi into the corresponding fields, where the sequence numbers of data packets are continuous, and finally sends the data packet to the next intermediate forwarding node

(b)Forwarding Packets:-

As illustrated in Table 1, all intermediate forwarding nodes retain a packet source node forwarding table (forward data table, DFT) with the Source ID field identifying the source node and the ForWord Count field indicating the number of packets passed.

Table 1 Packet forwarding table

Source_ID	ForWord_Count
…	…
ID	$ForWard\_Count_i$
…	…

When the intermediate forwarding node j receives a data packet Q, it first checks in its data forwarding table DFT

whether there is a record whose source node identity is Q.IDi; if not, then creates a new one in the data forwarding table DFT record, make DFT.Source_ID = Q.IDi, DFT.ForWord_Count = 1; if it exists, add 1 to the ForWord_Count field value of the corresponding record, and make DFT.ForWord_Count = DFT.ForWord_Count + 1, forward the data packet P to the next intermediate forwarding node.

(c)Detecting Selective Forwarding Attack Paths

After collecting the network's topological structure, the BS saves the identities of all source nodes and intermediary nodes in DST. Source ID, DST. Empty Path Array fields and other sections are initialised. If a node dies due to battery exhaustion, the path from some source nodes to the BS may change. The BS will update the network topology and adjust the Path Array field of the data packet sending table DST. When the BS receives a data packet Q, it will execute Algorithm 1 to detect the selective forwarding attack path. It first finds the record of the source node identity Q.IDi in the data packet transmission table DST; if the Seq_Number field is empty, it is the first time receives the data packet sent by the source node, and it will set DST.Seq_Number = Q.Seq_Numberi,

DST.Sum_Count = 1, DST.Drop_Count = 0; if the Seq_Number field is not empty, compare whether the sequence number of the last received data packet is continuous with the sequence number of the currently received data packet; if continuous, it means that there is no packet loss, it will update the values of the DST.Seq_Number and DST.Sum_Count fields so that DST.

Seq_Number = Q.Seq_Numberi, DST.Sum_Count = DST.Sum_Count + 1; If the packet sequence number is not consecutive, it means there is packet loss; it will make DST. Seq_Number = Q.Seq_Numberi, DST.Sum_Count = DST.Sum_Count + 1, DST.Drop_Count = DST.Drop_Count(Q.Seq_ Numberi - DST.Seq_Number - 1), where Q.Seq_ Numberi - DST.Seq_Number - 1 represents the number of lost data packets. Then the BS executes the formula (1) to determine the average PLR DPaverage of the current path and DPnormal of the recent course (2). The BS will use Algorithm 2 to find malicious nodes if the average PLR DPaverage is higher than DPnormal. DST. Sum Count+DST. The source node, DST, sends Drop Count data packets. Drop Count is the number of packages lost in the current path, q is a node in formula (2), and The average PLR of the previous nodes, h is the path length from the source node to the BS.

$$DP_{\text{average}} = \frac{\text{DST.Drop\_Count}}{\text{DST.Sum\_Count} + \text{DST.Drop\_Count}} \quad (1)$$

$$DP_{\text{normal}} = \sum_{i=1}^{h} r_i \prod_{j=1}^{i-1} (1 - r_j) \quad (2)$$

Algorithm 1 Selective forwarding attack path detection

Input: data packet Q, data packet transmission table DST, average PLR q of the link between nodes.

Output: Selective forwarding attack path.

1. For each record in DST, do
2. If Q.IDi == DST.IDi then
3. If DST.Seq_Number = null, then

a. DST.Seq_Number = Q.Seq_Numberi

b. DST.Sum_Count = 1

c. DST.Drop_Count = 0

4. Else if P.Seq_Numberi - DST.SeqNumber == 1 then

a. DST.Seq_Number = Q.Seq_Numberi

b. DST.Sum_Count = DST.Sum_Count + 1

5. Else

a. DST.Seq_Number = Q.Seq_Numberi

b. DST.Sum_Count = DST.Sum_Count + 1

c. DST.DropCount = DST.DropCount + (Q.Seq_Numberi - DST.Seq_Number - 1)

d. Calculate the DP average by formula (1)

e. Calculate DPnormal by formula (2)

f. If DPaverage > DPnormal, then

i. Return DST.PathID_Arrayi

g. End if

6. End if

7. End if

8. End for

(d) Locating Malicious Nodes

The BS detects DST selective forwarding. PathID Arrayi, assuming the path DST.PathID Arrayi has m hops from the source node to the BS, is represented by (x1,x2,..., xm, BS), where x1 represents the data packet's source node and the remainder Nodes indicate intermediate forwarding nodes. The BS first alerts each node to send the number of data packets in the data forwarding table DFT forwarded by the source node n1 to the BS sequentially along the route, starting from the source node (3). (3) represents node ni's identification, IDi. DFT. For Ward Count is the number of data packets forwarded by node ni, pi - 1 represents data packets transmitted by the previous hop, and Timestamp represents Timestamp, || denotes join operation.

$qi = FL4{,}1\ (IDi \parallel ni.DFT.ForWard\_\text{Count} \parallel qi{-}1 \parallel \text{Timestamp})$ (3)

V. Performance Analysis

This paper will analyze and compare the LSFAD scheme proposed in this paper and the scheme proposed in the literature [24] from the aspects of communication overhead and storage overhead and analyzes the detection

probability of selective forwarding attack paths. Since the scheme in this paper assumes that the calculation, storage and communication capabilities of the BS are not due to limitations, the BS's communication overhead [25] and storage overhead[26]are not discussed here.

(a)Communication Overhead:-

This paper analyzes the communication overhead caused by malicious node detection. It takes the number of data packets each node needs to forward or send as an indicator to measure the communication overhead. The PHACK scheme proposed in [27] is a detection method based on multi-hop confirmation. In addition to forwarding regular data packets, each node on the forwarding path needs to generate proof for each box to detect and locate malicious nodes. The data packets are sent back to the source node in different ways. Suppose a source node sends M data packets at a time. In the PHACK scheme, the communication overhead of each node is 2M. In the CLAIDS scheme proposed in the literature [28], assuming each node has N neighbor nodes and a node sends M data packets to each of its neighbor nodes, each node needs to return M confirmation packets. Therefore, in the CLAIDS scheme, the communication overhead of each node is 2M × N. In the DSFLACQ method introduced in [29], each node has N neighbor nodes and sends M data packets to them. Each neighbor node only needs to reply one confirmation packet[30], hence the communication overhead of each node is (M + 1)×N. This paper's LSFAD technique does not monitor adjacent nodes or transmit confirmation packets to the source node. BS detects attack path. If the BS discovers the attack path after receiving M packets from the source node, each node on the forwarding path will sequentially submit a statistical data packet for a malicious node location. This paper's LSFAD technique has M + 1 communication overhead per node. Table 2 shows each node's communication overhead for the LSFAD scheme, CLAIDS, DSFLACQ, and PHACK schemes. Table 4 shows that the LSFAD system suggested in this paper has substantially lower communication overhead than other schemes.

Table 2 Comparison of communication overhead

CLAIDS	DSFLACQ	PHACK	LSFAD
2M × N	(M+1)×N	2M	M+1

VI. SIMULATION EXPERIMENT

In this study, the LSFAD scheme's malicious path detection probability, malicious node placement probability, and energy consumption are simulated and analyzed. The OMNeT++ platform does simulation experiments. 100 nodes are randomly arranged in a 500 m X 500 m square. Each node has an ID. 90 m is each node's communication range. After deployment, the node won't move because the BS is in the center of the region. Select data source, malicious, and intermediate forwarding nodes at random. The data source node provides 256-byte data packets to the BS via multi-hop every 1 s. Each node has 1 J of starting energy and consumes 50 nJ/bit for sending and receiving. 0.2~0.8 % of malicious intermediate forwarding nodes reject data packets they seek to forward. Table 3 lists the simulation parameters.

Table 3 simulation parameters

Parameter	Value or range
N/w area/m2	500×500
No. Of nodes in n/w	100
Radius/m	90
Initial energy of the node/j	1
Sending and receiving energy consumption/(nj/bit)	50
Data packet sending interval/s	1

Algorithm 1 detects the selective forwarding attack path when the BS receives the source node's data packet. It estimates the present course's average PLR DPaverage and the recent system's formula (1). (2). The existing form has a selective forwarding attack if the system's average PLR DPaverage is greater than the way's DPnormal. Figure 1 shows that the link's average PLR is 0.005, 0.025, 0.045, 0.065, 0.085, and 0.105, and the malicious node's is 0.2, 0.4, 0.6, and 0.8. Figure 1 shows that when there is only one malicious node in the path, the regular PLR and the average PLR are higher than the regular PLR DPnormal of the way. means that selective forwarding attack pathways begun by hostile nodes on the way with PLRs q = 0.2, 0.4, 0.6, and 0.8 can be detected. Selective forwarding attack path verification is more likely if the association's normal PLR is low and malicious nodes' PLR is high.In the LSFAD scheme, the energy consumed by a node on the path is mostly from receiving and sending data packets, so the sum of the energy consumed by all nodes on a forwarding path is UE=(i=1)^n^M×N i×(f r+f s), where n is the path length, M is the data packet length, Mi is the number of data packets forwarded by node I, and er and es are the energy consumed to receive and send 1-bit data, respectively. Figure 1 shows the energy usage of all forwarding path nodes in normal and detecting modes. Table 4 shows that when the average PLR of the link is 0.025, the PLR of malicious nodes is 0.2, and 50 packets are sent at a time, when the path lengths are 4~12, the energy consumption of the whole way in normal mode and detection mode increases. The detecting state consumes 1.8 μJ more energy than the regular form.

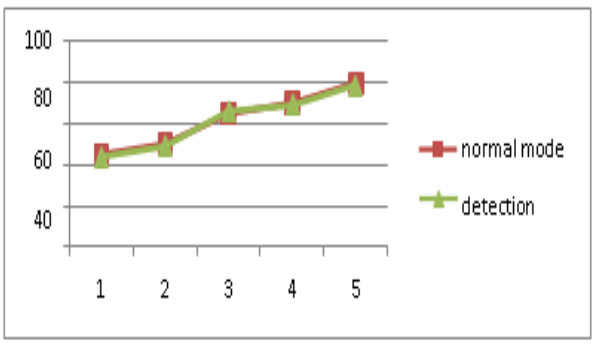

Figure 1 Energy consumption in normal mode and

detection mode

This is because when the BS finds a selective forwarding attack on a particular path, it will start the detection mechanism to locate the malicious node. After all, each node on the course needs to send information about the number of data packets forwarded by the source node along the forwarding path to the BS locates malicious nodes. The network consumes slightly more energy in detecting and locating malicious nodes than under normal conditions, but the overall energy consumption is not much different.

VII. Conclusion

This research provides a lightweight wireless sensor network selective forwarding attack detection technique (LSFAD). In the LSFAD scheme, the BS records the total number of data packets sent by each source node and the routing path of these data packets forwarding through Calculate and comparing the average PLR of the way with the regular PLR to determine if there is a selective forwarding attack on the current form. The base station assesses each node's average and regular PLR to find malicious nodes or links that launch forwarding attacks. The previous node link is a malicious link if its average PLR is higher than expected. The LSFAD scheme is simple, requires no listening nodes, does not need a sophisticated evaluation model to generate node trust values, and is easy to implement. LSFAD can also withstand passive and active selective forwarding assaults by hostile nodes. Performance study and experimental simulations reveal that the LSFAD method has substantially lower communication overhead than competing techniques. LSFAD's selective forwarding attack path can be detected even with a 0.125 connection PLR. Malicious nodes that launch forwarding attacks can be found when the packet rate exceeds 0.025. The network uses similar energy to detect and locate malicious nodes.

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Probabilistic scheme for Intelligent Jammer Localization for Wireless Sensor Networks

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Abstract – **With the development of artificial intelligence technology, intelligent interference sources can improve the interference effect by changing their transmission power, which leads to the failure of traditional positioning technology based on received signal strength. Therefore, a sensor wake-up mechanism is introduced to study multi-interference sources based on block-compressed sensing positioning method. First, wake up the sensor nodes periodically, while improving the utilization effectiveness of the sensor nodes and the accuracy of positioning information collection; secondly, considering that the distance between the distance and the received signal strength cannot be determined when the transmission power of the interference source is unknown and changes. Then, based on the compressive sensing theory, the positioning problem is modeled as a block sparse vector reconstruction problem; finally, a variation-based algorithm is designed by exploring the law of power variation. The Wake-VBEM reconstruction algorithm based on Bayesian mean expectation accurately reconstructs the target position vector. The simulation proves that the proposed method can simultaneously realize the position estimation of multiple interference sources and effectively improve the service life of the network when the interference source power is unknown and changes.**

Keywords: ***Wireless Sensor Network, Sensor Wake-Up Mechanism, Artificial Intelligence, Bayesian Algorithm, Intelligent Jammer***

I. INTRODUCTION

Wireless Sensor Networks (Wireless Sensor Networks, WSN) are composed of low-cost, low-power sensor nodes and are widely used in daily production, life, and national defense and military fields [1]. However, it affects the transmission of wireless signals, thus destroying the security and reliability of information interaction in WSNs. Existing spectrum anti-jamming measures ensure communication quality by improving technical solutions, such as direct sequence spread spectrum, frequency hopping technology, and intelligent anti-jamming technology [2-3]. However, such methods are highly complex and require a large amount of bandwidth. And storage resources cannot fundamentally eliminate the problem of malicious interference. Interference source location can provide technical support for anti- jamming technology, such as directional interference elimination but also help to achieve precise strikes on interference sources [4], fundamentally eliminating malicious interference Source of interference.

The interference source location technology based on received signal strength (Received Signal Strength, RSS) locates by collecting the RSS of the interference source, without the need for any sensor nodes to send any signals, and has the advantages of simple operation, high security, and wide application [5]. In the case of hiding itself, the location of the interference source is realized [6], so it has become an effective measure for locating the source. The literature [7] proposed a distributed RSS-based interference source location algorithm. According to the gradient idea, the interference source is approached along the rising direction of RSS, but this algorithm can only realize a single interference source location. Literature [8] studies the interference source location method in short-distance communication and uses the clustering method to learn the site according to whether it is affected by the interference source. , the positioning accuracy is low. With the continuous improvement of the intellectual level of malicious interference sources, the interference source can change its transmission power to enhance the interference effect [9]. The RSS-based positioning method relies on signal attenuation to estimate its position, but the interference source transmission power after the change

The power attenuation is difficult to calculate, so the positioning cannot be completed. In addition, to improve positioning accuracy, it is usually necessary to deploy many sensor nodes, but batteries power the sensor nodes, and their energy is limited. Therefore, any applications will seriously hinder the development of sensor networks [10].

Based on this, this paper studies the energy-saving positioning method for multi-intelligent interference sources and designs the Wake-VBEM algorithm based on the variation Bayesian Expectation-Mean (Varia-tional Bayesian Expect- Mean, VBEM) [11] under the sensor wake-up mechanism. Sensor nodes are used to improve the service life of the network and obtain more positioning data. At the same time, introduce reference power to solve the problem of inability to locate caused by interference source power changes. The main innovations are as follows:

(1)Design the sensor sleep-wake mechanism and periodically wake up the sensor to collect more positioning information and prolong the service life of the sensor node.

(2) Introduce the reference power to solve the problem that the perception dictionary cannot be obtained due to the power change of the interference source, and then adopt the Block Compressive Sensing (BCS) principle [12] to model the localization problem as a block sparse vector reconstruction problem.

(3) Design a correlation matrix based on the VBEM algorithm to explore the law of interference source power changes and design a correlation matrix based on interference source power changes to achieve accurate position vector reconstruction.

II MODEL ESTABLISHMENT

The sensor wake-up mechanism is used to collect data to solve the positioning problem under the intelligent change of interference source power. First, the compressed sensing theory is introduced to establish a positioning model. Then, in reconstructing the position vector, a reconstruction algorithm is designed under the framework of VBEM. The specific operation process is as follows Figure 1 shows.

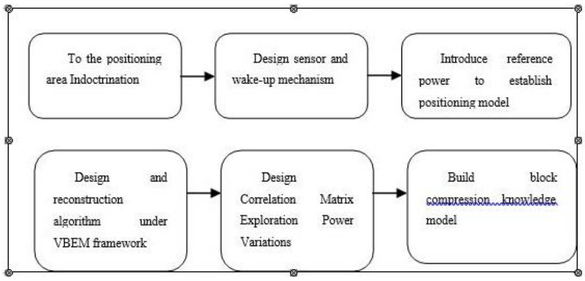

Figure 1 Flow chart of intelligent interference source location under the sensor wake-up mechanism

2.1 Compressed sensing localization model

Compressed sensing theory [13] reconstructs discrete sparse signals, and introducing it into positioning requires discretization of the positioning area. Therefore, as shown in Figure 2, the positioning area is divided into N grids and numbered sequentially (here, Take a square area as an example, other positioning areas of arbitrary shapes are handled this way).

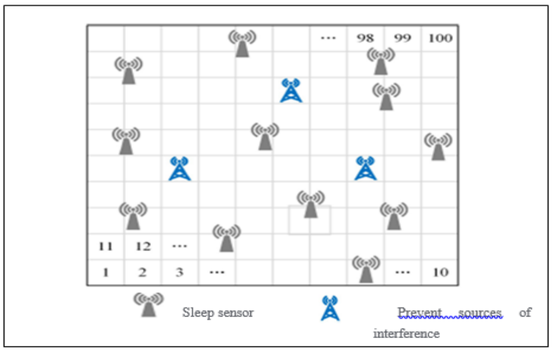

Figure 2 Compressed sensing positioning scene diagrams

The position of the interference source is uncertain and can be randomly distributed in any grid, and its work is described by a sparse vector t:

$t = [0,1,0, \cdots ,0,1,0, \cdots ,0]$ (1)

If ti=1, it means that there is an interference source in the i-th grid; otherwise, it does not exist. If there are R sensor nodes in the positioning area to collect positioning information, the positioning equation is as follows:

$zR = \mathbf{\Psi} R\times M\ TM + nR$ (2)

Among them, zR represents the sum of the RSS of all interference sources collected by the eth sensor node; Ψ is the perception dictionary, which is used to describe the relationship between the position of the interference source and the RSS; The RSS[14 - 19] of a sensor node is expressed as follows:

$\mathbf{\Psi} rm = Qm\ (, Km\ )$ (3)

Among them, Qm is the transmission power of the interference source located in the nth grid; Tr and Km are the coordinates of the rth sensor node and the nth interference source, respectively; g represents the relationship between the interference source and the sensor node. $\mathbf{\Psi} rm$ is affected by the influence of the transmitting power of the interference source and its distance from the sensor node. Once the position vector s is obtained, it can correspond to the coordinates of the interference source.

2.2 Sensor wake-up mechanism design

The introduction of the sensor wake-up mechanism under the CS framework has the following advantages: 1) Periodically wakes up the sensor nodes, which can save energy and prolong the service life of the network; 2) wake up different sensor nodes, which can collect more and more helpful positioning information; 3)

) to achieve positioning under the CS framework, which can make the number of wireless links awakened each time as small as possible.

At this time, the design of the wake-up strategy can be modeled as the construction of the observation matrix, let l=1,2,., M is the sampling time, then:

$$z_N^{(l)} = \Phi_{N\times R}^{(l)} \Phi_{R\times M}^{(l)} T_M + n_M^{(l)} = B_{N\times M}^{(l)} T_M + n_M^{(l)} \quad (4)$$

Among them, B(l), z(l) and m(l) are the perception matrix, measurement vector and noise vector at the lth sampling, respectively; here, it is assumed that the number of wireless links awakened each time is the same; TM represents the position of the interference source Φ(l) is the sampling matrix of the lth time, and only one element in each row is 1, indicating the wireless link index of the lth wake-up.

The design of the wireless link wake-up strategy is embodied in the compressed sensing positioning model, which is to design the observation matrix Φ, and the position of its non-zero element represents the wireless link to be awakened. This paper develops a random wake-up strategy, the non-zero elements in the observation matrix ΦS. The position of the 0 pieces is randomly generated, and there is only 1 in each row.

2.3 Establishment of positioning model under the wake-up mechanism

The intelligent interference source affects the communication by changing the power, so the perception dictionary Φ(l) in the CS model cannot be established. To solve this problem, a reference power Q0 is introduced. If the power of the interference source at the lth sampling time is Ql, the positioning model can be expressed as follows:

$(l) = (l)(l) = C(l)x(l), m = 1,2, \cdots , M$ (5)

Among them, $z(l)$, $B(l)$ and $T(l)$ are the measurement vector, perception matrix and position vector at the lth sampling, respectively. The establishment of $B(l)$ is shown in formula (3), and it needs to know the power Pl

of the interference

source. Still, it cannot be realized when the power of the interference source changes, so the reference transmits power is introduced, then:

$$y_m^{(l)} = \sum_{n=1}^{N} Q_n^{(l)} g(T_m, V_n^{(l)}) = \sum_{n=1}^{N} x_n^{(l)} Q_{n0}^{(l)} g(T_m, V_n^{(l)}) = \sum_{n=1}^{N} x_n^{(l)} F_{mn}^{(l)} \quad (6)$$

Among them, $Q_n(l)$ and $Q_{n0}(l)$ are the interference source's reference power located in the nth grid at the lth sampling moment. E is the

power corresponding to the reference power P(l) n0 Perception dictionary. At this time, the position vector $x^{(l)}$ is defined as follows:

$$Q_n(l) = x_n(l)Q_{n0}(l) \quad (7)$$

Although the elements of x(l) are not either 0 or 1, the index of the non-zero elements can indicate the target position. For example, if $x(l) \neq 0$, there is no

interference source in the nth grid.

Problem (5) involves the reconstruction of multiple measurement vectors. However, traditional numerous measurement vectors (Multiple Measurement Vectors, MMV) generally require the perception matrix to be consistent, so it is difficult to solve the above problems. Based on this, this paper introduces the BCS theory and explores the interference. In addition, the change law of source power is used to improve the positioning accuracy, which can solve the reconstruction problem when the perception matrix and the position vector are inconsistent.

III.SIMULATION VERIFICATION

The intelligent interference source location algorithm Wake-VBEM proposed in this paper is verified in Matlab. The 12m×12m square area is divided into N = 144 guards and Q = 144 sensor nodes deployed. K intelligent interference sources are randomly distributed, and each time, the number of awakened sensor nodes is

M. The noise is described by the signal-to-noise ratio (Sig-nal-to-NoiseRatio, SNR).

To measure the positioning performance of the algorithm, the average positioning error ErrL is defined as:

$$\mathrm{ErrM} = \frac{1}{L \cdot R} \sum_{l=1}^{L} \sum_{r=1}^{R} \sqrt{(y_l^t - \hat{y}_l^t)^2 + (z_l^t - \hat{z}_l^t)^2} \quad (8)$$

Among them, (y_l^t, z_l^t) and $(\hat{y}_l^t, \hat{z}_l^t)$ are the actual and estimated coordinates of

the k-th interference source in the n-th simulation, respectively. R and L are the total numbers of simulations and targets, respectively. The power change of the interference source can be regarded as a Gaussian process; the lth target power

$Q(l)$ changes at the lth sampling moment as follows [25-30]:

$$Q_k(l) = Q_k(l-1) + (1 - r)Q_0 + w(l) \quad (9)$$

Among them, $Q_0(l) \sim (\,, \sigma_q k)$ and $\sigma_q k$ is the variance of the power fluctuation of the kth interference source, and the parameter $w(l) \sim \mathcal{N}(0, (1 - s^2))$.r is used to describe the relationship between power changes. When the sampling interval is minimal, s is close to 1 and decreases with increasing sampling time. This model can set the power changes between different interference sources to be independent of each other, which is in line with the actual situation. Assuming four interference sources, the reference powers are 100w, 800w, 900w, and 1100w, respectively. When the correlation is s=0.5, the power changes of different interference sources are shown in Figure 3. The power changes of interference sources are inconsistent simultaneously at other sampling ties and other interference sources. Therefore, the power changes are a unpredictable. It can be seen that the proposed interference source change model can effectively simulate the actual power change. Thus, the performance of the algorithm is verified based on this model.

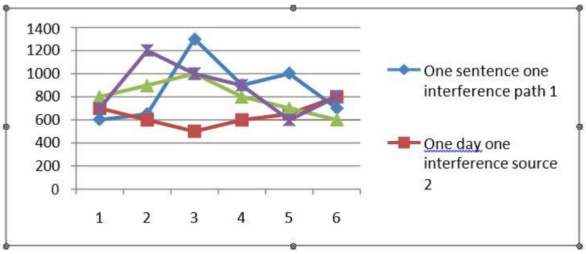

Figure 3 Schematic diagram of power variation of different interference sources

First, test the positioning performance of the algorithm under different sampling lengths M. Assuming that the number of sensor nodes awakened each time is N = 14 and SNR = 30dB when the number of interference sources L = 3, the ErrM of the algorithm under different sampling lengths is shown in Figure

4.SVM-VBEM and MMV-VBEM are single measurement vectors and VBEM algorithms that do not consider the law of power variation, respectively, and are used to compare with the proposed Wake-VBEM algorithm. As the sampling length M increases, the ErrM of both MMV-VBEM and Wake-VBEM algorithms decreases because M the addition of MMV can provide more positioning information. At the same time, SVM-VBEM only processes a single measurement vector, which cannot improve positioning accuracy. In addition, the MMV-VBEM algorithm does not consider the power variation of the interference source, its positioning error is significant, and the change of ErrM with M is small while Wake-VBEM, The ErrM of the algorithm decreases rapidly with the increase of

M, showing its superior positioning performance. To balance the positioning accuracy and algorithm complexity, M=2 in the following simulation.

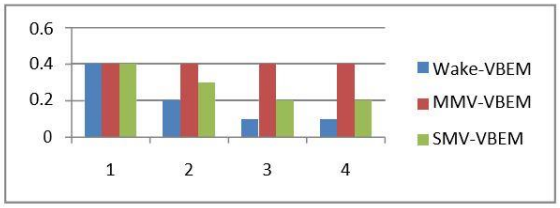

Figure 4 Effect of sampling length on localization performance

Secondly, the influence of the number of different interference sources on the proposed Wake-VBEM algorithm is tested. Let N = 14 and SNR = 30dB. When M

= 2, the average positioning error of different algorithms is shown in Fig. 5. It can be seen that the increase in the number of targets leads to the vector scarcity decreases, which affects the reconstruction accuracy, so the ErrM of all algorithms gradually increases. The proposed Wake-VBEM algorithm considers the power variation law of the interference source, and its positioning error is the smallest.

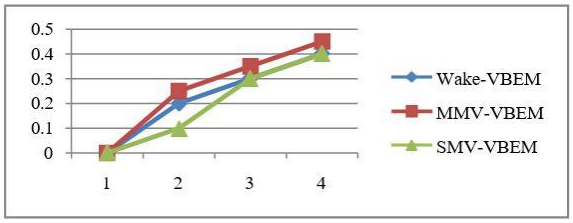

Figure 5 The effect of the number of targets on localization performance

Then, test the positioning performance of the algorithm under different sensor wake-up numbers. Let L=3, SNR=25dB and M=2, the change of ErrM of different algorithms with M is shown in Figure 6. Increasing M can obtain more positioning information, which helps to improve positioning accuracy. It can be seen that the ErrM of the three algorithms decreases with the increase in the number of wake- up sensors, and the ErrM of the proposed Wake-VBEM algorithm is the lowest.

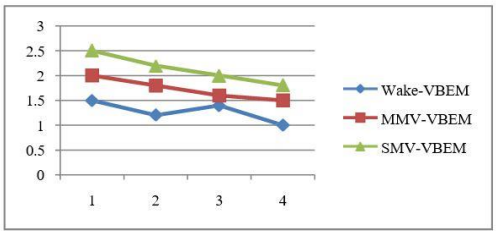

Figure 6 The influence of the number of awakened sensor nodes on the positioning

Finally, the anti-noise performance of the algorithm is tested. Let N = 14, L = 3 and M = 2, and the change of ErrM with noise is shown in Figure 7. As the SNR gradually increases, the ErrM of all algorithms decreases slowly. However, regardless of the SNR However, the ErrM of the proposed Wake-VBEM algorithm is always the lowest. In addition, when SNR=30dB, the ErrM of the proposed algorithm gradually begins to converge, reflecting the algorithm's good anti-noise performance.

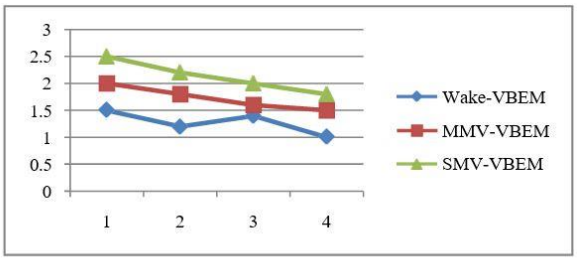

Figure 7 The impact of noise on positioning performance

Conclusion to solve the problem of positioning failure caused by the power change of intelligent interference sources, an energy-saving algorithm Wake- VBEM under the sensor wake-up mechanism is proposed. First, the random wake- up strategy is modeled as the design of the observation matrix under the CS framework. Then, the reference power is introduced. Based on the BCS theory and BCS theory; the positioning problem is modeled as a block sparse reconstruction problem. Finally, a reconstruction algorithm is designed under the VBEM framework, and the reconstruction accuracy is improved by exploring the power variation law of the interference source. Under the condition of unknown and changing source power, multiple interference source positioning can be realized, and the network's effective utilization can be improved simultaneously.

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A Research On Use Of Manet For Wireless Device

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Abstract – **With the fast improvement of wireless gadgets a MANET got here into existence. A MANET which is also referred to as cellular advert hoc network which connect cellular gadgets wirelessly. it is a self-organizing community which does now not have any framework. consequently it's far self-governing device. each device in MANET is loose to transport in any direction dynamically so that it will proportion information between devices or nodes of network. MANET has no any administrator node which is chargeable for controlling different nodes, each and each node of MANET is behave as router and host itself and shape their own network. diverse routing protocol is chargeable for routing in MANET. This paper introduces, routing protocol, benefits, problems, programs, traits of MANET.**

Keywords: hoc network, , characteristics, challenges, applications

I. INTRODUCTION

Manage the spinned words as you want.. With the speedy boom of era devices of communication has drastic exchange in statistics society. In early era human beings used stressed out devices with the intention to talk with each different. however now because of strengthen era we replaced stressed out gadgets with the wi-fi devices like pc, cellular telephones, Bluetooth and so on. wi-fi network haven't any. of nodes which help in speaking over wireless medium with none centralized gadget. The mobile devices are of two kinds. First category of cell gadgets comes underneath the category which has their specific framework. And the second one does no longer have any framework. as a result, this form of category is known as ad hoc network. wherein each tool is capable of shifting and able to connect dynamically and these networks have now not any proper of access factor which is preset. each and each node is behaving as host or router and might ship information packets to other nodes.The movement of nodes is random, that's why an ad-hoc network works between the taking part nodes, causing random modifications within the network. As MANETs are a class of wi-fi networks, wireless users can form the community dynamically and do no longer want any infrastructural setups . A stressed business enterprise involves base stations, passages, and doorways. distant frameworks are related thru constant switches, middle factors, and switches, though, in an impromptu organization the place of switches, facilities, and switches is probably transportable. At a kingdom of time, the quantity of switches can develop or decrease. Likewise, the publications may also range in an impromptu employer. a versatile impromptu agency (MANET) is a shape far flung particularly appointed organisation that includes an collection of remote devices known as transportable hubs sometimes known as mobiles related by using faraway connections

II. ROUTING PROTOCOL

Protocol is a fixed of rules therefore routing protocol is a hard and fast of rules that's responsible for sending and receiving packets form one host to another. there may be various routing protocol for MANET.

a) Reactive protocol:

Those styles of protocol are labored most effective on every occasion they're inquiring for to do so. this is why those are also referred to as on-demand protocol. And these styles of protocols discover their course on every occasion there may be any order is soliciting for sending or receiving packets and for this reason it much less the overhead of routing desk and it do not any routing inform to shop.

b) Proactive Protocol:

it's miles exceptional from reactive protocol as it retains the routing facts of community. hence, it is also referred to as desk-driven routing it maintains and produce updated the network facts sporadically. however it faces the community in big community due to the fact large community it's far hard to preserve the information of every and every node. This form of protocol has greater overhead as compared to reactive.

c) Hybrid Routing Protocol:

This protocol is intervening between reactive and proactive. It overcomes all the shortcoming of reactive and proactive protocol.

III. Characteristics

a. Autonoums:

Ad hoc network can automatically tie to various nodes so that it will percentage data.

b. No frame work:

NO FRAMEWORK ad hoc network is unfastened from any precise framework. There isn't always any define structure outline for advert hoc community. for this reason it is less luxurious and extra vigorous.

c. Multi Hop Routing:

In advert hoc network every and each node behave as router and host each node behave as router and host itself and it disperse facts among various nodes. because of multi hop facts is broadcast easily

d. Dynamic:

DYNAMIC In advert hoc community every and every tool is impartial of working and transferring dynamically in any route.

e. Scalability of Network:

SCALABILITY OF network: when variety of users extended advert hoc community can work continuously with none stoppage in cutting-edge activity. four. programs .

IV. APPLICATION

i.Military Battle field:

that is most extensively used era used by military squaddies that allows you to store and maintain facts.

ii. Local level:

nearby stage: advert hoc network can robotically join multimedia community to disperse data among various nodes.

iii. Commercial sector:

three commercial quarter: ad hoc community is likewise beneficial in commercial sector for emergency operations like flood, fireplace, catastrophe and many others.

iv. Personal Area network:

non-public region network; With advert hoc network one could easily disperse information among wireless gadgets located in private location network.

v. Data Mining:

nformation MINING: ad hoc network is also beneficial in information mining to acquire knowledge or facts that allows you to find records.

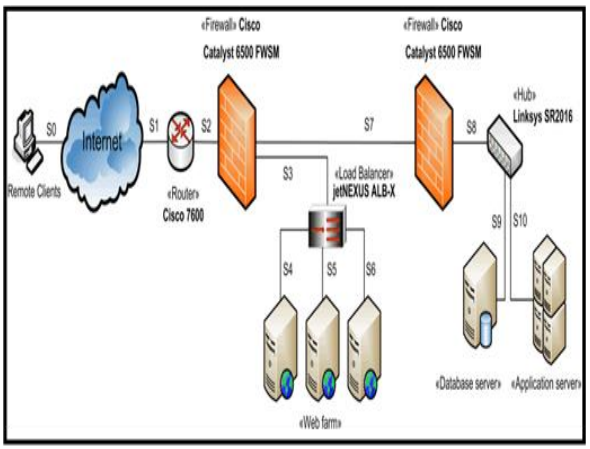

Fig:1 – Application of Network

V. ISSUES IN MANET

Troubles IN MANET As there are many blessings of advert hoc network this is dynamic and automatically connect to cell nodes through wi-fi network and it do not have any infrastructure and centralized node. There are certain problems in advert hoc network.

a) Security

safety: wireless network are much less proper than wired network

b) Routing

Routing is one of the first-rate challenges in MANET because advert hoc network trade network topology constantly some of the node

c) Quality of services

best OF carrier: QOS is likewise a massive defy in MANET is swiftly change it create an difficulty in MANET

d) MultiCasting

MULTICASTING: multicasting is a property wherein statistics is unfold to a collection of vacation spot.

Types of Manet:

MANETs have similarly been divided into 3 different sorts:

A. Vehicular ad-hoc wireless community (VANET) VANET, brief for Vehicular advert-hoc network, is one of the subclasses of MANETs. it's miles a unique class of wi-fi advert-hoc community with high mobility nodes and topology with a faster price of change. VANETs uses moving vehicles as nodes and create a network round them. each car inside the VANETs range will become a node, which in turn allows them to connect with every other ad create a network .

Despite the fact that motors inside a selected variety can create a connection with every different. As motors drop out of the community, due to increasing distance, other cars can be part of in connecting them to every other and making a mobile wi-fi network. those networks do not have infrastructural guide and depend totally on the cars to create a community and offer a network's functionalities

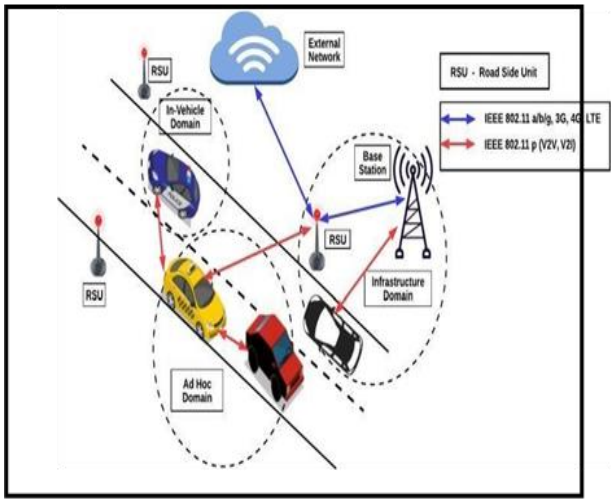

Fig:2 : Vehicular AD-HOC wireless network

B. Net-based cell advert-hoc community (IMANET)

MANETs linking mobile nodes with net-gateway nodes are referred to as net- primarily based cell ad-hoc

Networks (IMANET). With this type of community, regular routing algorithms do now not practice directly. As MANETS do not need any infrastructural support to function, these kind of networks work quality in which no fixed infrastructure exists. Hussain et al. (2020), UW magazine of computer technology.

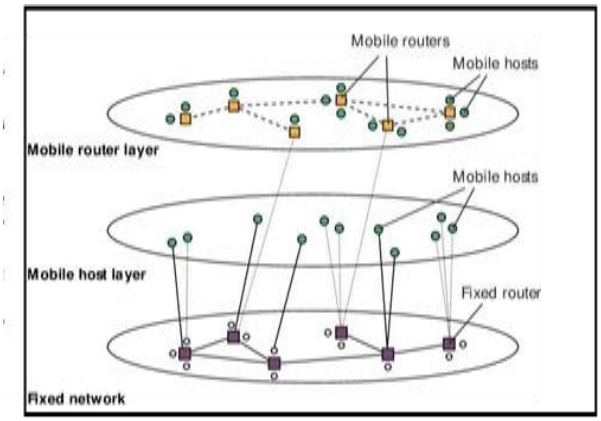

Fig:3: Internet based mobile Ad-Hoc Networks

C. clever Vehicular advert-hoc community (InVANET)

Artificial intelligence designed to prevent any kind of injuries of vehicles for diverse motives including drunken using, collisions, and so on. is referred to as clever Vehicular advert-hoc network (InVANET). Many advert-hoc networking technology combine VANET for handy, precise, and effective communique between vehicles. InVANET allows in defining safety measures in motors and also for better conversation among automobiles.

VI. METHODOLOGY

There are exceptional methodologies to design and classify routing protocols for MANET. for instance, changing of routing information, when and the way it exchanges and the way these routes are computed? some class of MANET protocols is listed underneath:

pro-active (desk pushed) Routing

This routing protocol maintains a listing of destinations and routes by way of dispensing routing tables everywhere in the community. There are some disadvantages of using this protocol the principle one is that those protocols require information maintenance and are gradual while reacting on restructuring. The maximum commonplace protocols underneath this are:

- Dynamic vacation spot-Sequenced Distance-Vector Routing Protocol (DSDV)
- wireless Routing Protocol (WRP)
- Fisheye country Routing

Reactive (On-demand) Routing

In these protocols, routes are observed on demand which is achieved by means of flooding the consecutive requests of packets. The disadvantage of these algorithms is that high latency time in locating routes and an excessive amount of flooding of the network can result in a clog in the network. it's also called on-call for routing. the primary Protocols are:

- Dynamic source Routing Protocol (DSRP)
- advert-Hoc On-call for Distance Vector Routing Protocols (AODV)
- Temporally Ordered Routing set of rules (TORA)

VII. Acknowledgement

I would like to expand gratitude to project guide Prof. Vijay.M.Rakhde who guided by providing the valuable suggestion in numerous way on this project which gave us the inspiration to improve our self independency. Secondly I would like to express my gratitude toward the project mentor Prof. B.Deharkar who help in finalizing the work done within the limited time period, I would also like to express heartfelt thanks to Head Of Department Lovelesh Yadav who has given us a platform where we can work on developing the projects and demonstrate the practical applications.

VIII. Conclusion

This paper offers review approximately cellular ad hoc community which is largely a community which does no longer have any framework and it's miles self-organizing. This paper efficiently explains the characteristics, issues and demanding situations, packages, routing protocol. MANET may be very boost and essential generation in nowadays's existence. we will easily speak with one another while not having stressed devices and irrespective of where they may be placed. however due to open nature of MANET there are also a few protection problems and attacks are possible in MANET. numerous assaults like denial of service, replay, Trojan house etc.

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Cloud Computing and Cloud Computing Technologies: A-Review

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Abstract – **Cloud computing play a big role in today business environment. It provides on-demand services via the internet, to computing resources applications, servers data storage, development tools, networking capabilities, and more hosted at a remote data center managed by a cloud services provider. The cloud services provider makes these resources available for a monthly subscription fee or bills them according to usage.. Here we give what really cloud computing is and it's various computing technologies and their characteristics**

Keywords: Cloud computing, cloud services provider, Architecture, computing technologies, characteristics

I. INTRODUCTION

Cloud computing defines using resources remotely rather than locally. Today cloud computing play an important role in business applications. Cloud computing remove the headaches of managing hardware and software for the users, it is the responsibility of cloud provider for managing all these. Cloud computing is an internet based computing where different services are provided to customers with the help of internet.

The two most important component of cloud architecture is the front end and the back end. The front end is the computer user and the application that is used to access the cloud via a user interface such as web browser. The back end is the cloud itself that include servers and cloud storage devices.

II. CLOUD COMPUTING TECHNOLOGIES

A. Client-Server Computing

In client-server computing the system is parts into two entities. The First one is the server that gives resources or services and second one is the client that uses the resources or services provided by the server.

In this computing client sends request to the server through computer network. The server assign resources with the client but client do not share any of its resources. e.g. E-mail and World Wide Web.

The various characteristics of client-server computing are:-

- Client-Server Computing uses local processing power-the power of desktop platform. It changes the way enterprise accesses and uses data. In this loom, there is no restriction on data access i.e. all company staff can access data and they are also involved in various decision making process.
- Client-Server computing is open systems. It means you can configure your systems that include software or hardware from various vendors as long as they follow a common standard. Due to this feature company can make systems that include cost effective software and hardware to accomplish a particular task.
- Client-Server computing using the concept of modularity in which we combine software and hardware of different features together as a whole. These software and hardware components are actually modular in nature. Modularity allows the system to expand and modernize to meet requirements and needs as the company grows.

B. Cluster Computing

A cluster computing is a type of computing in which group of computers are linked together to perform various tasks so that user of the system thinks that it can work on single system. Cluster computing take an advantage of parallel or distributed computer system for linking of two or more computers into the network.

The various characteristics of cluster computing are:

- The processing power of cluster computer is same as a mainframe computer.
- Cluster computing has typically low cost, high bandwidth and low latency.
- Parallel applications designed to run on it.
- Gives the impression of a single powerful computer
- Generally cost effective compared to single computers of comparable speed and availability
- Deployed to improve performance and availability over that of a single computer

C. Peer-to-Peer Computing

A peer-to-peer (P2P) computing is a distributed type of computing in which each computer is connected to other computer in the network. The computer in the network can act as both client and server for the other computers in the network, allowing shared access to various resources such as files, peripherals, and sensors without the need for a central server. Each peer called computer in the network makes their resources available to other peers in the network without the need of centralized control.

The various characteristics of Peer-to-peer computing are:

- No centralized control.
- Clients are also servers and routers.
- Nodes contribute content, storage, memory, CPU.
- Nodes are autonomous.
- Ad-hoc Nature.

- Limited Capacity and Reliability of Peers.
- Scalability

D. Ubiquitous Computing

Ubiquitous computing also known as pervasive computing is an advanced computing concept where computing is made to appear everywhere and anywhere. Ubiquitous computing can occur using any device, in any location, and in any format. Pervasive computing makes devices smart by using sensor network.

The various characteristics of Peer-to-peer computing are:

- Permanency: The information always remains their and can only be removed if the learners want to remove it.
- Accessibility: The information is always available whenever the learners need to use it.
- Immediacy: The information can be retrieved immediately by the learners.
- Invisibility: Computing can be performed by Invisible Intelligent Devices - Wearable Computing Devices.
- Adaptation: Adapting to Device Type, Time, Location, Temperature, Weather, etc.

E. Grid Computing

Grid computing is types of distributed computing in which the resources of different computers in the network are used to solve a big task that require large number of CPU cycle and huge amount of data [3]. Grid computing is a computer network in which each computer's resources like processing power, memory and data storage are shared with every other computer in the system. O grid computing turn a computer network into a powerful supercomputer.

Grids provide protocols and services at five different layers as shown in Fig 5.

- Fabric layer: - It deal with resource management. The different resources in this layer are computer, storage system and networks, code repository, etc.
- Connectivity layer: - The connectivity layer deal with security i.e. it defines communication and authentication protocols for secure network transactions.
- Resource layer: - It provides access to resources by defining different protocols for monitoring, accounting and payment of sharing operations on individual resources.
- Collective layer: - It controls the interaction between different types of resources.
- Application layer: - Application layer rely on lower layers for grid to run which comprises user applications that operate within virtual organization Environments.

The various characteristics of Grid computing are:-

- Large scale: The resources in the grid range from few to millions.
- Geographical distribution: The resources in the grid may be located at distant places.
- Resource sharing: The shareable resources in a grid belong to many different organizations.
- Multiple administrations: In grid resources are shared from different organization. Each organization maintains their own security and administrative policies for their owned resources which result in challenging security problem for different policies.
- Resource coordination: In a grid resources must be coordinated.
- Grid cannot be built by one or by a single resource. One can be a part of grid.

III. CONCLUSION

Cloud computing is a new technology in today's environment Cloud is widely used in today's business environment. This paper discussed what actually cloud computing is and different cloud computing technologies with their characteristics. In spite of various challenges like performance, security cloud computing gaining more importance especially in enterprises.

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Future Farms - Small & Smart: A Review

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***Abstract*— Agriculture being backbone of any country nearly about 60 of our country's population works in husbandry or the primary sector. It contributes further to our country's GDP. It employs the maturity of India's population. The internet of things exploration presents a frame in which growers may gain expansive information on the soil, crops growing in specific areas, and agrarian yield and productivity. By exercising resource optimization and smart planning, this technology- grounded agricultural practices will help growers in making wise agrarian opinions. The development of IOT grounded intelligent Smart Farming using smart bias is changing the agricultural product by not only adding the quality and yield but also to make farming cost effective. These practices of smart agriculture is to get live data like temperature, soil humidity and moisture to cover the girding terrain. All of this is fulfilled with the use of temperature, moisture, and humidity detectors. This paper briefly studies the need, advancement and compass of smart agrarian practices.**

Keywords— Drones, Organic Cultivation, Cloud Storage, Precision Agriculture, Robots.

I. INTRODUCTION

The agriculture sector forms only about 18 percent of India's GDP despite employing nearly 65 percent of the total pool. Despite significant enhancement in food grain product, there are several challenges to attack as the government aims to increase agrarian product as a share of GDP. Farming in India is largely dependent on nature, but climate and global warming issues make tilling changeable. The need of the hour is to educate growers in the use of ultramodern technology and innovative approaches to increase productivity and raise profitability. Natural imbalance is visible in pollution, soil declination, wildlife population decline, and a mortal- created differences of foliage and fauna.

It's reasonable to assume that mortal population growth will continue and place lesser demands on the Agri- ecosystem. therefore, technology has and will continue to play a major part in Farming and sustainable development going forward.

Technology has a major part in agriculture and agricultural practices; and with the arrival of digital technology, the compass has widened.

Innovation in agriculture is leading an elaboration in agrarian practices, thereby reducing losses and adding effectiveness.

Use of digital and logical tools is driving nonstop enhancement in farming, and the trend is then to stay, performing in perfecting crop yields and helping to increase the income of the agro community. This is

Figure 1: Digitalized farming

appreciatively impacting growers. Experimenters and masterminds around the globe are proposing different styles and infrastructures and grounded on that suggestinga variety of outfit to cover and cost the information regarding crop status during different stages, considering multitudinous crop and field types. Fastening on the request demand, numerous leading manufactures are furnishing a range of detectors, unmanned upstanding vehicles(UAVs), robots, communication bias, and other heavy ministry to deliver the tasted data. In addition, colorful commissions, food and agriculture associations, and government bodies are developing polices and guidelines to observe and regulate the use of these technologies in order to maintain food and terrain safety.

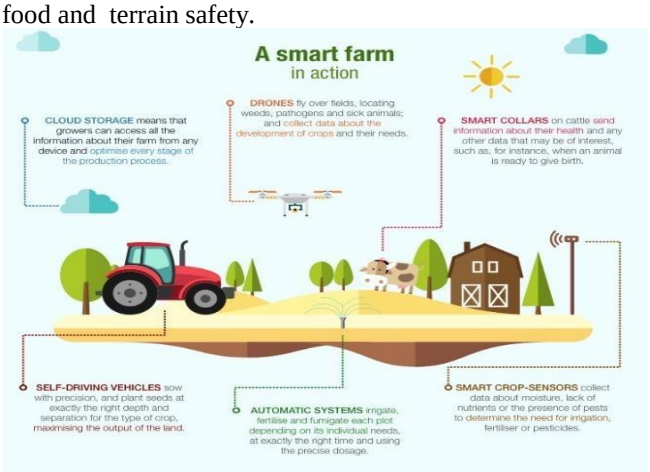

Figure 2: Future farms and work process

II. LITERATURE SURVEY

This research article provides a complete insight of internet of things on building the applications of precision agriculture. Various cost effective[1] smart technological adaptations in the agriculture sector are analyzed towards the upgradation of the traditional approach and the lifestyle of the farmers. Major agriculture applications like environment and soil monitoring, smart irrigation system, utilization of intelligent drones in the agriculture field, smart robot integration for various automated works in agriculture field are also discussed in this research article. It highlighted the advantages and limitations of an IoT based smart precision agriculture that can be further enhanced by researchers in the future.

Drones, also called Unmanned Aerial Vehicles(UAV), have witnessed a remarkable development in recent decades. In agriculture, they've changed agricultural practices by offering growers substantial cost savings, increased functional effectiveness[2], and better profitability. Over the once decades, the content of agrarian drones has attracted remarkable academic attention. We thus conduct a comprehensive review grounded on bibliometrics to epitomize and structure being academic literature and reveal current exploration trends and hotspots.

We apply bibliometric ways and dissect the literature girding agrarian drones to epitomize and assess former exploration. Our analysis indicates that remote seeing, perfection husbandry, deep literacy, machine literacy, and the Internet of effects are critical motifs related to agrarian drones. Theco-citation analysis reveals six broad exploration clusters in the literature. This study is one of the first attempts to epitomize drone exploration in agriculture and suggest unborn exploration directions.

This paper is considering all the aspects and highlighted the role of various technologies, especially IoT, in order to make the agriculture smarter and more efficient to meet future expectations. For this purpose, wireless sensors, UAVs, Cloud-computing, communication technologies are discussed thoroughly. Furthermore, a detailed study on recent research efforts is provided. In addition, various IoT-based architectures and platforms are provided with respect to agriculture applications. A summary[3] of current challenges facing the industry and future expectations are listed to provide guidance to researchers and engineers.

On the basis of all these facts, it can be concluded that every inch of land that is used for farming is vital to maximize crop production. And hence , to utilize the farmland effectively, the use of sustainable IoT-based sensors and communication technologies is not optional—it is necessary.

In Africa most of the farm houses are using a steady sub-division of their land for farming that draws the attention towards small-scale farming. Small-scale farmers[4] are poised to be significant economic drivers in developing countries in Africa. Hence, it clearly indicates the potential in smart farming applications. This research is aimed to provide appropriate farming practices information through co-designing an Agricultural Management Application that would maximize small-scale farmer's crop production. Reviewing relevant literature and applying an experimental design approach, an Agricultural Management Application was developed in this research. The results of the study proved satisfactory as the application developed was found useful and informative by local farmers. Because only a few crops are listed on the application currently in use, it is further recommended that more crops can be added to this mobile application. This will help farmers to expand their scope of participation and the use of the application.

Food security is in threat because of population growth and traditional agriculture is no longer adequate. Agriculture being one of the main foundations of a developed economy today. In recent years, agriculture sector is revolutionized and automatized. The precision agriculture is most advanced aspect of automation of agriculture. It has become essential due to the potentials and applications Including smart irrigation, agricultural robotics, remote sensing, and mapping. Agricultural robotics has made farming easier and more efficient and has come to the aid of farmers.

Usage of drones in smart farming[5]not only makes farming more accurate but also can help people farm smarter. Amongst all the drones in agricultural drones, the performance of spraying drones is very impressive and reliable. In this paper , the pros and cons of the spraying drone will be investigated. They are fast and use a low amount of water and have a few more advantages. There are a few drawbacks like battery efficiency. It can be concluded that spraying drones are a good solution to spray the crop fields.

III. TECHNIQUES USED IN SMART FARMING

Precision farming: It is a technique where inputs are utilized in precise amounts to get increased average yields, on the basis of traditional cultivation techniques. Small field size is one of the major problems in India. In the country More than 58 per cent of operational holdings have a size of less than one hectare (ha).

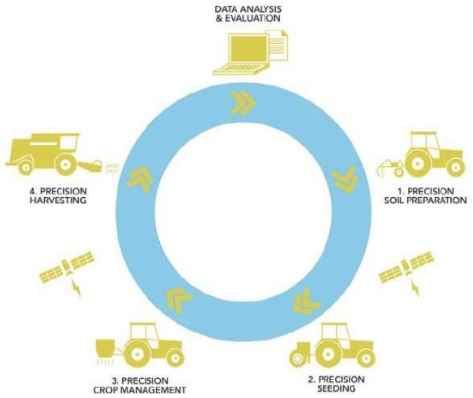

Figure 3[6]: Steps in Precision Agriculture

Precision agriculture involves the following four basic processes to effectively monitor, tracking the growth of

crop as well as the environment in nurturing the quality crop from the seeding stage onwards.

1. Environment and soil fertility monitoring
2. Effective smart irrigation
3. Smart drones for field monitoring
4. Utilization of robots in farming field

Drone in Agriculture: Drones are completely changing the whole process of cultivation and harvesting around the world. According to Industry estimates the use of drones could increase crops yields by 15 to 20 per cent. 100 Kisan Drones in different cities to spray pesticides on farmsacross India has already flagged off by the government.

Drones are part of day today life on many farms. They also make agricultural sustainable – and as an added bonus, they are helping to save deer as well along with overflying fields and monitoring crops. Every year, when fields are mowed and end up caught in the machinery countless young deer are overlooked. Drones help prevent this by spotting the animals from the air before beginning of the work.

Digital Agriculture: Use of digital technology to integrate agro-production from the paddock to the consumer. These techniques can provide the agricultural industry with tools and related information to make more informed decisions and improve productivity.

Farmers will be behaving more smartly with smart devices in their hands and would be able to be more aware and connected with different stakeholders.

Figure 4: Statistics of smart systems utilization across globe

Using smart farming applications, it provides a way for farmers to monitor their crops and animals via their smartphone. Depending on the software, statistics can also be looked upon.

Automation in Agriculture: Latest farming tools and automation in agriculture will smooth the production cycle and make it more efficient.

The mechanization of farms is an approach that has provided great benefits to farmers across the world and the same will be true for India.

In major commercial crop and animal value chains, autonomous and semi-autonomous farm robots will substitute labour intensive human tasks and drudgery.

Figure 5: Statistics of smart systems utilization across globe

Organic Farming will Prosper: In the coming decade, organic agriculture will prosper in India and will contribute to feeding 1.6 billion people.

Agriculture must have sustainable intensity and diversity, giving priority to organic farming, to sustain growing demand and supply . High consumption of high-value food and cash crops, and demand for bio-energy will create a favorable business environment by activating policies for high-value organic agriculture.

In the organic farming practices, a major breakthrough is required. Use of pesticide and modern fertilizer are bringing various health hazards. Plant and food quality is being in a state of degradation day by day. Personal or home farming practices are to be promoted and supported in various manners.

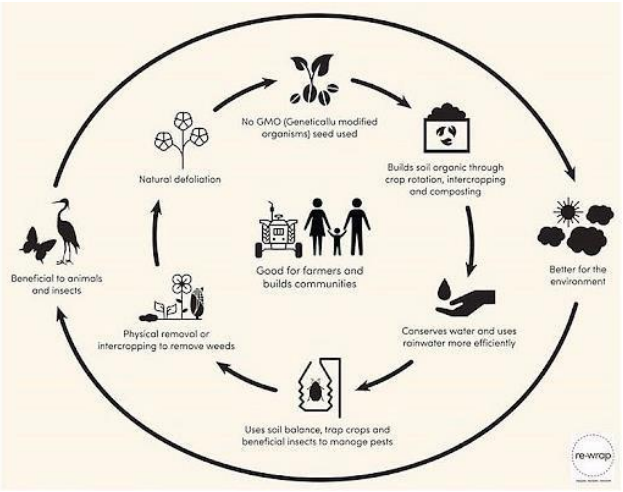

Figure 6: Working of Organic Farming

Hydroponics and aquaponics systems are pointing to success of the technology adoption in the organic farming culture. Possibilities in assisted large farmlands also need to be confronted through agricultural technologies. World watch institute, a global environmental institution explains prominent agricultural researchers, experts and scientists believe in the organic farming in near future still has the potency to feed the whole world. Smart farm lands and organic indoor farms have lot to do and succeed to every corner of the world.

IV. RECENT TRENDS

Block chain and the IoT:

Industry experts are certain that intelligent agricultural technologies is going to play an important role in near future, particularly the Internet of Things (IoT).

The ability of machines of communicating with each other is a must for cases such as precision farming – the precise cultivation of arable land – and smart greenhouses, because that is the only way to use collected data on climatic conditions, soil properties, etc. in order to make sure the ideal environment for the plants being grown and cultivated.

For example, If the plants are too dry specific sensors in the greenhouse detect them and they can notify the watering system immediately, which then gives water to the plants.

However, many smart farming models draw on the interaction between the Internet of Things and blockchain technologies, apart from solely relying on IoT.

These eventually creates a secure environment for storing and processing data, which actually makes it easier for farmers to use data-driven innovations in smart farming. The sensors built using IoT in an intelligent greenhouse can then operate as a private local blockchain, for example, which can be controlled centrally by its owner.

Indoors Organic Farm Systems:

Modern indoor farms are soilless and hydroponic or aeroponics. Aeroponics use nutrient rich mist as the growing medium. These farms are generally vertical farms. Vertical farm cultivates tray of setups arranged one over the other in vertical manner utilizing the indoor space to its maximum with minimum effort of arranging the growing systems.

World's largest indoor farm is a vertical indoor farm in New Jersey. These indoor farms apparently have 1 acre space for cultivation.

The System Includes[7]:-

Light weight cloth or clay pellet hydroponic/aeroponic grow medium trays.

LED lightings over each tray and programmable logic controls for lighting time, wavelength and amount of light.

Figure 7: Setup for Indoor Organic Farm

Tray sensors are used for measuring O2 and CO2 levels, nutrients like nitrogen, potassium and phosphorus, temperature and humidity. Grow medium helps in providing nutrient to water or air recycling and distribution systems.

V. CONCLUSION

As a result of growing population, growing average income and globalisation effects in India demand for volume, quality and nutritional food, and variety of food has also increased. Hence, pressure on dwindling available cultivable land to produce further volume, variety and quality of food will keep on adding.

Although the constraints in agriculture make the productivity and return complex but still a high untapped eventuality is there in India's farming sector. sweats are being made to convert all the challenges in husbandry into openings and this process is the future of husbandry.

While prognostications can exfoliate light on the future, we're still not there. A whole new generation of farmers, who aren't yet born, will be tilling mid-century, and much will be between now and also that we cannot prognosticate. But if the history and present are a indication to the future, Indian farmers will continue to seek better ways to produce crops by embracing invention. Issues similar as social-equity, gender- equivalency, and environmental justice will remain the critical pillars of agrarian and societal progress, and India must make giant hops in the coming times.

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Weakly Supervised Learning Model for Clustering and Segmentation of 3D Point on Cloud Shape Data

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Abstract – **Point cloud data, which retains more 3D spatial geometric information, has emerged as one of the core data formats for describing 3D models with the rapid growth of 3D acquisition technologies. However, the majority of deep learning network topologies used in 3D point cloud model segmentation studies rely on expensive labelled high-quality training data. A weakly supervised learning-based method for collaborative and consistent segmentation of 3D point cloud model clusters is presented to address the issue of using training samples with a small number of labeled points to achieve collaborative segmentation of 3D model clusters. Initially, the K-nearest neighbor technique is used to create the local neighborhood graph between the points. The point cloud model's component features are then extracted using the local convolution approach, and a matrix of related components is created. The network weights are then refined using energy function back propagation to produce results for model cluster consistency segmentation. The experimental findings indicate that the algorithm's segmentation accuracy on the public dataset ShapeNet Parts is 85.0%. Furthermore, when the number of training sample labels is lowered to 10%, this algorithm can still yield segmentation results comparable to or superior to those of supervised learning approaches. In addition, segmentation accuracy is considerably enhanced compared to current weakly supervised mainstream techniques.**

Keywords: **Machine Learning, Cloud computing, Clustering, Segmentation, Supervised Learning, K-nearest neighbour;**

I. INTRODUCTION

Three-dimensional models become a new generation of digital multimedia after audio data, two- dimensional images and videos. Compared with traditional multimedia data, 3D models have attracted extensive attention from industry and academia because of their strong sense of reality, which is more in line with people's intuitive understanding of nature. With the wide application of technologies such as information technology industry, data-driven and deep learning in computer vision and computer graphics, 3D model segmentation has made remarkable progress. The segmentation of 3D models is a basic problem in the field of 3D model analysis. It divides the 3D model into several meaningful, connected and independent semantic components according to the geometric and topological characteristics of the 3D model [1] to help The understanding and analysis of 3D models is the research field of computer graphics important question to study.

The widespread use of laser scanning and other 3D sensing technologies in recent years has led to the development of 3D point clouds, which are now the standard format for representing 3D geometric data [2] and are being used extensively in a variety of industries, including autonomous vehicles, virtual reality, 3D city modeling, and more. Some deep learning methods have begun to try to analyze and process point cloud data. Literature [3] proposes that the PointCNN network model can directly apply the convolutional neural network structure to unordered point cloud data, avoiding the change of features with the order of input points, and enhancing the network's ability to process the model. Literature [4] proposed a deep learning network framework PointNet that can directly classify and segment point clouds. Considering the sparsity of the point cloud, the point cloud is not converted into multi-view or voxel grid, so that more 3D feature information can be preserved and better segmentation results are achieved. Literature [5] proposes a multi-feature fusion 3D point cloud model segmentation method, which learns the implicit relationship between global single-point features and local geometric features by constructing an attention fusion layer to fully mine the fine-grained geometric features of the model to obtain better model segmentation results. At present, most of the 3D point cloud model segmentation methods based on deep learning rely on labeled training data set, which limits the promotion of such methods.

Literature [6] learns the potential common features of the model from the labeled data set, so as to perform the collaborative analysis of the model. Therefore, if the number of labeled data sets is large enough, supervised algorithms can achieve ideal segmentation results. However, obtaining high-quality labeled data is time-consuming and expensive. On the contrary, the literature [7] proposes an unsupervised co-segmentation method to segment the input model into patches, and then classify similar patches by subspace clustering. Although unsupervised 3D model segmentation algorithms can utilize unlabeled data to achieve collaborative segmentation of 3D models, this segmentation algorithm comes at the cost of reducing the segmentation accuracy. Combined with the characteristics of point cloud data, this paper proposes a weakly supervised learning clusters based model for segmentation of 3D point cloud. In the feature extraction process, the use of local convolution operations can better correlate feature information between points and improve the network's ability to identify and segment point cloud models. Since similar models have similar feature information, similar component features can be represented by similar component matrices. When the network is learning, multiple models of the same type can be learned

collaboratively. In addition, the deep learning network is guided by the energy function, and the network parameters are optimized through backpropagation, so as to achieve consistent segmentation of point cloud model clusters. The main innovations and contributions of the algorithm are: (1) The neighborhood of the subset is chosen in the sampled point set before sampling, and the information of the discarded point can be incorporated into the related point to make up for the sampling loss.

In the neighborhood of , the feature information of more points is retained while reducing the computational complexity of the network. (2) Using the weakly supervised learning method for 3D point cloud model segmentation can reduce the dependence on high- quality labeled data sets in the network training phase. This method only needs to mark a small number of points in the training phase to achieve and supervise methods comparable to segmentation results.

1.2 3D Point Cloud Model Segmentation and Feature Extraction

The 3D point cloud model is composed of a series of point sets with geometric information. The essence of its segmentation is to classify the point sets point by point, aiming to classify the points of the same category into the corresponding parts to obtain the model segmentation results. Therefore, this paper proposes to use the local convolution method and construct a local neighborhood map to solve the above problems, and use a small amount of labeled data for training through the weak supervision method, which improves the universality and segmentation effect of the network architecture.

1.2.1 Construct the local neighborhood map of the point cloud model

The 3D point cloud model is a collection of 3D coordinate information of a group of unordered points. However, each point does not exist independently, and there is similar geometric information between adjacent points. Therefore, establishing the correlation between points can be more accurate. To characterize the local feature information of the 3D model well, Figure 1 shows the construction process of the neighborhood graph of the point. Define a point set as

$\{pi = xi, yi, zi)|i = 1,2, \dots, n\}$, where pi is any point in the point cloud, represented by the coordinates (xi, yi, zi) corresponding to the point , with pi as the center point, use the Knearest neighbor (KNN) method to establish a local directed graph G, which is composed of a vertex set V and an edge set E, defined as follows:

$$\begin{cases} G = (VE) \\ V = \{P_i|1,2,\cdots,n\} \\ E = \{e_i = (e_{i1}, e_{i2}, \dots, e_{ik})|i = 1,2,\cdots,n\} \\ e_{ij} = p_{ij} - p_i \end{cases} \quad \dots\dots\dots(1)$$

In the formula, ei is the ith directed edge set, and eij represents the directed edge from the adjacent point pij to the central point pi.

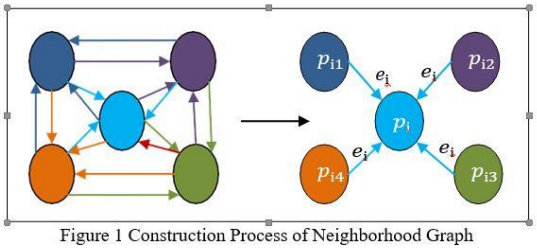

Figure 1 Construction Process of Neighborhood Graph

1.2.2 Local convolution operation to extract features

The local convolution operation is used to extract the features of the center point and the edge vectors between the center point and the K nearest neighbor points. Since the point cloud model is a set of unordered point sets, the maximum pooling operation is adopted. This method is not affected by the order of neighboring points and can extract the most important features of all edge vectors. Define the same feature extraction function fe for all points, then input a local neighborhood map whose center point is pi to get the output local feature li, the formula is as follows:

$$li = fe(G(pi, ei)) = \max\{h(pi, ei1), h(pi, ei2), \cdots, h(pi, eik)\} \dots (2)$$

Where $h(pi, eij)$ is the hidden feature vector between the center point pi and an edge vector eij. The output local feature li takes the maximum value { } of the hidden feature vector.

For the segmentation task, it is necessary to concatenate the global features and the extracted local features point by point, and use a neural network to output a prediction score for each point. The local convolution operation method is represented in the Eqn. (3).

$$p'i = h(pi, eij) = h(pi, ei1) \quad h(pi, ei2) \quad \cdots \quad h(pi, eik) \dots\dots(3)$$

In the formula, $p'i$ represents the updated point feature, which associates the own feature of each point with the corresponding neighbor point, and □ represents as pooling operation or summation. In summary, local convolution creates a new set of points with new dimensional characteristics linked to the local features by first applying a multi-layer perceptron to each point and its accompanying neighbourhood to record a local receptive field. The local convolution process is shown in Figure 2.

The local convolution operation mainly generates the edge features, which are used to represent the mapping between each point and its neighbors. This convolution method has two advantages: (1) KNN Graph can better extract point local information while maintaining the invariance of the arrangement, and improve the segmentation effect of the point cloud model;

(2) after multi-layer iteration it is then able to better capture potentially distant similar features.

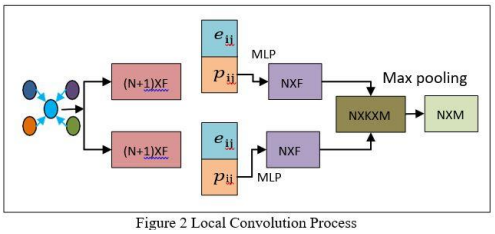

Figure 2 Local Convolution Process

1.3 Experimental results and analysis

The experimental are performed in the Intel Core i9 9900k CPU and NVIDIA Rtx 2080Ti GPU (11 GB video memory) processor, with CUDA 9.0, the GPU accelerated library is cudnn 7.0. To implemented proposed deep learning model the Keras and Tensorflow framework have been used.

a. Data Set

In order to compare with other algorithms, this paper uses the ShapeNetParts [27] dataset, which contains 16881 3D models, 16 categories, and a total of 50 labeled parts. Most models are labeled with 2 to 5 Parts, and labels are annotated on the sampling points of the 3D model.

b. Parameter Setting and Performance Evaluation

To improve the segmentation performance of the model, 2048 points are uniformly sampled from the model surface for training and testing experiments. In the experiment, adaptive moment estimation (Adam) is used to optimize the neural network model. The initial learning rate is set to 0.003. Momentum is set to 0.8 to prevent the network from falling into local optimum when updating parameters. In order to prevent inconsistent data distribution in the middle layer of the network during training, a batch normalization layer (batch normalization) is inserted before each input layer of the network, and the exponential decay coefficient of batch normalization is set to 0.5, so that the loss function can be quickly convergence. In this experiment, when the batch size is set to 32, the impact on the gradient of the network is minimal.

c.Evaluation Criteria

The intersection over union (IoU) on the point set is the metric that is used to evaluate how accurately the 3D point cloud model segments data. IoU is mainly used to compute the ratio between the intersection and union of two data point sets: true segmentation and predicted segmentation by model. The IOU formula is as follows:

$$IoU = \frac{TP}{T + P - TP} \quad \ldots\ldots\ldots (8)$$

In the formula, TP represents the true sample size; T represents the real true sample size; P

represents the predicted true sample size.It is required to incorporate the mean intersection over union (mIoU) for measurement after getting the IoU value for each type of model in order to assess the segmentation effect of the network on the entire model cluster. The formula is as follows:

$$mIoU = \frac{1}{m}\sum_{i=0}^{m}\frac{TP}{T + \sum_{i=0}^{m}(P - TP)} \quad \ldots\ldots\ldots (9)$$

In the formula, m represents the number of categories of the 3D model, and the larger the value of mIoU, the closer the real value is to the test value, so that the effect of model segmentation is better. In the ShapeNet Parts data set, since the number of models of different categories is different, it is necessary to continue to evaluate the segmentation accuracy from a quantitative perspective, so the part averagedIoU (pIoU) is introduced for further comparison. The formula is as follows:

$$pIoU = \frac{1}{\sum_{i=0}^{m}\sum_{i=0}^{m}TP} \times \sum_{i=0}^{m}\frac{TP\sum_{i=0}^{m}T}{\sum_{i=0}^{m}T + \sum_{i=0}^{m}(P - TP)} \quad \ldots\ldots\ldots (10)$$

This formula represents the weighted summation of the IoU of each class according to the frequency of each type of model. In this experiment, the frequency is the number of each type of model. The higher the pIoU value, the higher the segmentation accuracy.

d. Analysis of Results

The collaborative segmentation effect of the algorithm on the 3D point cloud model cluster is as follows: Where point clouds of different colors represent different model segmentation parts. It can be seen that the colors of the same parts corresponding to each type of model are consistent, which better reflects the consistency of the collaborative segmentation of the 3D model clusters. Table 1 and figure 3 shows the comparison of the algorithm in this paper with the algorithms in literature [4], literature [21,23], literature [26] and literature [28] on the ShapeNet dataset. The algorithm in this paper adopts a weak supervision strategy, and establishes a local neighborhood map of points through the KNN method to better correlate information between sampling points. When only one point is marked for each component in the model, it can already obtain competitive As a result, when 10% of the points are marked, the mIoU value increases by 0.012 and the pIoU value increases by 0.014 compared with the algorithm in [4]. In addition, the algorithm in this paper uses an energy function back propagation iteration to generate the consistent segmentation results of the model. Compared with the recursive proximity search strategy adopted in the literature [28], the mIoU value is increased by 0.042, and the pIoU value is increased by 0.027. Since the algorithm in this paper adopts a weakly supervised learning strategy and experiments with a small amount of labeled data, the segmentation accuracy is slightly lower than the methods in [21] and [26]. However, compared with the weak supervision strategy adopted in literature [22] and literature [23], the mIoU value increased by 0.007 and 0.017, and the pIoU value increased by 0.001 and 0.004, respectively.

Table 1 Comparison of segmentation performance with existing method

Algorithm	mIU	pIoU
PointNet	82.5	85.4
PointNet++	83.7	87.3
DGCNN	84.4	87.6
KD-Net	79.3	84.8
Capsule-Net	82.7	86.3
BAE-NET	80.8	86.2
Our Algorith (1 Point)	76.7	77.2
Our Algorithm (10% Points)	83.5	87.2

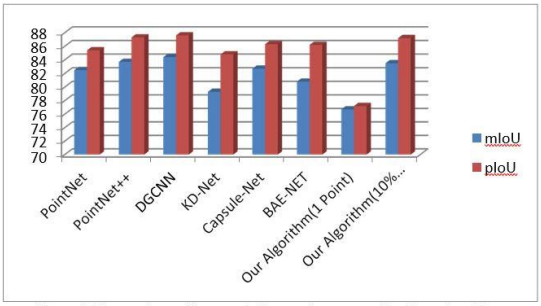

Figure 3 Comparison of segmentation performance of various algorithm

This study further compares the segmentation performance in terms of mIoU and pIoU of various algorithms. Literature [4], Literature [21], Literature [26] and Literature [28] all adopt the supervised strategy, while the literature [22], Literature [23] and the algorithm in this paper adopt the weak supervision strategy. When each part of the model is when marking a sampling point, compared with the supervised strategy in [28], the weak supervision strategy in this paper has a certain improvement in the segmentation accuracy of some models, among which the accuracy of the hat model (cap) and the cup model (mug) are respectively improved. 0.049 and 0.036. When the marked sampling points in the training samples are increased to 10%, the segmentation accuracy of various models is comparable to the segmentation results of the supervised strategy in the comparative literature, and the segmentation effect of some models is even better than the supervised learning method. Compared with literature [28], the segmentation accuracy of the car model (car) and the rocket model (rocket) has improved most significantly, increasing by 0.075 and 0.101, respectively. Literature [26] uses the edge

convolution method to correlate the features between point cloud model points. When segmenting a model with a large number of training samples, the segmentation result is better than other algorithms, such as airplane model (airplane), chair model (chair) and Guitar model (guitar). Compared with literature [26], the segmentation accuracy of the algorithm in this paper is reduced by 0.005, 0.011 and 0.006 in the three types of models of airplane (airplane), chair (chair) and guitar (guitar), but in the car model (car), knife model (knife model).), the rocket model (rocket) and the table model (table) have higher segmentation accuracy than the literature [26] algorithm by 0.007, 0.003, 0.022 and 0.009, respectively. Literature [22] uses the attention mechanism driven by dynamic routing to effectively extract local feature information, so that it has a high segmentation accuracy for small parts of the model. For example, the segmentation accuracy of the motorcycle model motorbike is 0.044 higher than that of the algorithm in this paper. Literature [23] adopts a branch auto-encoder, and each branch learns a component feature of the input model separately, without model cluster consistency optimization, and the classification accuracy of the model with a small number of input sets is low. For example, the segmentation accuracy of the algorithm in the bag model (bag), earphone model (earphone) and rocket model (rocket) is higher than that of the algorithm in [23] by 0.099, 0.069 and 0.048, respectively. The experimental results show that compared with the supervised algorithm, the weak supervision strategy in this paper can still obtain competitive results when dividing various models when the number of marked points is reduced to 10%. Compared with the weak supervision method using different strategies In contrast, the main advantage of the algorithm in this paper is to constrain the consistency of model segmentation results by constructing component feature matrices, and to achieve label prediction for unlabeled points with a label propagation strategy under weaker supervision, which can complete collaborative segmentation tasks while further improving the segmentation accuracy. Therefore, the advantages of the weak supervision strategy are also reflected in the algorithm of this paper.

The role of each module of this network architecture is very important. In order to better analyze the impact of each module of the network on the results, the segmentation accuracy comparison of the ablation experiment is shown in Table 2. It can be seen that: (1) the local convolution module has the greatest impact on network performance. After removing the local convolution module, the segmentation result mIoU is reduced to 56.3%. After the final after far-point sampling, local convolution can characterize the spatial relationship between each sampling point and its neighbors to make up for the feature information lost in the sampling process. (2) The impact of removing the energy function on the segmentation results is inferior to (1), which proves that this module can effectively implement back propagation learning, and constrain the consistency of the segmentation results with the feature matrix. (3) After replacing the farthest point sampling with random sampling, the segmentation accuracy rate has declined, because this sampling method cannot have a good coverage of the sampling space, which is not conducive to the subsequent extraction of feature information. The results of ablation experiments show that the components of the network constructed in this paper are effective and can complement each other to achieve the best performance.

The three labeling techniques were tested in the experiment to confirm that the weakly supervised sample labeling strategy used by the algorithm in this paper had certain advantages. The comparative findings are

displayed in figure 4 for each labeling strategy. 100% training samples (samples) and the quantity of labeled points (Pts) included in each sample serve to define the labeling approach. The experimental results show that as the marked points of the training samples are reduced from 100% to 10%, the mIoU value of the segmentation result is reduced from 83.93% to 82.98%, and the pIoU value is reduced from 86.80% to 86.18%, which are respectively reduced by 0.49 percentage points and 0.1 points. As a result, it is evident from the experimental findings that the segmentation accuracy of the algorithm in this study does not significantly change when the number of markers is decreased (from 100% to 10%), which effectively verifies that the algorithm in this paper is less dependent on the number of markers. The reduction of marked points has strong robustness and weak supervision, which saves time- consuming and laborious manual marking costs.

Table 2 Verify Effectiveness of Model Components with different ablated experiments

Replace with random sampling	Local Conv	Energy Function	mIoU %
Yes	Yes	Yes	71,2
Yes	Yes	Yes	56.3
Yes	Yes	Yes	67.1
Yes	Yes	Yes	**81.6**

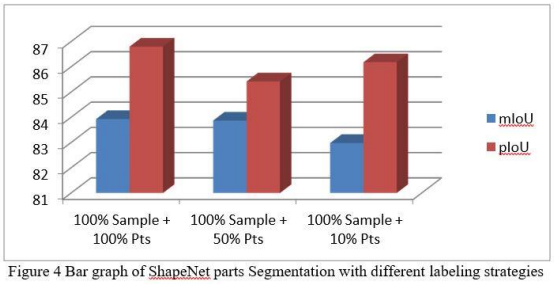

Figure 4 Bar graph of ShapeNet parts Segmentation with different labeling strategies

1.4 Conclusion

This study presented the proposed a co-segmentation model based on weakly supervised learning, aiming for addressing the co-segmentation problem of 3D point cloud models with a small amount of labeled data. First, use the farthest point sampling method to sample the original point cloud, and establish a local neighborhood map of the point through the KNN algorithm to associate the information between points, so as to better characterize the local characteristics of the model. Then, model features are extracted using local convolution methods to generate feature descriptors corresponding to each part of the model. Finally, by constructing the component feature matrix, the consistent segmentation results of the model clusters are obtained through the energy function backpropagation iteration in the deep learning network. Experiments were carried out on the ShapeNet Parts dataset. Compared with supervised methods such as literature [4] and literature [26], the deep learning network proposed in this paper only needs a small number of marked points to effectively achieve point cloud model segmentation. When it is reduced to 10%, the results comparable to the supervised algorithm can be achieved, and compared with the weakly supervised methods in the literature [22] and literature [23], the algorithm in this paper achieves better segmentation under weaker supervision result. However, the algorithm in this paper also has limitations: on the one hand, the algorithm has a clear neighbor relationship for each point in LocalConv, so the network calculation complexity is greater, and the efficiency will decrease when processing large-scale point cloud data; on the other hand, Since the algorithm in this paper adopts a weak supervision strategy, it has obvious advantages in terms of data set requirements, which makes the network

more universal. However, compared with the fully supervised algorithm, the segmentation results of some models have obvious gaps. These are issues that require further research in the future.

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Machine Learning Based Detection Of Depression And Anixiety Using Voice Recognition

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Abstract – **A more objective assessment is required to assist patients in receiving a speedier and more accurate diagnosis of depression. A significant number of people suffering from depressive illnesses are not diagnosed correctly. Despite the fact that the actual predictive value of speech traits has not been studied, it is clinically simple to collect data on them, and their link with depression has been researched. Hence, it is unknown how much a person's voice traits affect their ability to be diagnosed with depression generally. Every person has anxiety at some point in their lives. The word "anxiety" is frequently used in everyday speech to describe the unpleasant feelings that accompany tension or fear. Computers can prepare data for factual study using machine learning techniques in order to reach a certain range of performances. It encourages the use of computer frameworks to automate decision-making based on data inputs while creating the models for the test data. A paradigm for forecasting anxiety and sadness is presented in this article. This framework receives a set of voice data as input. To remove data noise and make the input data set consistent, this data set has undergone preprocessing. The input data set is then subjected to different machine learning methods such as Nave Bayes, Random Forest, and SVM. Data classification is carried out. The classification results of several methods are compared**

.Keywords: — Anxiety, Depression, Prediction, Machine Learning, Classification, Speech data

I. INTRODUCTION

Everyone [1] experiences anxiety at some point in their lives. The word "anxiety" is frequently used in everyday speech to describe the unpleasant and uncomfortable feelings that people experience when faced with stressful or frightening situations. A wide range of things might make someone anxious. The majority of the time, though, stress is to blame. Anxiety brought on by stress is the most frequent cause of treatment requests among college students. One in eight undergraduate students who have stress-related problems in college seek therapy. Anxiety is defined as an underlying fear brought on by a compelling urge to commit. It is a group of symptoms brought on by inadequate adjustment to the stresses and demands of life. One of the most frequent problems college students deal with is anxiety. Some people could feel overwhelmed by the added demands that come with moving to a new location, being far from family, and the need to perform well in school. Anxiety disorders are among the most frequent and widespread mental ailments. Anxiety disorders are characterised by differences in physiology, thought, behaviour, and emotion. College students may exhibit them in a variety of ways, such as adjustment problems, anxiety tests, social phobia, and anxiety disorders brought on by drugs. [2] [3]

The signs and symptoms of anxiety [4] [5] can include problems with the mind, the body, or the environment. Many symptoms of anxiety include excessive worrying, fear, agitation, overly emotional reactions, and negative thoughts. While they are anxious, some people appear calm, but their minds are always racing. This negatively affects their quality of life. Chest tightness, a racing or hammering heart, and a pit in the stomach are common symptoms of anxiety. Some people get headaches, sweat, and even the urge to urinate when they are anxious. The signs of anxiety include worry, panic, losing focus during an exam, feeling helpless while executing activities, and losing interest in a challenging subject.Depression [6] affects a person's thoughts, actions, feelings, and fitness and is characterised by a low mood and aversion to activity. Anxious, reluctant, helpless, unworthy, guilty, irritated, or restless feelings are common among depressed people. Individuals could stop finding pleasure in formerly enjoyable activities, experience excessive or loss of hunger, struggle to concentrate, remember details, make decisions, or even consider suicide. College may be difficult for students, and depression is common. University students frequently experience depression, and campus life can be demanding.

II. RELATED WORKS

Millions of people experience depression, a powerful sense of helplessness, gloom, and unhappiness [7]. It's more than just a "black mood"; it's a persistent, uncontrollable feeling that makes it difficult to go about daily tasks. By 2023, depression is expected to overtake all other causes of death as the leading cause of death.

There are different levels of depression [8], ranging from general to clinical. It's common to experience depression. Mood disturbances are the most overt of the symptoms, which appear in the four fundamental domains of human functioning: emotional, cognitive, physical, and behavioural. Changes in food or weight, disturbed sleep, psychosis, diminished energy, feelings of guilt, disorganised thinking, difficulty concentrating, trouble making decisions, persistent death thoughts, and thoughts of harming oneself are all common signs of depression. Depression has been related to a range of harmful health outcomes, such as impaired recovery and diminished immune function.An area of information technology that departs from conventional computer methods is machine learning [9] [10]. According to conventional wisdom, algorithms are collections of explicitly designed instructions that a

computer uses to find or fix a problem. Machine learning techniques enable computers to prepare data inputs for factual inquiry in a particular field. It promotes the development of computer frameworks for test data models to enable automated decision-making based on data.There are many algorithms on social media to recognize depression and bullying, as the basic requirement is to interpret textual data as we want it to be. Nevertheless, accurate algorithms begin as their building block from the Support Vector Machine, Random Forest, Navie Base theorem. The field of machine learning is constantly evolving. Supervised training and uncontrolled learning are two essential types. approaches for machine learning. Similar to this, decision-making, deep learning, and the closest K- algorithm are typical algorithmic strategies in machine learning. Examine the most popular programming languages for machine learning by outlining some of its advantages and disadvantages. In addition, biases like this are avoided throughout the development of machine learning algorithms.

III. VOICE RECOGNITION

Voice recognition is another way to detect depression and anxiety using machine learning. Voice analysis can reveal subtle changes in pitch, tone, and other speech patterns that can indicate depression and anxiety. Some researchers have used machine learning algorithms to analyze voice recordings and identify patterns associated with depression and anxiety.There are several ways to use voice recognition to detect depression and anxiety. One approach is to use a machine learning algorithm to analyze speech features, such as pitch, tone, and speaking rate. The algorithm can be trained on a dataset of speech recordings from people with and without depression and anxiety. Once the algorithm is trained, it can be used to analyze new speech recordings and determine whether the person is experiencing depression or anxiety.Another approach is to use voice recognition to detect specific vocal biomarkers that are associated with depression and anxiety. Researchers have identified several biomarkers, such as the rate of speech, pauses, and variations in pitch, that can be used to identify depression and anxiety. Machine learning algorithms can be trained to detect these biomarkers and use them to predict depression and anxiety in new voice recordings.Overall, voice recognition is a promising approach to detecting depression and anxiety using machine learning. a study published in the Journal of Affective Disorders found that machine learning algorithms were able to accurately distinguish between the speech of people with depression and those without depression. The algorithms analyzed features such as pitch, tone, and pauses in speech to make their predictions.Another study published in the Journal of Medical Internet Research used a mobile app to collect voice samples from people with depression and anxiety. The app analyzed the samples using machine learning algorithms and was able to accurately detect depression and anxiety in the participants.

IV. DEPRESSION DETECTION USING VOICE RECOGNITION SURVEY

There have been several studies that have explored the use of voice recognition and machine learning for the detection of depression. Here are some examples of literature in this area:"Depression Detection by Fusing Vocal and Linguistic Features Using Deep Learning" by F. Alam, et al. (2021): This study used a deep learning approach to analyze both vocal and linguistic features of speech to detect depression. The researchers collected speech samples from 62 participants and used a combination of acoustic and linguistic features to train their model. The results showed that the model achieved an accuracy of 83.87% in detecting depression. Depression Detection from Speech using Deep Learning and Hand-Crafted Features" by S. Lee, et al. (2018): In this study, the researchers collected speech samples from 142 participants with and without depression. They used both deep learning and hand-crafted features to train their model, and achieved an accuracy of 86% in detecting depression."Detecting Depression with Audio and Textual Features" by S. Soleymani, et al. (2017): This study used a combination of audio and textual features to detect depression. The researchers collected speech samples and written responses from participants and used machine learning algorithms to analyze the data. The results showed that the model achieved an accuracy of 73.9% in detecting depression."Depression Detection via Harvesting Social Media: A Multimodal Approach" by M. Li, et al. (2019): This study used both text and voice data from social media to detect depression. The researchers used a combination of natural language processing and machine learning algorithms to analyze the data. The results showed that the model achieved an accuracy of 82% in detecting depression. These studies suggest that voice recognition and machine learning can be effective tools for detecting depression, and that a multimodal approach that combines vocal and linguistic features may lead to higher accuracy in detection.

V. MACHINE LEARNING USE IN HEALTH CARE DOMAIN

Machine learning has the potential to revolutionize healthcare by improving the accuracy and efficiency of diagnosis, treatment, and disease prevention. Here are some ways in which machine learning is being used in healthcare:Medical image analysis: Machine learning algorithms can be trained to analyze medical images, such as MRI scans and X-rays, to help diagnose diseases and conditions. For example, machine learning models have been developed to identify cancerous cells in medical images, reducing the need for invasive procedures.Electronic health records analysis: Machine learning can be used to analyze patient data in electronic health records (EHRs) to identify patterns and trends that can help with diagnosis and treatment. For example, machine learning algorithms can be used to identify patients who are at risk of developing certain diseases,

allowing for earlier intervention and better outcomes.Personalized medicine: Machine learning can be used to develop personalized treatment plans for patients based on their individual characteristics, such as genetics and medical history. This can lead to more effective treatments and better outcomes.

Drug discovery: Machine learning can be used to help identify new drugs and treatments by analyzing large amounts of data and identifying patterns and relationships. This can help accelerate the drug discovery process and lead to more effective treatments for diseases.

Health monitoring: Machine learning can be used to analyze data from wearable devices, such as fitness trackers and smartwatches, to monitor health and detect early warning signs of disease. This can help individuals take proactive steps to improve their health and prevent disease.

Overall, machine learning has the potential to transform healthcare by improving diagnosis, treatment, and disease prevention. However, there are also challenges associated with implementing machine learning in healthcare, such as data privacy and security concerns, and the need for regulatory oversight. As such, continued research and development are needed to fully realize the potential of machine learning in healthcare.

VI. MACHINE LEARNING FOR DEPRESSION AND ANXIETY DETECTION

Machine learning has shown promising results in the detection, diagnosis, and treatment of depression. Here are some ways in which machine learning is being used for depression and anxiety:

1.Detection: Machine learning algorithms can be trained on various types of data, such as speech, text, and physiological signals, to detect patterns that are associated with depression and anxiety. These patterns can then be used to develop diagnostic tools that can help identify individuals who may be at risk for depression.

2.Diagnosis: Machine learning can be used to analyze patient data, such as medical history and symptoms, to help clinicians make more accurate diagnoses. For example, a machine learning model can be trained on patient data to predict the likelihood of a patient having depression, which can help guide the diagnostic process.

3.Treatment: Machine learning can be used to personalize treatment plans for individuals with depression and anxiety. By analyzing patient data, such as medical history, symptoms, and treatment outcomes, machine learning algorithms can identify patterns that are associated with successful treatment. This information can then be used to develop personalized treatment plans for individuals with depression.

4.Early intervention: Machine learning can be used to identify individuals who are at risk for depression before they develop the disorder. By analyzing data from multiple sources, such as social media activity, physical activity, and sleep patterns, machine learning algorithms can identify patterns that are associated with depression and anxiety risk. This information can then be used to develop early intervention strategies to prevent the onset of depression.

Overall, machine learning has the potential to improve the detection, diagnosis, and treatment of depression, and has the potential to lead to better outcomes for individuals with depression.

VII. MACHINE LEARNING TECHNIQUES

Real values (housing costs, number of calls, total sales etc.) are measured depending on variable via a linear regression (s). In this connection, the relationship between independent and dependent variables is formed using the best possible line. This best fit line is called a regression line and the linear equation $Y= a*X + b$ is shown. This is known to be the Y-regression line on X and there is another X- regression line, and it is represented by $X = c*Y + d$. The best way to understand linear regression is to recall your child's experience. Allow us to declare that we want a fourth-grade youngster to instruct understudies in his class by growing weight requests without asking them their loads! What can we anticipate the child doing? He/she would almost definitely look (outwardly dissect) people's stature and job and mastermind them using a combination of these distinct factors. In fact, this is linear regression! The child has truly comprehended that height and construct would be related to the burden by a relationship that resembles the equation above. [11] The closest neighbour method of regression and classification can both be used with a pattern recognition model. The nearest k is a positive, ordinarily very small number that is occasionally abbreviated as k-NN. The k nearest training examples will be the inspection or regression inside the space. The main goal of classifying k-NN is: The class membership is a result of this role. This produces a new object in the class with the greatest number of its closest neighbours. The object's closest neighbour determines its classification if $k = 1$. [12] Decision trees should appear to or offer advice on making decisions and should refer to options. In machine learning and data mining, decision trees are employed as a prediction model. These models present data in order to let users decide what the data's objective value is. Creating a model that forecasts the estimation of an objective based on input data is the aim of decision tree learning.

The Support Vector Machine is a binary linear, non-probabilistic classification technique. The data is categorised into one or more target groups using a training model that is created. Points are used to represent the data objects in space. The objects of various categories are separated by a clear gap, which spreads its breadth. Which side of the gap the new instances are on determines the target classes for them. The support vector machine can also do non-linear classification when the input datasets are not labelled. The support vector machine uses unsupervised learning to categorise data because there are no goal classes to which the examples can be allocated. Once clusters have been created, additional instances are added based on functions. The author describes a potent non-linear support vector machine-based model-based recommendation system. The most popular approach for

working with unlabeled data is non-linear support vector machine approaches, which are employed in a wide range of industrial applications. [15]

In his paper, author [16] presented Random Forest as an ensemble learning technique for classification and regression operations. During the training phase, it produces a large number of decision trees and predicts the outcomes of the individual trees using regression techniques. It has a low variance and quickly links the many aspects of the supplied data for prediction. The reason behind this methodology's initial lack of enthusiasm is because random forest classification techniques are difficult to understand.The goal of machine learning is to simulate the conversion of light and sound into vision and hearing in the human brain. The machine learning engineering system is composed of many layers of a hardware-built neural artificial network and is powered by biological neural networks.One layer's contribution to the progressive layer is the outcome. Both unsupervised and supervised machine learning methods can be used to classify data.

Machine Learning Based Framework for Anxiety and Depression Prediction:

Figure following depicts a framework for predicting anxiety and sadness. As input to this framework, there is a set of voice data. There are 600 records in the input data set. 340 records are connected to depression sufferers, while the remaining 260 records are related to normal persons. This data set has been preprocessed in order to eliminate noise from the data and make the input data set consistent. The input data set is then subjected to different machine learning methods such as Nave Bayes, Random Forest, and SVM. Data classification is carried out. The classification results of several methods are compared. Table 1 displays these findings.

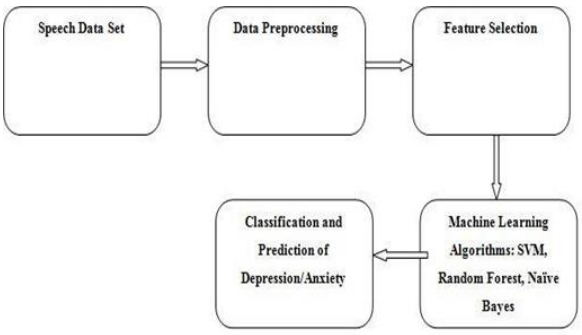

Fig.1: A Framework to Predict Depression/Anxiety

A. Data Cleaning

Data cleansing is an essential tool for data and NLP research. Text cleanup removes stop words (words that don't affect the model very much). These are usually pronouns, conjunctions, and so on. In addition, code cleanup in NLP removes unique characters such as @, #, and trailing characters. Stemming translates the same term as a word with a specific root, so the model is applied in all cases where similar words are used, and it works better and minimizes problems.

B. Tokenization and Sequence Padding

Tokenization is a greater state-of-the-art shape of statistics control that could fit and change exceptional textual content files. It can be the proper alternative for big projects. The Tokenizer ought to be constructed to suit both uncooked textual content or encoded textual content files in an integer. Next is sequencing and collection padding in which we remodel the tokens into sequences used for a sequential pattern.These sequences change in duration, so we pad positive sequences to get all of the statements or sequences to a popular length.

C. Naïve Bayes Classifier

Naïve Bayes classifiers are highly used for text based classification. It is a probabilistic learning model that applies Bayes Theorem [7].

The dataset is first subjected to the pre-processing stage. Pre-processing consists of following steps:

1. Tokenization: This process splits the given text into relevant tokens like characters, words, phrases etc., Here word –level tokenization is used [7].

2. Bag-of-words: Bow counts the number of times a particular token appears in the given text. To achieve this a class called Count Victories from scikit-learn is used.[7]

Naive Bayes Classifier is another machine learning algorithm that can be used for depression detection. Here are the general steps you can take to use Naive Bayes Classifier for depression detection:

Data collection: Collect data on individuals with and without depression. This data can include a variety of features such as demographic information, medical history, and psychological assessments.

Data preparation: Clean and preprocess the data. This may involve handling missing values, normalizing the data, and feature engineering.

Split the data into training and testing sets: Use a portion of the data to train the Naive Bayes Classifier and another portion to test the performance of the model.

Feature selection: Use feature selection techniques to identify the most relevant features for depression detection.Train the Naive Bayes Classifier: Train the Naive Bayes Classifier on the training data, using the selected features. Naive Bayes assumes that all features are independent, and calculates the conditional probability of each feature given the class label.Test the Naive Bayes Classifier: Test the performance of the trained Naive Bayes Classifier on the testing data. Use appropriate evaluation metrics, such as accuracy, precision, recall, and F1-score, to assess the performance of the model. Iterate and refine: Analyze the performance of the Naive Bayes Classifier and refine the model as necessary, including adjusting hyperparameters such as smoothing factor.Overall, Naive Bayes Classifier is a relatively simple algorithm that can be effective for depression detection, especially when the number of features is large. However, like any machine learning

algorithm, it is important to carefully consider the data and features used in the model, as well as to seek input from mental health professionals when interpreting the results.

D. Support vector Machine (SVM)

SVM is a supervised learning model that emphasizes two different classes in a higher dimension. You can customize multiple features while balancing good performance. SVMs are especially famous for their powerful features.We are working on real-world data, including definitive rationale and its insensitivity to high-dimensional data. SVM is an algorithm with some marked training examples. SVM training algorithms are potential hyperplanes, Divide the case into two classes. Escalate the distance between shared hyperplanes.

Support Vector Machines (SVMs) are a type of supervised machine learning algorithm that can be used for classification tasks, including depression detection. Here are the general steps you can take to use SVM for depression detection:

Data collection: Collect data on individuals with and without depression. This data can include a variety of features such as demographic information, medical history, and psychological assessments.

Data preparation: Clean and preprocess the data. This may involve handling missing values, normalizing the data, and feature engineering.

Split the data into training and testing sets: Use a portion of the data to train the SVM and another portion to test the performance of the model.

Feature selection: Use feature selection techniques to identify the most relevant features for depression detection. Train the Random Forest model: Train the Random Forest model on the training data, using the selected features. Random Forest is an ensemble learning method that constructs a multitude of decision trees at training time and outputs the class that is the mode of the classes of the individual trees.

Train the SVM: Train the SVM on the training data, using the selected features and an appropriate kernel function. The kernel function maps the data into a higher-dimensional space to allow for better separation between the classes.

Test the SVM: Test the performance of the trained SVM on the testing data. Use appropriate evaluation metrics, such as accuracy, precision, recall, and F1-score, to assess the performance of the model.

Iterate and refine: Analyze the performance of the SVM and refine the model as necessary, including adjusting hyperparameters such as the kernel function and regularization parameter.

Overall, SVMs can be a powerful tool for depression detection when used appropriately. However, it is important to note that depression is a complex and multifaceted condition, and SVMs may not be effective in all cases. It is important to carefully consider the data and features used in the model, as well as to seek input from mental health professionals when interpreting the results.

Training example is closest to the hyperplane. SVM is predictive Determines to which side of the hyperplane the object is tilted. The linear classifier relies on the inner product between vectors [20] (support vector ai and test tuple aT):

$$\boldsymbol{K(ai, aj) = ai\ Taj}$$

If each data point is mapped into high-dimensional space via some transformation Φ: a → φ(a), the inner product becomes

$$\boldsymbol{K(ai, aj) = \varphi(ai)T\varphi(aj)}$$

A kernel function corresponds to an inner product in some expanded feature space. A common kernel function is the radial basis function (infinite-dimensional space):

$$\boldsymbol{(ai, aj) = (-|ai - aj\|2/2\sigma 2)}$$

Although SVM can tolerate the data outlier, it is computationally inefficient and sensitive to the Kernel.

A. Random Forest

In Random Forest Algorithm, the dataset is divided into several individual trees and forms a class with similar functionalities. Then from the different classes, the final class is selected by voting the majority. The main advantage of any decision tree-based algorithm like Random Forest is the clear and understandable prediction rules that may be generated from the training dataset. Random Forest is a machine learning algorithm that can also be used for depression detection. Here are the general steps you can take to use Random Forest for depression detection:

Data collection: Collect data on individuals with and without depression. This data can include a variety of features such as demographic information, medical history, and psychological assessments.

Data preparation: Clean and preprocess the data. This may involve handling missing values, normalizing the data, and feature engineering.

Split the data into training and testing sets: Use a portion of the data to train the Random Forest model and another portion to test the performance of the model.

Feature selection: Use feature selection techniques to identify the most relevant features for depression detection.

VIII. RESULTS

By training the naïve bayes classifiers, SVM and Random Forest on depression and harassment datasets and visualized the results. The results are as follows.

Table 1 gives accuracies for depression prediction:

Model	Test Accuracy
Naïve Bayes	67%
SVM	90%
Random Forest	69%

Table 1: Model Accuracy on depression dataset

Thus the SVM model performs best out of all the three models

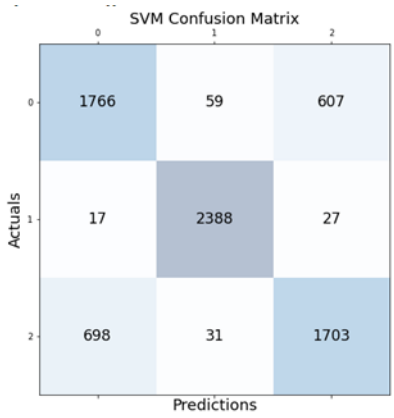

Figure 2 SVM Confusion Matrix

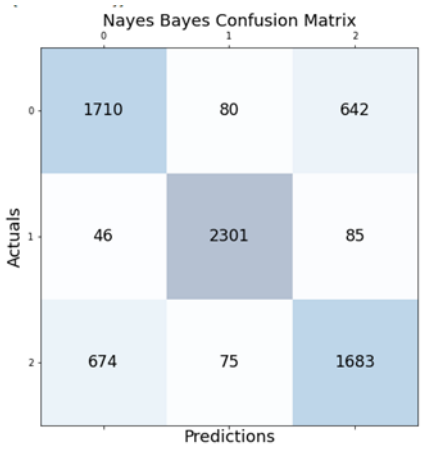

Figure 3 Naive Bayes Confusion Matrix

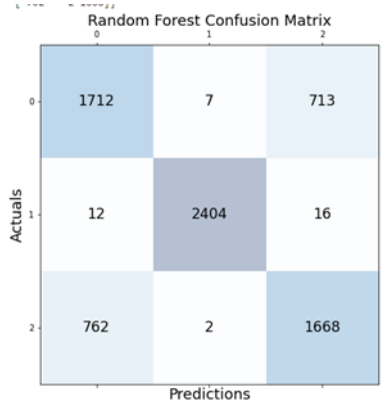

Figure 4 Random Forest Confusion Matrix

IX. CONCLUSION

Everybody has anxiety at some point in their lives. The word "anxiety" is frequently used in everyday speech to describe the unpleasant and uncomfortable feelings that people experience when faced with stressful or frightening situations. Computers can use machine learning techniques to prepare on data inputs for factual enquiry and deliver findings that fall within a specific range. In order to automate decision-making based on data inputs, it encourages computer frameworks to develop models for test data.

A paradigm for forecasting anxiety and sadness is presented in this article. This framework receives a set of voice data as input. To remove data noise and make the input data set consistent, this data set has undergone preprocessing. After that, various machine learning techniques including Nave Bayes, Random Forest, and SVM are applied to the input data set. There is data classification. The classification outcomes of several approaches are contrasted.

X. ACKNOWLEDGMENT

The authors express their gratitude for the support given by their college, Faculty of Computer Engineering, for their continuous encouragement.

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Restaurant Table Booking Application

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Abstract: With the rate at which humanity is progressing in various fields, new inventions have changed the field again and again. In this changing world, one industry that has kept adapting to the changing technology while keeping its original essence intact is the food industry. People have been fond of the concept of delicious dishes whether they were cooked at home or bought from outside. On average, 163 million people visit restaurants each week to satisfy their hunger. Post-pandemic people have become accustomed to the tradition of online delivery of food items through various mobile applications. People can roam outside and visit places they were restricted to visit before and revisit the old customs they used to follow. One such custom would be calling a restaurant to reserve tables or visiting a restaurant and waiting in queue till a table frees up for you to sit. In the modern age of mobile and web applications where there is an app for almost every service. We would like to preach the idea of booking or reserving restaurant tables through a mobile application. An application that works similarly to booking tickets for movies, trains, or flights but is focused on satisfying your hunger. We present such an application to solve all these hunger pangs and be different from just ordering food online.

Keywords - Restaurant, Manager, Customer, Application, seat booking, Reservations, Mobile Application, food, Table booking

I. INTRODUCTION

Restaurants have been around for a while satisfying the hunger of people and the desire for good food around the world. The purpose of visiting a restaurant has ranged from trying new food to being one of the events for an outing. Such plans brought with them a huge crowd of people visiting restaurants on a daily basis. Situations started arising where there were no tables available at a restaurant and people had to wait in long queues before getting a chance to satisfy their hunger.

The first act of reserving tables at a restaurant was somewhere around in the mid-20th century. The process of reserving a table was instructing the manager or the personnel in charge about when they would want the table to be free for their visit and which table they would like to be seated at. This process has evolved over time, where tables at a restaurant are booked by calling the restaurant and making your desired reservation.

There are several problems with this method of reserving tables. When almost every type of industry has a mobile application for conducting many of its functions. A mobile application for solving the problem of restaurant reservations has been proposed. The application will be designed for hassle-free table booking at a restaurant.

Manual booking done by the customer can be efficiently managed through the application. Customers have to decide their restaurant of interest. The application allows the customer to book their table online, based on their desired number of guests and availability at that time. [4][5].The admin can efficiently manage the bookings according to the schedule of the customers.

II. LITERATURE SURVEY

In the past few years, it is experienced that customers are desirous to find a handy application for reservation of tables and menus or any other services to avoid physically walking to the hotel or contacting by call or reserving through a middleman. Therefore it is aimed to develop an application for table reservation and online menu booking. The growth of mobile and wireless technology is making a large impact on our lives in the present condition as compared to previously. [1]

Nowadays people are looking for an application that satisfies their needs even more precisely. Even the

restaurant industries are looking for any mobile application that enhances the dining experience as well as increases the profit which in turn is not only an advantage for restaurant industries but also for the customers to choose the restaurant of their desired choice and location.[5][7]

This application will save time, cash, and paper by converting the manual reservation system to an automated system.[5] Running a restaurant means spending 100% of your time focusing on one metric — the number of customers visiting your restaurant. Between making sure your front-of-house and back-of-house are operating harmoniously, you are often left with no time to focus on increasing this number. [7]

Increasing restaurant reservations is not as difficult as you think. There are a number of quick changes you can make at your restaurant to start tapping into missed bookings. Some methods are easier than others, but all will increase restaurant reservations.

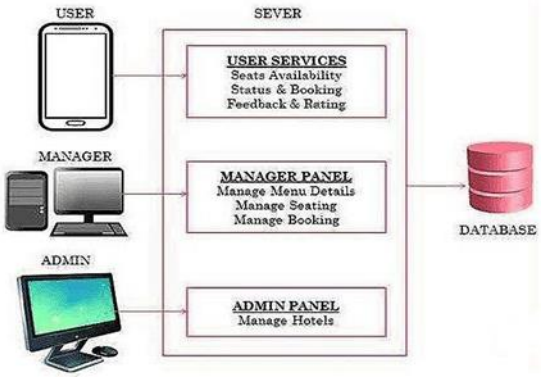

Fig. 1. - Restaurant Management System

The above figure shows a framework overview of the proposed restaurant seat booking application. This framework gives online menu requesting and reservation-making capacities and a menu suggestion benefit. The proposed restaurant seat booking application enables immediate identify customers via GPS-based location and

then actively recommends the most appropriate menus for customers according to their consumption records. For new clients, the administration staff gives proposals in light of feast ubiquity and afterward makes clients' inclinations to store in the back-end database; to infer items preferred by customers or items close to those preferred items based on customers' preference data stored in the system. [2]

Below, is certain reasons support how old fashion reservation system is losing customers:

1. Guests aren't able to check table availability online and make bookings

If you require guests to call, email, or fill out a form to make a booking, you are already missing out on a large number of restaurant reservations. The extra effort involved in the

process is often enough to turn customers away in favor of an easier booking process.

With more than 25% of people making reservations exclusively online, it is a channel that you can't afford to ignore. Online reservation systems allow your guests to choose their preferred date, view available times, and reserve a spot, without the need to make a call or send an email. By partnering with an online reservation system you remove the main barrier to entry preventing potential guests from visiting your restaurant.

2. Double booking without a table management system can sometimes get out of hand

Selling your tables through various channels (website and phone) tends to get messy without an online reservation system. Every time a booking comes through, your reservation team will have to manually update booking information to get an idea of how many tables you have left. This is not only a headache but also a source of potentially lost revenue for your restaurant. Using a table management system gives you the information you need to double-book tables.

3. Communication with guests is broken

When a guest makes a reservation at your restaurant, there are certain forms of communication they should receive. These include booking confirmations, reminders, and a message sent after their visit requesting feedback. Smaller restaurants have no way of automating this process without the help of services, such as a reservation system. Their best bet is to try and find free templates online that lack personalization and require each message to be sent manually. Having these messages sent automatically not only makes it easier for the restaurant staff but also increases customer confidence and helps cut down on no-shows. [3][6]

III. OBJECTIVE

To make an online restaurant table booking system +++that will recommend a table to book before visiting the restaurant according to their requirement. The Online Restaurant Management System is made to offer both the restaurant and the consumer a service facility. The employees of a restaurant can use this software to handle patrons and orders, and make it simple for them to locate open tables or nearby orders. The services include management of online ordering for food, management of customer and waiter information, and management of menu information.[8][10]

Customers can examine menu details using this software and reserve orders for a given time. On the management side, the staff is also permitted to change menu details, price, chef assignments, store details pertaining to requested orders, etc. Therefore, the goal is to provide a user-friendly interface that can track all of the customers' orders.

IV. EXISTING SYSTEM

In the manual system, everything depends upon the waiter and the diary. Also, there is no automated system for keeping the records in the restaurant.[9] The consumer must make a phone reservation to make a reservation for food in a typical online restaurant management system. In the unlikely event that the phone connects, the customer will request a contemporary menu, discuss the menu items they want, and place their purchase. They will also need to submit some of these identity details. It takes 5-8 minutes to finish this process. In addition, the employees at the restaurant must physically record each reservation on paper and place an order on the line with a special priority based on price and timing. The chef is then given a specific order to complete. [12][13][14]

Therefore, this takes a lot of time and paperwork. Therefore, a system that can oversee the restaurant's daily operations and automate all the procedures is required in order to save paperwork and save time.

Problems of Existing System:-

a. No computer-based data.

b. Loss of time, cash, and paper.

V. PROPOSED SYSTEM

In the proposed system, we provide customers to book restaurant tables according to their requirements of the number of seats and time. We have developed an application for the same which is currently operable for four restaurant chains. The application also provides the menu and restaurant details about its timings. Seats can be chosen according to the liking and comfort of the user. The new online restaurant management system is built on a website that logs customer orders online; however, consumers must first register with the system in order to use this feature. The user must enter his email address or User ID, password, and preferred time for order delivery upon login. The customer can view the menu page with the items specified for the appropriate time after successfully logging in. He or she can use the menu to browse the available items based on pricing and food category, and then place an order for food. On the management side, the employee must first login before the rights are set based on their classification. The notification of the order or reservation will be sent to Manager. The manager will then have the duty to manage all the orders and reservations. The managers will have access to editing menus in case it has been changed. If the employee is a chef, you are only permitted to change the order item's status to reflect the menu items that he has

produced. The administrator has the authority to update the website as needed, including adding or removing menu items. You may see a list of menu items, reservations, messages, and contact details right away on the homepage.[15][16][17]

VI. METHODOLOGY

Customer Registration Module

Customer details and other information specific to that customer are included in the customer registration module. After that, a database is used to store all of this data.

Administrator Module

The online restaurant management system's menu management information system is accessible to the admin. The menu, orders, and client profile are all editable by him.[5]

Customer Online Ordering and Reservation Module

To place an order for meals or reserve a table, a form must be filled out on the customer's online ordering and reservation module.

Menu Module

The management of the food that the restaurant prepares for clients is under the purview of the menu module. Customers can examine the menu and make reservations for orders in this module.

General Report Module

The system offers a way to create reports. The following will be in the report:

1. Reports on customer orders and reservation tables

2. Information about customers and servers.

As a result, the design is intended to benefit both the patron and the restaurant manager, particularly with regard to online ordering and table reservations.[10]

Features of a Restaurant Table Booking System:

User-Friendly Interface: The user interface (UI) of the app or website for the restaurant table reservation system is the first thing you need to keep in mind. The app should be simple to operate. Do not attempt to make it mysterious. Try to keep things as simple as you can. The app should be simple to use so that users can quickly reserve a table for themselves. The restaurant's information must all be simple to find. Don't try to complicate matters; instead, keep it straightforward and honest.[8]

Easy to understand Calendar: You must maintain things more understandable and straightforward, as we just suggested. Any system for online restaurant reservations must include a straightforward calendar. When it comes to dealing with online reservations for restaurant tables, a correctly kept calendar is essential. It can lead to anarchy and be a major system failure if not organized.

Customers ought to have explicit access to the reservation calendars. If not, customers would have numerous issues, such as multiple bookings and incorrect table reservations. We are confident that you do not want your customers to experience any of these issues.

A Visually Appealing Menu: According to Grubhub, adding images to your restaurant's menu will boost sales by 30%. If a customer sees images of the dining area and the dishes you are serving, they are more inclined to browse your entire website. Your sales will quickly soar if your app, website, or online restaurant reservation system offers a visually appealing menu.[6][7] Additionally, studies reveal that more than 85% of patrons visit a new restaurant after viewing photos of the menu items. To get customers to your restaurant, try to organize a professional photo shoot for the advertisements of your distinctive meals.

VII. USER INTERFACE DESIGN

Project Architecture Algorithm: The application consists of various screen layouts which are redirected from one screen page to another. Below is the separately mentioned UI screen for our application.

1. Splash Screen

2. Menu Page

a. List of different cuisines

b. List of different dishes

3. List of Branches

4. Seat Layout of a Branch

a. Seat Booking Form

5. Feedback Form

a. Contact Information

All of these pages were finalized after seeing what a customer ideally is looking for when browsing through the best dine-in restaurants. The interactivity for the user is also enhanced so they do not feel static and the application can actually make them stick to it and enjoy the whole process right from the thought of using it. For a dynamic experience, some fun activities still can be embedded to make the user visit again while ordering the food. Usually, customers ought to skip sometimes in a hurry to enjoy the whole vivid variety of restaurants in their locality and they tend to miss out on the best offers also if any restaurant has. To avoid this problem, the best-suited environment is to have a rating visible to the customer itself when they look over the restaurants. It is nearly possible, that by the brand name or misconceptions of some top-notch restaurant name or by chefs, customers feel they can visit the dine-in without even hesitating, still, there can be a lot better options for them to look for after reviews of people available on the application.

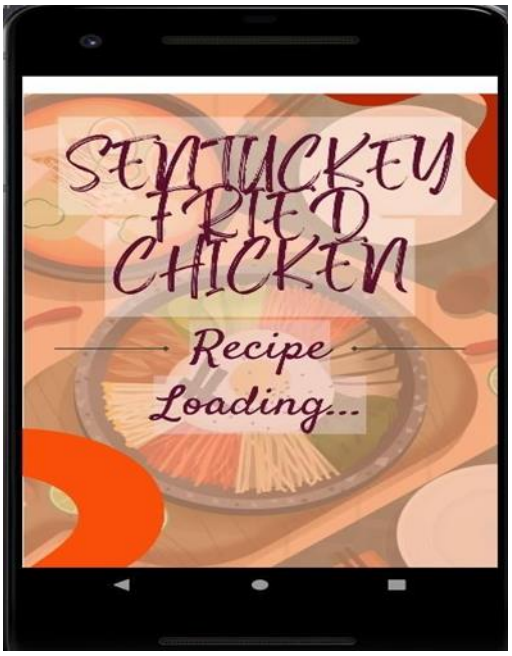

Fig. 2. - Splash Screen

The splash screen is the first Landing UI whenever a user interacts with the application. The User experience is more emphasized so as to make more interactivity and screen timeout is more.

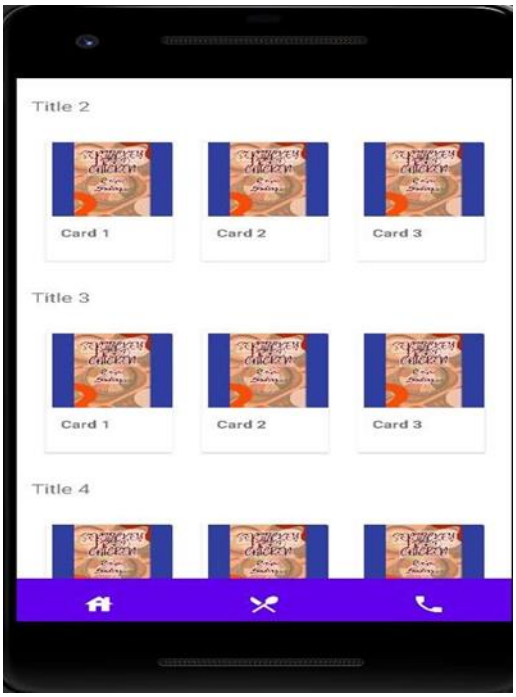

Fig. 3. - Menu Page

The menu page is the main UI wherein users can customize their order purchase. The screen adjustment is relatively compact and easy to scroll and look for the best-fitted dish to order for.

Fig. 4. - List of Branches

This page is choosing the right location near to your vicinity area, so as to visit the right location in nearest destination restaurant possible. This allows users to choose a particular area based on their choice.

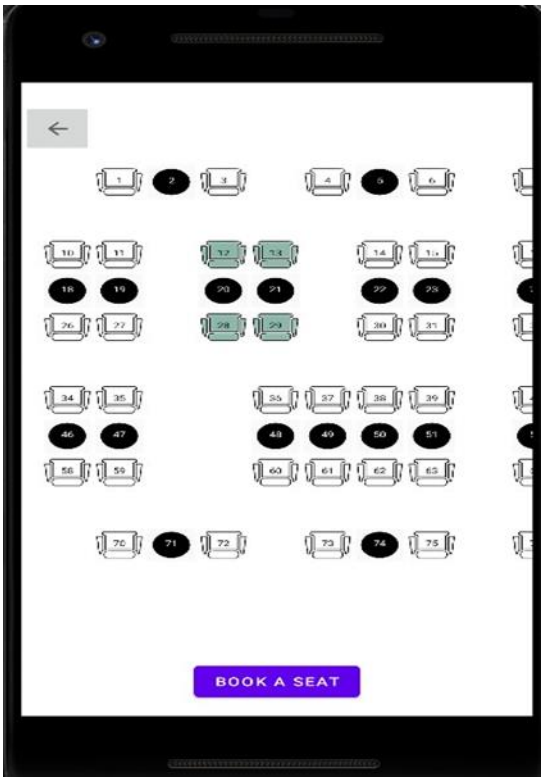

Fig. 5. - Seat Layout

Many customers do not have a good experience or a comfortable sitting area given a hasty place full of crowd. This page defines available chairs and tables placed over the whole dining area and allows the customer to sit according to their convenience. The user can select as well as deselect here.

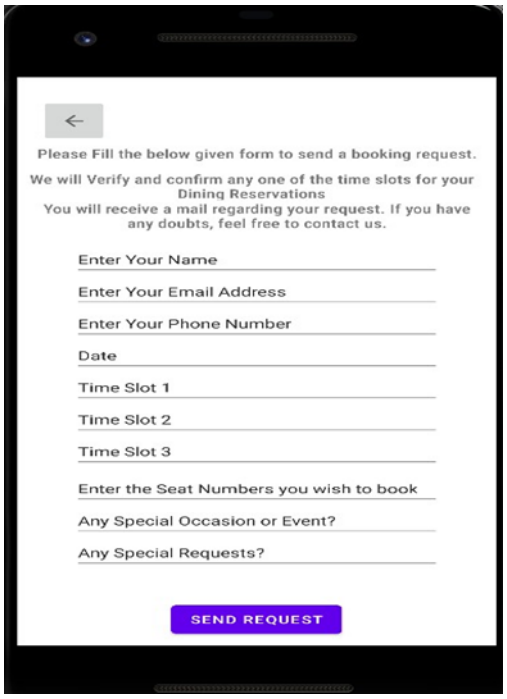

Fig. 6. - Seat Booking Form

The seat booking form asks users for their identity for official registers.

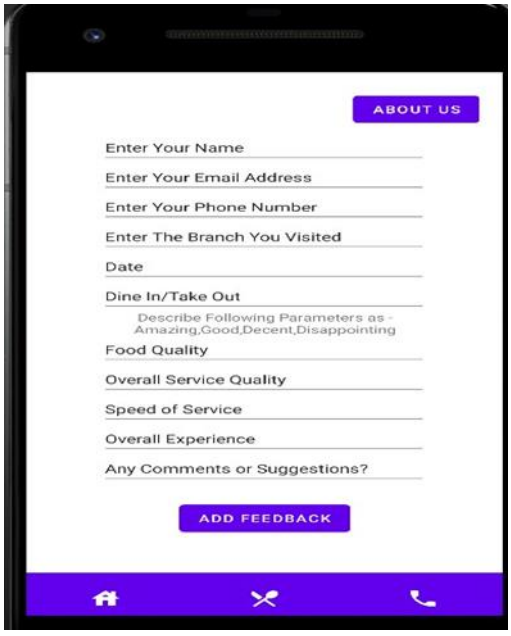

Fig. 7. - Feedback Form

The feedback form asks for rating and customer's experience. The UX of the page is designed to give the best possible experience.

Fig. 8. - Contact Information

The contact information page stores the contact details of the registrants with all the people who visited along and stores the same in the backend database for official purposes.

Building a restaurant reservation system is a wise investment in the current economic climate, and it is probably the hospitality sector's future after the epidemic. Although they appear to be straightforward, there is a tonne of room for improvement and the development of truly original systems.

VIII. CONCLUSION

The restaurant reservation app offers customers a variety of options that guarantee a superior eating experience compared to conventional techniques. With mobile applications, everything has grown easier in our digital age.

With the ability to create Android and iOS apps, USM is the top mobile app development business in the USA and India. To convert your concepts into mobile applications, get in touch with us. The concept is built around an Android application that customers may use to reserve the desired table and menu from a restaurant at their convenience. Previously, table reservations were made manually, a practice that is gradually coming to an end in well-known restaurants. However, these days, consumers are entering the digital era of restaurant reservations, and vendors are considering using a digital method of booking. Everything in a manual system is dependent on the waiter and the booking notebook; there is no automated mechanism in place to maintain the records. The overall goal is to create a reservation system for tables and menu items to help staff members with simple problems with the current manual reservation method.

Taking time and money as examples. Modern society favors high-tech services, particularly those provided online. [18][19]

In order to assist restaurant owners in automating their business operations, the project has been built skillfully.

[20] Customers have the option to reserve a table, a menu, or both via the suggested reservation system, depending on their convenience. The customer must pay 50% of the total price when ordering from the menu. If the customer is running late, they can cancel the reservation and reserve a table for the next available time window, but they must do so 30 minutes before the time slot they had chosen or their advance payment won't be refunded.[7]

IX. ACKNOWLEDGEMENT

A sincere thanks to Ms, Niki Modi, and Dr. R. R. Sedamkar for briefly explain about Mobile Computing and Android Components. We would also like to thank our batchmates who patiently solved our queries and took part in the discussion for the betterment of the Project. With the help of many resources compiled together, we finally made an Application that defined our potential of understanding Android Components.

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Facial Emotion Recognition for Feedback using Convolutional Neural Networks

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Abstract— **This study provides an overview of the phases, methodologies, and datasets used in modern Facial Emotion Recognition (FER). FER has been known for decades and is an important topic in computer vision and machine learning. By using convolutional neural networks to recognize facial expressions, we can gain valuable insights into the emotional states of people and provide better services, such as personalized healthcare, improved customer service and more effective marketing. Automated FER can be used in a variety of settings including healthcare, education, criminal investigation, and Human Robot Interface (HRI). A comparative study showing the performance and conclusions of each model is summarized. The aim of this study is to use several models like Resnet50, VGG16, Mobilenet and also our developed CNN architecture that can be integrated in systems, for different purposes like getting feedback on products or services or in other systems like virtual Learning can be integrated platform. Finally, facial emotion recognition using convolutional neural networks can help to reduce bias in decision-making processes, as it can provide an unbiased assessment of a person's emotional state.**

Keywords— CNN, Facial Expression Recognition, Facial Feature Extraction, Expression Classification.

I. INTRODUCTION

In today's world, facial expression identification has become a critical issue in a variety of applications. In recent years, many studies have been conducted on facial emotion recognition. The goal of facial emotion detection is to use specific facial images to help determine the state of human emotions (e.g., neutral, happy, sad, surprise, fear, anger, disgust, contempt). The goal of facial emotion identification is to accurately and automatically detect facial emotion states. As a result, it can be difficult to determine the similarity of the same emotional state in different people, since they can show the same emotional state in different ways. For example, the expression may change depending on the person's mood, skin color, age, and environment. Each studyuses a different abbreviation for Facial Emotion Recognition (FER), such as B. Facial Emotion Recognition or Facial Expression Recognition. In this article, the abbreviation FERstands for Facial Emotion Recognition.

As indicated in Figure 1, FER is divided into three primary stages: Face detection, feature extraction, and emotion classification are the three steps. A picture of a face is identified in the first step, which is a preprocessing stage, and facial components of the face are detected from the region. Eyes, eyebrows, nose, and mouth are examples of face components. The second step involves extracting informative traits from various areas of the face. A classifier must be trained before being used to produce labels for the Emotions using the training data in the final stage.

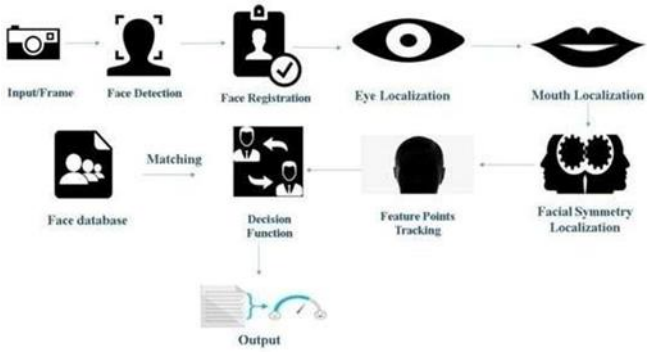


Fig.1. Flowchart

Regarding feature extraction, another technique for facial expression analysis (FACs) is Facial Action Coding System [1]. Ekman [2] popularized this concept as a facial coding system to classify emotions based on movements of specific facial muscles. Various Action Units (AUs) are used to categorize facial activities and AU collections are used to

categorize emotions [3]. Deep learning is a type of machinelearning that can be used to recognize emotions and analyze facial expressions. Deep learning, on the other hand, isaffected by data size, which could impact performance [1]. This model is specifically designed for sequence predictionwith:

II. LITERATURE REVIEW

One of the papers proposed a model to solve the problems of emotion recognition based on facial recognition in virtual learning environments [4], and the efficiency and accuracy are considered at the same time. Using HAAR Cascades to detect eyes and mouth and identify all kinds of emotion through the neural network method, the combination of efficiency and accuracy is achieved. It can be applied to real distance education. The application of emotion recognition invirtual learning environments is a much-researched topic. In addition to the change of uncertainty factors makes teachers and students face pattern is more complex, so the emotion recognition in the online learning network application mode is a very challenging topic. the subject requires further research. Since this research does not involve the illumination and pose of the image, it is uncertain how much these factors influence facial expressions and thus the final emotion recognition. All of these issues need to be explored in future research and validated by experiments. To make the theory and technology of emotion recognition fully meet the practical requirement, there are suggesting that the comprehensive application of image processing, pattern recognition, computer vision and neural networks, psychology, cognitive science, and integrates with other biometric authentication methods and methods of human- computer interaction perception based on the in-

depth and meticulous research work.

Another method for Facial Emotion Recognition through 3 steps - Face Detection, Feature Extraction and Emotion Classification [5]. Face Detection deals with geometric and appearance features and can be done by Haar Classifiers, Adaptive skin color, Adaboost Contour Points. Feature Extraction to get features for better emotion recognition can be done through LBP, LDA, Fisher Face method, PCA, CNN, etc. Emotion classification is to give emotion label to each data point by using features and models like hidden Markov, Neural Network, SVM, Bayesian, etc. A deeper insight into different research papers and their accuracies are also given, where SoftMax Classifier gives best result.

The FER may improve the interaction between Human Robot Interface in near future. This research could also involve the process of improving performance of emotion classification models, through addition of layers as well as doing cross validation on dataset. An ensemble of different classification models can be used which may give an even better performance for dataset. This hasn't been explored.

For emotion recognition based on the Perspective of Computer Simulation, there can be two parts, image extraction through online learning platforms and performing FER (Feature Extraction Recognition) using a deep learning model, CNN (Convolutional Neural Network) to analyze students' emotions according to their facial expressions from the perspective of computer simulation [6]. The preprocessing includes face detection, alignment, rotation, and resize, according to the different elements in the original images. The facial expression recognition algorithm trained by the standard facial expression database is employed to detect the faces and classify the facial expressions in terms of anger, disgust, fear, happiness, sadness, surprise, contempt, and neutral.

Lastly, the histogram of probability distribution about the expression is plotted and provided for the tutor so that the teaching plan can be adjusted timely. The proposed method is unable to provide satisfactory results when facing problems, such as backlight, shadows, and facial incompleteness, caused by complex environments. The testing of various other deep learning models which could have provided better results.

Another research gives a study about 2 datasets, namely CK+ and FER datasets and gives a comparison between the performance of Resnet50 model which is deep residual neural network and the convolutional neural network [7]. A 50-layer architecture is implemented for datasets having images of seven types of emotions. The findings are that Resnet50 model gives a better performance with an accuracy of 88.3% and 81% for CK+ and FER dataset respectively, while the convolutional neural network gives an accuracy of 67% and 64%. With the increase of depth and using identity shortcut connections better feature learning can be achieved ultimately delivering a high- performance network. An ensemble of different classification models can be used which may give an even better performance for dataset. This has not been explored. Moreover, there is a lack of the testing of various other deep learning models which could have provided better results.

It has been examined how human emotion, which is often expressed by face expression, could be recognized using computer vision [8]. The study is performed by analyzing journals and researches related to this topic, ranging from psychological to technological journals. Several algorithms and techniques have been reviewed, and at the end of this paper, a summary of recommendation for performing facial emotion recognition based on the reviews of the techniques/methods is given.

TABLE I. LITERATURE SURVEY

Paper Name	Advantages	Gaps Identified
Emotion Recognition of Students Based on Facial Expressions in Online Education Based on the Perspective	1. This paper examines how image extraction through online learning platforms and a deeplearning model, CNN, can be used to analyzestudents' facial expressions in computersimulations. 2. A facial expression recognition algorithm trained by a standard facial expression database is used to classify emotions such asanger, disgust, fear, happiness, sadness, surprise, contempt and neutral.	1) The proposed method is unable to provide satisfactory results when facing problems, such as backlight, shadows, and facial incompleteness, caused by complex environments. 2) This research lacks the testing of various other deep learning models which could have provided better results.
Deep Residual Learning for Facial Emotion Recognition	1. The paper compares the performance of a Resnet50 model, a 50-layer deep residual neural network, and a convolutional neural network on two datasets, the CK+ and FER datasets.	1) An ensemble of different classification models can be used which may give an even better performance for dataset. This hasn't been explored.

	2. It is suggested that an increase in depth and use of identity shortcut connections can lead to better feature learning and a higherperforming network.	2) This research lacks the testing of various other deep learning models which could have provided better results.
Facial Emot ionRecognition UsingComputer Vision	1. This paper examines how computer vision can be used to recognize human emotion expressed through facial expression. 2. Six papers are discussed, and the algorithms and tools used for facial emotion recognitionare explored, including SVM, Adaboost, neural networks (CNN, CNNLSTM, k-NN, MLP), Bayesian networks (Naive-Bayes andGaussian-TAN), VGG_S, Microsoft Kinect 3D, and SURF.	1) Larger amount of training data is required. 2) Convolution Neural Network does not encode the position and orientation of the object.
		3) Inability to be spatially invariant to theinput data.

After a careful analysis as shown below, it can be seen that the prime requirement of clients is to express proper unambiguous meaning of images and that will perhaps help intellectually impaired people. This analysis is done after observing responses to a survey created by us and floated among college students and elders.

1- Less Critical

2- Critical

3- Recommended

4- More Critical

5- Most Critical

TABLE II. REQUIREMENT ANALYSIS

DESCRIPTION	CRITICALITY LEVEL
Identifying features from image	5
Removing image face ambiguity	4
Accurately predicting emotionfrom face image	3
Aiding nonverbal communication through emotions known throughfacial expression	4

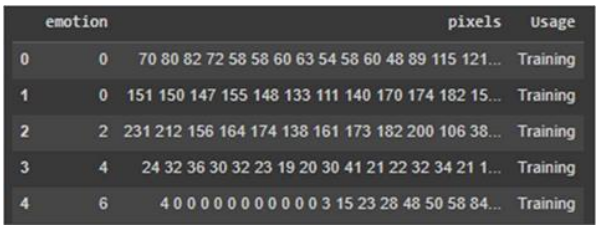
III. METHODOLOGY

1. Dataset:

The dataset has been taken from Kaggle and consists of 48x48 grayscale images, The faces have been automatically registered so that the face is more or less centred and occupies about the same amount of space in each image. This data is in the form of a CSV file, having the following columns:

- Emotions: This consists of an index given to each of the emotions expressed in corresponding images. There are 7 unique emotions, namely Angry (0), Disgust (1), Fear (2), Happy (3), Sad (4), Surprise (5), Neutral (6).
- Pixels: This consists of an array of 2304 pixel values in each row, which is a our pixel matrix of 48x48 dimensions. These can together be plotted to get our digital image. Thisformat helps in storage optimization.
- Usage: This tells whether the row (image) should be used for training or validation.

Moreover, our dataset consists of 35887 rows or images in total.



	emotion	pixels	Usage
0	0	70 80 82 72 58 58 60 63 54 58 60 48 89 115 121...	Training
1	0	151 150 147 155 148 133 111 140 170 174 182 15...	Training
2	2	231 212 156 164 174 138 161 173 182 200 106 38...	Training
3	4	24 32 36 30 32 23 19 20 30 41 21 22 32 34 21 1...	Training
4	6	4 0 0 0 0 0 0 0 0 0 0 0 0 3 15 23 28 48 50 58 84...	Training

Fig.2. Dataset

2. Pre-processing:

The next step is to make sure our data is ready for deep learning process, so that it can be used meaningfully. As seenin figure 2, the emotions like 3: Happy, 4: Sad and 6: Neutral occur majority of times in our dataset, while the emotion of disgust occurs extremely less.

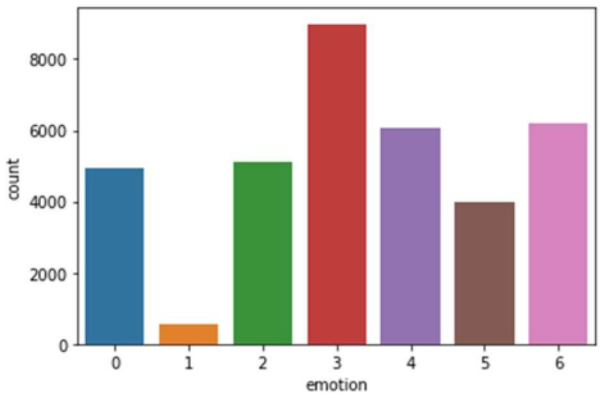


Fig.3. Count plot of emotions

We do not want this imbalance and thus, we remove the disgust emotion instances from our data. The number of rows becomes 35340, which is not a major change compared to ourentire dataset.

To make our data compatible for our neural networks, a NumPy array to represent the data is created of size, (35340, 48, 48, 1). Our data is split into training and validation set, inthe ratio, 90:10, as shown in figure 3.

```
X_train, X_valid, y_train, y_valid = train_test_split(img_array, img_labels,
                                                      shuffle=True, stratify=img_labels,
                                                      test_size=0.1, random_state=42)
X_train.shape, X_valid.shape, y_train.shape, y_valid.shape
((31806, 48, 48, 1), (3534, 48, 48, 1), (31806, 6), (3534, 6))

print(X_train.shape)
(31806, 48, 48, 1)
```

Fig 4. Splitting data

The pixel values in our independent variable X are divided by 255 to normalize them, since pixel values range from 0 to 255.

3. Selecting Parameters:

Several parameters or conditions need to be selected under which our deep learning model can work.

- Callbacks: Two callbacks called early stopping and Reduce LR on Plateau are applied. The idea of early stopping is very simple[9]. The model tries to work on the loss function for training data, by tuning the parameters. Early stopping keeps a track of the enhancement of performance for validation data, and in case there is no significant improvement with respect to training performance, it stops running to reduce computation. This way it prevents overfitting as well. Reduce LR on plateau also reduces the learning rate in case the improvement seen for a fixed number of epochs is less.

```
early_stopping = EarlyStopping(
    monitor='val_accuracy',
    min_delta=0.00005,
    patience=11,
    verbose=1,
    restore_best_weights=True,
)
```

```
lr_scheduler = ReduceLROnPlateau(
    monitor='val_accuracy',
    factor=0.5,
    patience=7,
    min_lr=1e-7,
    verbose=1,
)
```

Fig 5. Callbacks

- ‘Image Data Generator: When our data does not consist of good amount of variation, we use this tool to create variations in our data. This can be done through horizontal flip, width shift, height shift, zooming, rotation etc.

```
train_datagen = ImageDataGenerator(
    rotation_range=15,
    width_shift_range=0.15,
    height_shift_range=0.15,
    shear_range=0.15,
    zoom_range=0.15,
    horizontal_flip=True,
)
train_datagen.fit(X_train)
```

Fig 6. Image Data Generator

- Batch size and epoch: The batch size is the number of rows or instances considered for training during each epoch. Wehave chosen to divide our data in batch size of 32. The epoch is segment of data being trained in one pass. We have 100 epochs (can be pre-empted by early stopping).

4. Applying models:

Deep Learning models are then applied on our dataset, whichrun for multiple epochs. Each of these models have their own unique architectures, and thus produce varying results.

However, the general terminologies of layers used in Convolutional neural networks are given below:

A CNN contains several layers that are designed to recognizesimpler patterns (lines, curves, and so on) first. Patterns that are more complex follow (faces, objects, etc.).

- Convolution Layer – The kernel slides across the image matrix and dot multiplication are done to get a value as elements for the resultant output matrix.

- Pooling Layer – This helps in reducing the spatial size of the representation by deriving a summary statistic of the nearby outputs.

- Fully Connected Layer – In this, the input image from the previous layers is flattened and fed to the FC layer.

- Dropout – Usually, when all the features are connected to the FC layer, it can lead to overfitting in the training dataset. To overcome this problem, a suppression layer is used where some neurons are removed from the neural network during training

- Activation Function – It adds non-linearity to the network. There are several commonly used activation functions like the ReLU, Softmax, tanH and therefore the Sigmoid functions.

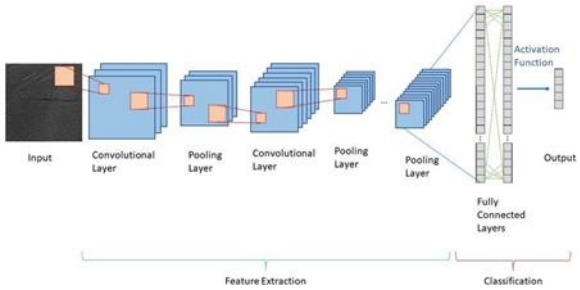


Fig 7. Convolutional Neural Network

Model 1: VGG16

VGG 16 was proposed in 2014 by Karen Simonyan and Andrew Zisserman from the Visual Geometry Group Lab at Oxford University in the work "Very Deep Convolutional Networks for Large-Scale Image Recognition" [10]. This model won 1st and 2nd place in the above categories in the 2014 ILSVRC Challenge.

The architecture of VGG is given in the figure. The idea behind the uniform use of 3 x 3 filters distinguishes the VGG. Two consecutive 3 x 3 filters give an effective receptive fieldof 5 x 5. Likewise, three 3 x 3 filters give a receptive field of7 x 7. In this way a combination of several 3 x 3 filters can enter a receptive area of greater Size. Although VGG has its own advantages, it faces the problem of exploding gradients. An error gradient is the direction and magnitude calculated during training of a neural network used to update the network weights in the right direction and by the right amount, yielding very large slopes. These in turn result in large updates to the network weights and in turn an unstable network.

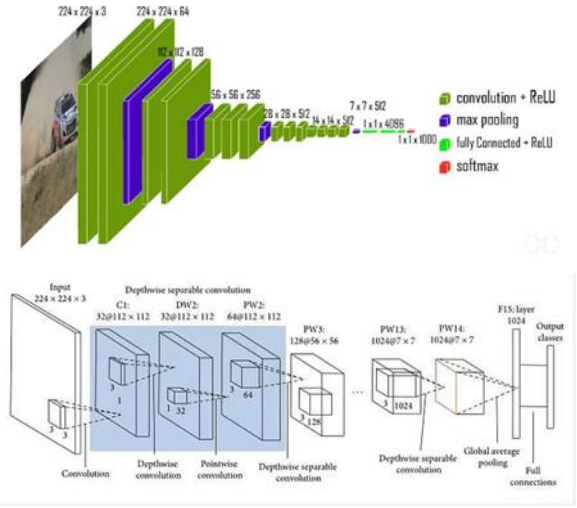


Fig 8. VGG16 architecture map

Model 2: Resnet50

ResNet, which was proposed in 2015 by researchers at Microsoft Research, introduced a new architecture called Residual Network[11]. To solve the vanishing/exploding gradient problem, this architecture introduced the concept called residual blocks. In this network we use a technique called skip connections. The jump connection connects activations of one layer to other layers by skipping some layers in between. This forms a remainder block. Resnets are made by stacking these leftover blocks together.

The approach behind this network is that instead of layers learning the underlying map, we allow the network to adapt the residual map. So instead of saying H(x), initial mapping,let the network fit,

F(x) := H(x) - x which gives H(x) := F(x) + x

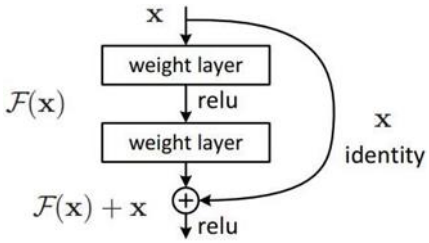


Fig 9. Skip Connections

The benefit of adding this type of skip connection is that regularization skips a layer that degrades the performance ofthe architecture. So this leads to training a very deep neural network without the problems caused by vanishing/exploding gradients. The authors of the paper experimented with 100- 1000 slices of the CIFAR-10 dataset.

Model 3: Mobilenet

Mobilenet is a model that performs the same convolution as CNN to filter images, but in a different way than the previousCNN[12]. It uses the idea of depth convolution and point convolution, which is different from normal convolution as done by normal CNNs. This increases the efficiency of CNNin predicting images and hence it can compete in the mobile systems as well. Because these types of convolutions greatlydecrease the comparison and recognition time, they provide a better answer in a very short time and hence we use them as our image recognition model.

Fig 10. Mobilenet architecture

Model 4: Self designed Deep CNN

A deep neural network (DNN) is an ANN with multiple hidden layers between the input and output layers. Similar to flat ANNs, DNNs can model complex nonlinear relationships. Computers have proven to be good at performing repetitive calculations and following detailed instructions, but not so good at recognizing complex patterns.

When there is the problem of recognizing simple patterns, a support vector machine or a logistic regression classifier can do the job well, but when the complexity of the patterns increases, there is no other way but to go for deep neural networks. Therefore, shallow neural networks fail for complex patterns like a human face and have no alternative but to go for deep neural networks with more layers. The deepwebs can do their job by breaking down the complex patterns into simpler ones. For example a human face; A deep mesh would use edges to detect parts like lips, nose, eyes, ears, etc.and then reassemble them to form a human face.

As you can see in the figure, the architecture starts with a convolution layer, batch normalization, max pooling and dropout. These sets of layers are repeated three times. The flatten and dense layers with softmax

function are used at theend to predict the emotion as the output.

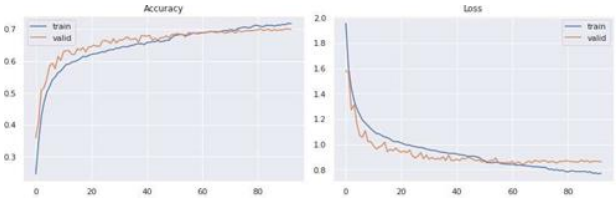
Model: "DCNN"

Layer (type)	Output Shape	Param #
conv2d_1 (Conv2D)	(None, 48, 48, 64)	1664
batchnorm_1 (BatchNormalization)	(None, 48, 48, 64)	256
conv2d_2 (Conv2D)	(None, 48, 48, 64)	102464
batchnorm_2 (BatchNormalization)	(None, 48, 48, 64)	256
maxpool2d_1 (MaxPooling2D)	(None, 24, 24, 64)	0
dropout_1 (Dropout)	(None, 24, 24, 64)	0
conv2d_3 (Conv2D)	(None, 24, 24, 128)	73856
batchnorm_3 (BatchNormalization)	(None, 24, 24, 128)	512
conv2d_4 (Conv2D)	(None, 24, 24, 128)	147584
batchnorm_4 (BatchNormalization)	(None, 24, 24, 128)	512
maxpool2d_2 (MaxPooling2D)	(None, 12, 12, 128)	0
dropout_2 (Dropout)	(None, 12, 12, 128)	0
conv2d_5 (Conv2D)	(None, 12, 12, 256)	295168
batchnorm_5 (BatchNormalization)	(None, 12, 12, 256)	1024
conv2d_6 (Conv2D)	(None, 12, 12, 256)	590080
batchnorm_6 (BatchNormalization	(None, 12, 12, 256)	1024
maxpool2d_3 (MaxPooling2D)	(None, 6, 6, 256)	0
dropout_3 (Dropout)	(None, 6, 6, 256)	0
flatten (Flatten)	(None, 9216)	0
dense_1 (Dense)	(None, 128)	1179776
batchnorm_7 (BatchNormalization)	(None, 128)	512
dropout_4 (Dropout)	(None, 128)	0
out_layer (Dense)	(None, 6)	774

Fig 11. Deep CNN architecture

5. Integrating with system:

A separate system can be created, using Django, HTML/CSS,which can get user input as multiple images or live pictures. These can be processed using our best model, and then can help in predicting the emotion of the collective data. This can be very useful to get feedback through visual data of faces of users for any system, providing any product or service.



- Self designed Deep CNN:

It ran for 93 epochs, before stopping early. As we can see, it worked better than the other models, through gradual increase in both Training and validation accuracy.

- VGG16:

IV. RESULT AND DISCUSSION:

It ran for only 13 epochs before stopping early. As we can see, this model suffers from the same accuracy and no improvement through the epochs. Thus, not a fit one for ourdataset.

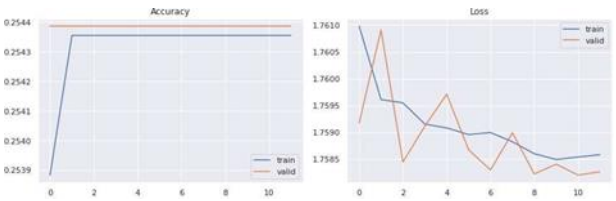


Fig 12. Plot of History - Epochs for VGG16

- Resnet50:

Similar to VGG16, It ran for only 13 epochs before stopping early. There are minor fluctuations in accuracy and loss, but still it does not show any major improvementsthrough the epochs.

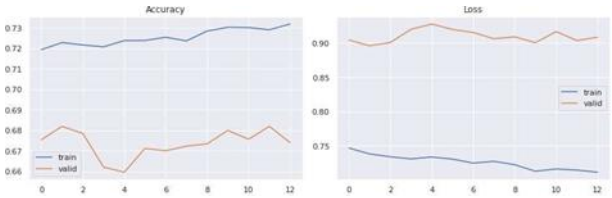


Fig 13. Plot of History - Epochs for Resnet50

- MobileNet

It ran for about 89 epochs. As compared to others, it is a computationally less expensive model, and still was able to show gradual improvement in performance through running on epochs.

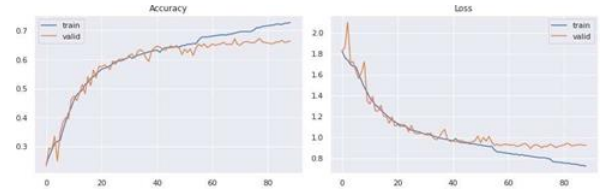


Fig 14. Plot of History - Epochs for MobileNet

Fig 15. Plot of History - Epochs for Self designed Deep CNN

In the table we can see how our Deep CNN is giving the bestvalidation accuracy of 69.92%, with Resnet50 close behind with 67.40% accuracy. MobileNet also managed to give accuracy of 66.38%. VGG16 gave the least performance with 25.44% accuracy. Further work can also be done, to improvethese models.

TABLE III. Performance of all models

Models	Training accuracy	Validation accuracy
VGG16	25.44	25.44
Resnet50	73.18	67.4
Mobilenet	72.74	66.38
Deep CNN	71.68	69.92

V. CONCLUSION

The development of a facial emotion recognition system hasthe potential to revolutionize the way people interact with computers, as well as help us better understand the emotions of those around us. This system can use machine learning and facial recognition technology to accurately detect and categorize the emotions of people in an image or video. Withthis, the system can then be used to improve user interfaces for computers, as well as helping people to better understandthe emotions of those

around them. The system also has potential use in the medical and psychological fields, as it can be used to diagnose and track mental health issues. Overall, facial emotion recognition systems can be used to benefit people in many different ways and can help us to better understand the emotions of those around us.

VI. FUTURE SCOPE

The future scope of a facial emotion recognition system for the feedback system could include the ability to identify and respond to multiple emotions and facial expressions at the same time. This could be used to provide more nuanced and accurate feedback, as well as to gain a better understanding of how people are responding to different stimuli. Additionally, the system could be used to predict future behaviors and reactions, allowing for more targeted marketing and customer service initiatives. Another potential use case could be to identify emotionally charged conversations in customer service environments and automatically redirect them to a more suitable representative. Finally, the system could be used to provide real-time feedback on user engagement, allowing for more efficient and effective user experience design.

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Development of Web Educational ERP System using Modern Tool

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Abstract— **College ERP system provides a simple interface for maintenance of different students, departments, faculties and other information. It also provides a way to share projects and have peer learning through blogs. Our college ERP system has all the information about the students, teachers, events, departments and other respected information. The system allows the admin to add students, faculties and any other events. Our system allows a faculty to enter or input student's attendance into the database and also give assignments which can later be viewed by students and faculties. The students can view his/her attendance through a separate student login and also add their projects onto the system. The system provides a blog/discussion section where students can post their doubts/queries which can be resolved by their peers or faculties. This will help improve peer learning and get students to share their knowledge.**

Keywords: - Project, Blog, College, Database, Faculty, Peer, Students, ERP

I.INTRODUCTION

Existing ERP systems are not enough to meet the current needs of students. Students and faculties are dependent on multiple platforms like classroom, teams etc. We feel there is a need for such a platform which can benefitstudents as well as teachers. So we have decided to develop a system which aims to improve the current system and add more functionalities. Our system provides platforms for teachers to manage assignments. We aim to improve the task of managing attendance for students. Furthermore, we have decided to add a project section in our system so thatstudents can easily get information about different ongoing projects or previously done projects through this. With addition of this section students will get exposure to the project world and will get connected with their colleagues . Furthermore, there will be a blog/discussion section on which students can put their various doubts and other peers can give solutions to that.

II.LITERATURE SURVEY

Enterprise Resource Planning (ERP) college web application is the one kind of web application which integrates all the modules and functionalities of a college system on a single system that can be handled by the administrative head and accessed by the students and faculties with valid user id and password [1].

Over the last 10-15 years, organizations have been in growing numbers, turning to ERP (Enterprise Resource Planning) systems to consolidate their information technology infrastructure, streamline business processes, and help them become more efficient and effective. The ERP software market has been very lucrative for both software developers as well as consultant firms. These systems are very large and complex, and as such, often require expert assistance for successful implementation [2]. Indeed, existing ERP research has neglected the higher education sector worldwide, even though most universities have implemented or are in the process of implementing an ERP system [3].

As we know, a college has different information sections, such as branches, courses, fees, students etc. The main goal of the entire system is to provide a user-friendly interface and give an ease of access to various information about college on an online platform. The College ERP system brings all the details of the college to an online portal which is updated by admin only and can be accessed by the students and faculties. Only a person having administrative access is enough to maintain all the reports and records of the system. The most important thing is that our system reduces human work and can also provide security as per requirements.

Table1.:Comparative Study

Sr No	Gaps	Finding
In [7]	Most of the companies faced various technical issue and finding experts to resolve the issue was a difficult task. Organizations were resistant to change as per needs.	Universities with the successful ERP implementation was able to adapt its social structure to the new technology. While other case studies have provided insight into why ERP projects fail or succeed.
In [8]	Systems were not scalable and resistant to change as data grows Server crashes and database server failure.	User friendly which covers the holistic needs of the entire schools and college and allows the administrators to register the daily required information of Students, Teachers & office staff.
In [6]	Maintaining huge data was aproblem with manual system No efficient way to manage redundant data, difficulty inupdating data, etc.	The results shows that the fundamental problem in maintaining and managing the time table and the daily schedule of the system was overcome.

In [9]	Many processes were repetitive and needed to enter data manually. There was no transparency whether the data is safe or not.	The present research paper is the outcome of the pilot study of the use of ERP system in the college administration and in depth study can be undertaken in future to understand the details of ERP system, its uses and limitations.
In [10]	Administration faced problem in maintaining and managing work for daily schedule and time table. Lack of proper infrastructure. Different data managementprocesses were in isolation & cannot interact with eachother.	The fundamental problem in maintaining and managing the work by the admin is overcome. By using this web-based application the amount of time consumption is reduced and also the manual calculations are omitted, the reports can be obtained whenever on demand by the user.

used to make important decisions. Taking this into consideration, we made a questionnaire which covered questions regarding the current ERP system, why there is a need for new features ,etc.

1. Following questions were included in survey:
2. Do you think the existing ERP system of college is sufficient to meet different requirements?
3. Do you feel that there is a need to improve the existing ERP system and more useful functionality to it?
4. We all know that managing attendance during an online lecture is a tedious task for teachers. Do you think it would be useful if this process could be done easily?
5. How useful would it be if we could have a Platform for uploading our assignments on the ERP system only so that we do not need to use different platforms?
6. Do you think there is a need for any platform which will help connect students of the same college irrespective of the year they are studying?
7. In our academic career we work on different projects, but did you ever feel that there could be some platform through which we can get help on projects from others or know what are different projects going or completed by students in our college? (getting info of all projects at the same place)
8. We are also planning to add a Discussion Forum section to our web app so that students can interact,ask their queries or share some valuable information with others. Do you think it will be useful?

Below are responses for some of the questions which we asked in the survey:

III.PROBLEM STATEMENT

The work proposed in this paper addresses the followingissues:

1. To provide facility for managing assignments in anERP system.
2. To allow the students to push their projects into theERP system and manage them.
3. Students will get exposure to the project world andwill get connected with their colleagues.

IV.DATA COLLECTION AND VISUALIZATION

Survey is very important when we are doing research. Surveys can help gauge the representativeness of individual view and experiences.When done well, surveys provide hard numbers on people's opinions and behaviors that can be

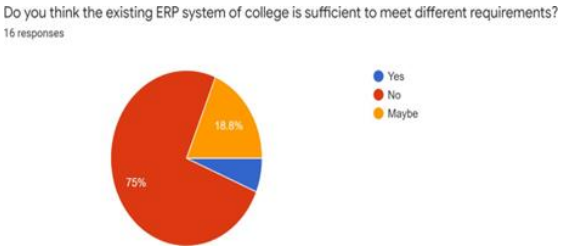


Figure 1.:Responses for question 1

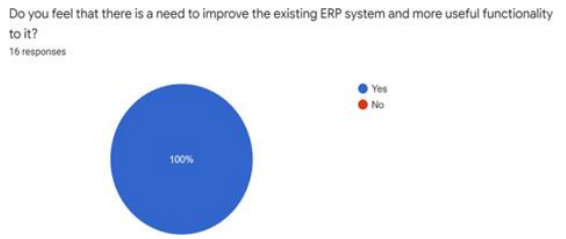


Figure 2.:Responses for question 2

Figure 3.:Responses for question 4

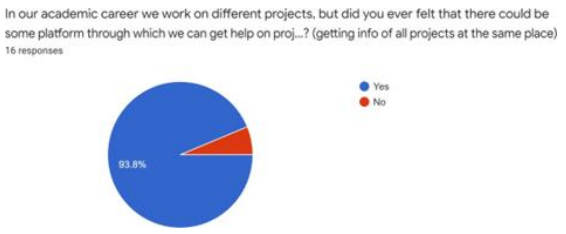


Figure 4.:Responses for question 6

Figure 5.:Responses for question 7

V.PROPOSED SYSTEM

So we have proposed an Advanced ERP system which will add extra functionality to existing systems and aims to improve existing systems. Some features are:

1. Our project provides a platform for teachers to manage assignments.

2. Students can easily get information about different ongoing projects or previously done projects.

3. Students can easily get connected with other students in the college.

4. Also students can get answers for their queries which can be answered by other students through the blog/discussion section.

Users:

1. Admin: The admin has entire rights to the working system. Admin is the one who handles the admission, Employee registrations, Academics flow. At the start he enters the appointed staff of the assigned department. Then the classes are installed

and the appointed staff is assigned to the respective classes. Once the teachers are allotted then the student registration process begins. All these functions are handled by the admin only. This access is not allowed for the other users. Admin is responsible for the accountability of the college. Heis the one who maintains all the accounts of the assigned staff and registered students.

2. Staff / Teachers: The Faculty members are installed by the admin and the login information is generated by the system. The faculty has the entire rights to handle the data of their subjects for their respective classes. Faculty members are given entire rights to give the information and can also upload the note and assignments for their specific subject. Faculty can also access the blog and project section and act as moderator wherever required he/she can take down any post which seems irrelevant.

3. Students: The newly admitted students are entered in the system by the admin. When the student gets admitted the user-id and password is generated by the system. The students get access to his/her profile, college events, college routine and other information having student access. Students can also access the blog and project section.

Core Modules:

1. ERP

a. Fees

b. Assignment

c. Attendance

d. Syllabus/portion

e. Subject

f. Feedback

2. Project

a. Explore (View projects posted by otherstudents)

b. Add Project (Domain, title, etc)

3. Blog/ Discussion

Figure 6.:Flow chart for our proposed system

We also made a prototype for the project section. Below aresome wireframes we built for the same.

VI RESULT AND DISCUSSION

To make the proposed solution accessible to people, all the above-mentioned components are modularized and connected to each other in backend by referring to the system design created and serving it as an Application Programming Interface (API). To make this service accessible a web-app has been developed.

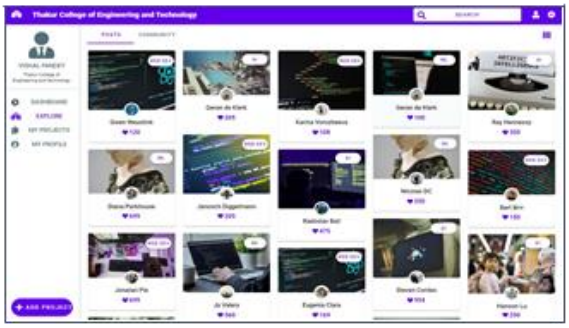


Figure 7.:Explore Page UI

Figure 8.:My Projects UI

Figure 9.:Posts UI

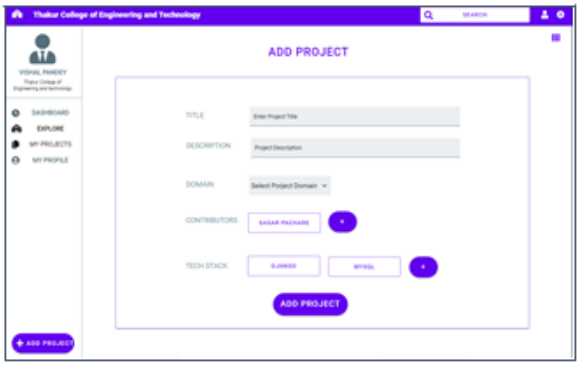


Figure 10.:Add Project UI

1. Server-Side Development

For developing the backend logic, we have used JavaScript programming language with libraries like Node.js and Express.js. Its flexibility in organizing the project structure as per our preference and the ability to write async code makes it a better choice than other frameworks. As an outcome, our proposed solution can be served on a server and can be accessed by calling the API.

2. Client-Side Development

To make our solution to general public, a Web-App needs to be developed which connects to the API developed. The web-app is written in HTML5, CSS & JavaScript using React.js Framework. This level of the architecture is what the user will interact with to access the features of our application.

3. Database Tier

Our Database Tier (Model) will be hosting PostgreSQL. This is where we will store all of the crucial data our application needs to function.

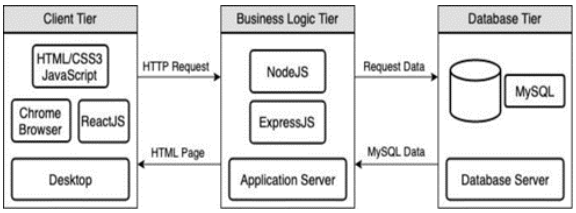
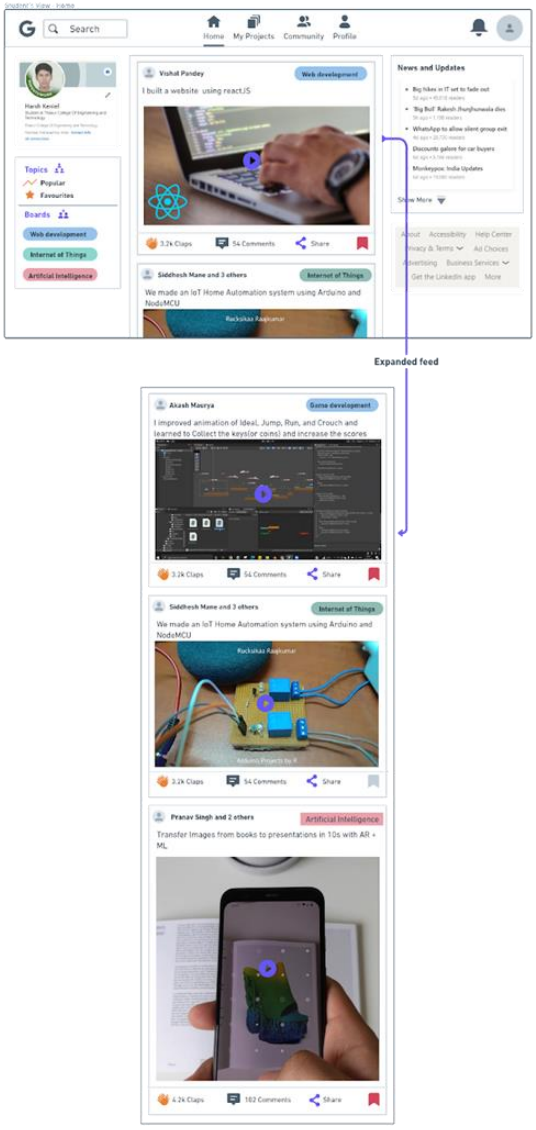


Figure 11.:Client-Server Architecture

Therefore, by leveraging Client-Server Architecture, we served our proposed solution as a web-app.

Below is the project feed section of our Project Module as you can see the application will allow the students to put their projects onto the platform and view them as a feed just like in LinkedIn, this allows the students to view each other's projects and learn from them.



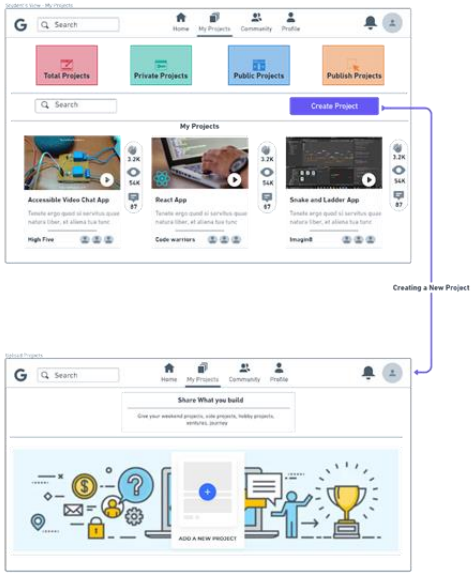


Figure 12.:Project Feed

This is the project panel where students can see their projects which they have created onto the platform and also create new projects using the create project button

Figure 12.:Project Panel

VII CONCLUSION

The benefits of a properly selected and implemented ERP system can be significant. The future of successful ERP implementation does not rely on further improvements of technology, but on bringing people and business up to speed on the appropriate use of ERP technology to fit their defined business needs and objectives [4]. ERP systems are rapidly beginning to embrace the demands forthcoming for e-commerce applications such as online billing and payment, e-procurement, etc. The data warehouse and data retrieval tools are maturing and will play a more important role in the future [5]. Hence, every educational institute should use ERP for proper planning, management and to improve quality.

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Augment Reality based E-commerce Application

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Abstract—**New shopping methods with various attributes compared with traditional internet shopping can improve the administrations of business websites or E-commerce systems. The utilization of internet shopping has been developing significantly over some time. Augmented reality (AR) may assume the most significant job in improving the method of web-based shopping. The advancement of new AR innovation can be made valuable if it can imitate the highlights that have made web-based shopping the most favorable shopping source in present times. The execution of AR shopping is changing internet business by helping the web retailers to decrease the developing expense of profits and furnishing their clients with all the more captivating and advantageous approach to shop through their gadgets. Imaginative AR arrangements permit clients to envision their item continuously, from the comfort of their place. And it may play a major role in the industrial revolution with a specialization area.**

Keywords—Augmented Reality, AR kit SDKs, E- commerce, Industrial revolution.

I. INTRODUCTION

E-commerce is a boom in the modern business. E-commerce means electronic commerce. E-commerce (Electronic commerce) involves buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, predominantly the Internet. E-commerce (Electronic commerce) is a paradigm shift influencing both marketers and the customers. Rather e-commerce is more than just another way to boost the existing business practices

E-commerce provides an easy way to sell products to a large customer base. However, there is a lot of competition among multiple e-commerce sites.

There is a fundamental disconnect between the wealth of digital data available to us and the physical world in which we apply it. While reality is three- dimensional, the rich data we now have to inform our decisions and actions remains trapped on two- dimensional pages and screens. This gulf between the real and digital worlds limits our ability to take advantage of the torrent of information and insights produced by billions of smart, connected products (SCPs) worldwide.

Augmented reality, a set of technologies that superimposes digital data and images on the physical world, promises to close this gap and release untapped and uniquely human capabilities[1].

Augmented Reality (AR) exhibits the mix of innovations that empower to join the PC created content with a live video display in real-time[2]. Augmented Reality is the combination of virtual and real worlds, enclosing the real world with computer- generated virtual objects in real-time. As per one of the most ordinarily acknowledged definitions, AR is supposed to be an innovative technique having three key prerequisites: a combination of the real and virtual article/objects in a real environment, adjusting real and virtual article/objects with each other, and real-time interaction. On account of versatile AR, innovation includes the expansion of advanced components to this present reality through a cell phone camera[3]. AR was perceived as a rising innovative technology of 2007, and with today's smartphone and AR programs, we are starting to get a handle on this astoundingly new and invigorating kind of human-PC collaboration. An AR framework is officially characterized as an application that satisfies the accompanying three properties, to be specific, (a) ready to mix genuine and virtual substance in a genuine climate, (b) is continuous and intuitive, and(c) can enlist virtual substance in a 3D climate. An AR framework is officially characterized as an application that satisfies the accompanying three properties, to be specific, (a) combination of virtual and real substance in a real world, (b) is realistic & intuitive, and (c) can enlist virtual substance in 3D environment[4].

II. LITERATURE REVIEW

In this [5] paper Leading e-commerce providers have built large and complicated systems to provide countrywide or even worldwide services. However, there have been few substantive studies on e-commerce systems in the real world. In this paper, we investigate the systems of Tmall and JD, the top- two most popular e-commerce websites in China, with a measurement approach but Limited to Specific Region, also only mobile application user traffic was considered

While this [6] paper The faster speed of 5G networks and high-resolution screens of 5G-enabled devices might lead to a higher degree of customer willingness to engage in e-commerce activities, more time spent on e-commerce websites, and more purchases online. The features of 5G can also lead to a higher degree of effectiveness of e-commerce vendors' activities such as online advertising. However adaption of 5G network and stable release will take time.

In this [7] paper BDA capabilities are used in e-commerce activities as a key growth

direction to increase vendors' evenues and attract customers. Based on the importance of analyzing big data and its advantages to e-commerce operations, this paper aims to study the values of implementing BDA in e-commerce to both vendors and consumers although Lack of solution on how to implement the solution

where market does not has much consumers.

Here [8] The research proposes and tests the technology adoption model of AR, which can serve as an initial step in the direction of efficacious embracing of AR by e-commerce firms. In contrast to earlier research on technology adoption conducted from the customer perspective establishing the usefulness and ease of use of the new technological system, this article highlights the key factors influencing the adoption intention of AR. The measurement model validation established the robustness of the proposed model still Exploring factors affecting AR adoption from an organizational viewpoint is a fairly new area in IS research & AR technology, upcoming revisions may discover additional factors to improve the capability of the model.

Lastly in this paper [9] The objective of this study is to examine whether the hypothesized features of MAR applications and their relationship with

persuasion dimensions leading towards purchasing intention would be supported by the data. Except for informativeness, the relationship of real-time interactivity, entertainment, and irritation with cognition and affection persuasion dimensions is supported by the data. The only limitation is the generalizability of the results is limited since the collected student data from a convenience sample may not be representative of all users

III. USABILITY STUDY

A usability study was conducted to compare our enhanced AR e-commerce system with a traditional e-commerce system. To avoid web page design bias, two web pages were designed using the same design template, which included a word description of the product and a visualization of the product. The only difference between the two types of e-commerce systems was in the visualization component[10].

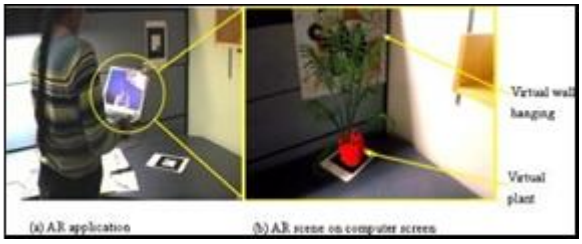

Fig 1: AR Demonstration

For visualization, traditional e-commerce web pages typically use several static 2D pictures of a product, viewed from different perspectives. Our AR- enhanced ecommerce website uses ActiveX controls for visualization. Users only need to click one button, and then the system will download 3D models in real time and activate the AR visualization capability [11, 12]. System users can visually bring products into their actual physical environments, as shown in Fig. 3. To control for interaction bias during the usability study, users were only asked to use the visualization capabilities of the systems, rather than the entire menu system, which was developed.

IV. SURVEY ANALYSIS

Survey analysis refers to the process of analyzing your results from customer (and other) surveys. Data on its own means nothing without proper analysis. Thus, we need to make sure out survey analysis produces meaningful results that help make decisions that ultimately improve the business. A quantitative analyst's main task is to present a given hypothetical situation in terms of numerical values. Quantitative analysis helps in evaluating performance, assessing financial instruments, and making predictions. Below is the Quantitative Analysis of thesurvey carried out.

Q1. How often do you use e-commerce applications[13]?

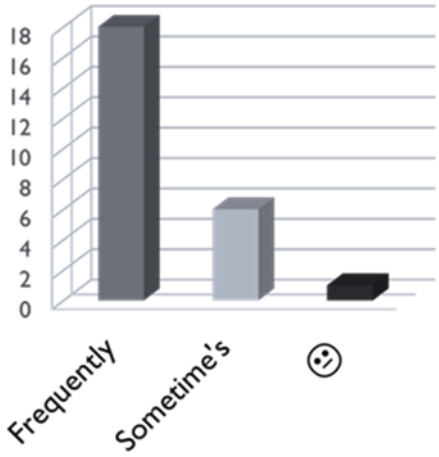

Fig 2: Use of E-commerce

Q2. Concern about data privacy ?

Fig 3: Data Privacy concern

Q3. Major concern related to user experience while using an E-commerce Application[14] ?

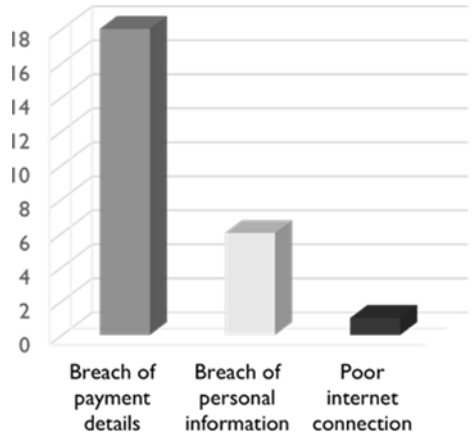

Fig 4: Major Concern in E-commerce

Q4. Have you used AR in any of the e-commerce applications[15]?

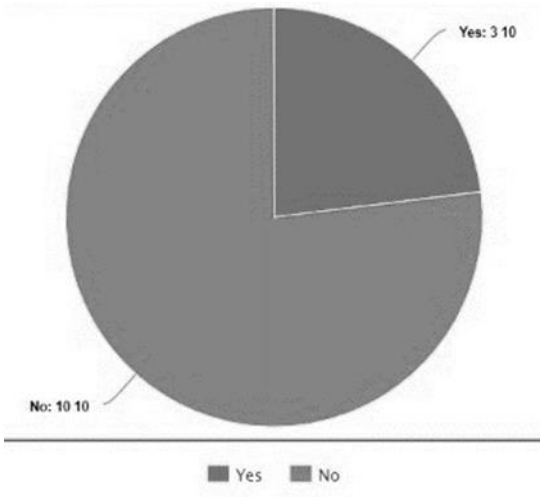

Fig 5: AR Usability

V. TOOLS & TECHNOLOGY

Blender-3D: It is an open-source 3D creation suite which is available free of cost and supporting the integrity of the 3D pipeline—demonstrating (modeling), fixing, animation, simulation, delivering compositing, and movement tracking video altering and game creation[11].

Unity-3D: It is a cross-platform 3D game-engine created by Unity technology Co. Ltd. It can superpose the virtual onto reality and acknowledges human-computerized collaboration with some Augmented Reality tools. It permits Vuforia SDK augmentation modules to distinguish and follow under the relating ports and makes AR applications and games.

ARToolKit for Android: ARCore is Google's platform for building augmented reality experiences. Using different APIs, ARCore enables your phone to sense its environment, understand the world and interact with information. ARCore uses three key capabilities to integrate virtual content with the real world as seen through your phone's camera: Motion tracking, Environmental understanding & Light estimation [16].

VI. PROPOSED WORK

From the above analysis and research, we are aiming to build a solution which will solve the aforementioned problem. Our proposed solution consists of many components which contribute to form a service. Following figure demonstrates the flow chart and different components that will be required to build such a solution [17].

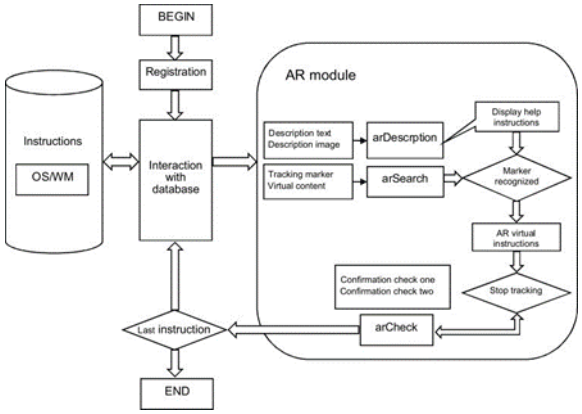

Fig 5: Architecture of System

The Body Measurement feature has a goal to offer the user the most accurate virtual fitting of the body. This AR solution is a better way to measure the fitting of the user which is revolutionary in eCommerce.

AR user manual demonstrates the process of reading a manual of appliances in an interactive way with a step-by-step virtual guide. Users without any hassles using smart devices can easily go through the details of the product. It also reduces the time and the fear of unknown risks while going through the manual of any appliances.

Cosmetics and beauty brands are hopping on the AR train to success. It makes sense: Seeing an eyeshadow applied to your face often looks vastly different from how it appears in the online product photo of the compact.

VII. APPLICATION

Virtual try-on solutions: "It looked great on the mannequin." -Everybody, at least once, after trying a new clothing item on for the first time and realizing it doesn't suit you at all. The fear of that very outcome can reduce conversion rates. Shoppers want to really know what they're getting and take every precaution for it to be what they want. And if they do take the chance to buy and it doesn't work out, your return rates will go up [18,19].

Fig 6: Brands using AR

Retail and Wholesale: Ecommerce has numerous

applications in this sector. E-retailing is basically a B2C, and in some cases, a B2B sale of goods and services through online stores designed using virtual shopping carts and electronic catalogs. A subset of retail ecommerce is m-commerce, or mobile commerce, wherein a consumer purchases goods and services using their mobile device through the mobile optimized site of the retailer.

Digital Advertising: Online advertising uses the internet to deliver promotional material to consumers, it involves a publisher, and an advertiser. The advertiser provides the ads, and the publisher integrates ads into online content. Often there are creative agencies which create the ad and even help in the placement. Different types of ads include banner ads, social media ads, search engine marketing, retargeting, pop-up ads, and so on.

VIII. RESULT & DISCUSSION

The execution of the item/ Product with Augmented reality in e-commerce permits a client to review items or experience administrations by the reasonable appearance of the item in their daily life before purchasing. Implementation of this paper can assemble an innovative promoting effort to catch the client s consideration and impact, attitude, and behavior. This can assemble attention to mark credits and offer clients the opportunity to essentially encounter the advantage of those characteristics for themselves. Clients cannot just shop for an item/product online through genuine interfaces but also attempt the item. Retailers can conquer physical restrictions and offer admittance to each item includes, eventually bringing more clients into the selling funnel for higher transformation.

IX. CONCLUSION

By utilizing augmented reality precisely, clients can be propelled to select the correct choice for buying items/products. This is advantageous to the retailer to persuade their intended interest group besides clients will have the option to get extensive data like surveys, and related items. All the more critically, AR specifically, can provide clients to in- store shopping experience, paying little heed to their zone service can superimpose 3D objects in various spaces, permitting customers to interfacing with advanced delivery to their own place with consolation.In this domain of the present scenario of more products, shorter runs immensely accelerate the variation in products, and enhance the business rivalry. Resilience in the application of above-mentioned AR- based marketing method lies in its ability to impart an intelligent fast and effective decision-making thought process in the mind of application user who may not be even technically sound about the usage of the product and its relations with other elements in its vicinity after being procured. In the future, a dynamic framework consisting of various stakeholders such as a user with an E-commerce interface who may be or even can be a potential customer, various professionals, and concerned entrepreneurs related with various domains ranging from logistic and supply chain to manufacturing [20, 21], R&D, customer support can be proposed and can be simulated tohypothetical conditions and responses given by them can be recorded and studied for various desired objectives.

X. ACKNOWLEDGMENT

This paper and the research behind it would not have been possible without the exceptional support of our guide, Dr. Harshali Patil. Her enthusiasm, knowledge and exacting attention to detail have been an inspiration and kept our work on track.

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Foodera (Self Ordering System For Restaurant)

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Abstract—**In the today's era, technologies are increasing daily with new features in the respective sections. Even in the age of technology, the traditional pen paper method is followed by many restaurants for receiving the orders, which in turn wastes a huge amount of time of both, the restaurant and the customer. Various earlier efforts were done to bring the technology in the field of food servingindustries. After analyzing them we have a proposed a system which improves efficiency and accuracy for restaurants by saving time, eliminating human errors, getting customers feedback. This system will remove manual order placing system which includes interaction with waiters, it contains digital menu where people can digitally place there order directly to the chef and from there the process can be managed.**

Keywords—Digital menu, Android application, Order management, Menu management.

I. INTRODUCTION

As the technology is increasing day by day the Standard of living has also been developed. By using of technology our life becomes easier and convenient and almost every field technology has developed. In adopting new technology, the food industry still lags behind as compare to other technology especially automation in different processes. After so many years restaurants and hotels still follow manual process of paper and pen system due to which table turnover process has become solve as everyone knows thatin the foodservice industry, table turnover is tough to optimize. As a restaurant owner, you want to turn tables as frequently as possible and serve the maximum number of guests. There are quite a lot of ways your restaurant can maximize table turnover, from updating your dining room to preparing certain menu items in advance but all this have some constraints and also this system requires a lot of manpower and it istime consuming. Sometimes due to increase waiting time customer tend to leave the restaurant and also due to lack of waiter's patience of a eating and hangout place and results in clutter. This system provides a solution to all this problem as nowadays everybody is on their phone and want every work to be done by there mobile phone so we proposing an application through which they can order their food without even contacting the waiter just by the help of their mobile phone. It increases the user experience while ordering food as it provides visual representation of the item and can also decide their order by others feedback as well.

II. LITERATURE SURVEY

There are number of research papers which uses these technologies introduced in market to automate this system such as:

A. Robots as waiters

This system includes robots in the place of waiters to take orders it provided contactless services which is very much needed in this covid situation and also attracted customers but it has the same disadvantage as seen with waiters such as lack of robots, process becomes solve, maintenance and installation of robot is very costly and cannot be afforded by small restaurants, order get changed, customization not possible etc.

B. Converting table into screen

This process included converting the table into the screen in this when a customer wants to order something he just simply click on their touch screen table and can place the order from their itself but this system also had drawback as installation is costly and it required proper maintenance and since it is a restaurant, table damage is common and dueto which it damage the screen placed on table as well.

C. Computer based ordering

In this process the customer goes to the cashier place the order do the payment and then wait for their order to get ready, but this system fails during rush hours since there is abig line to place the order and it takes time for a person to decide their order it increases the waiting time for others as well and also if a customer needs to order something new heneeds to go again to the cashier and do the same process again.

We have a conducted a survey in the form of multiple choice to find out what is the expectation of the customer

with this type of application and whether they are going towilling to accept this type of technology in future.

The following are the questions asked in the survey:

- Age Group

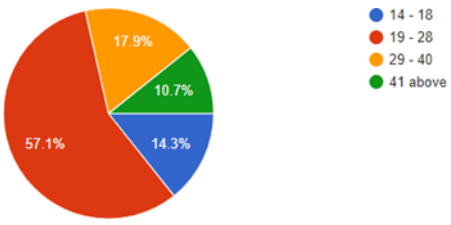

Fig. 1

- How frequently do you visit restaurants?

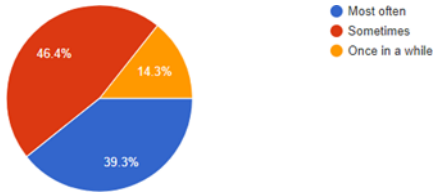

Fig. 2

- Do you hesitate to interact with waiter?

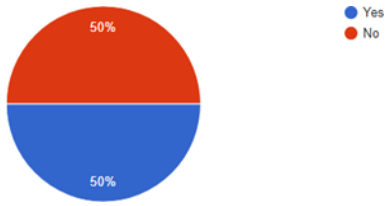

Fig. 3

- Have you ever experienced long waiting time forordering food?

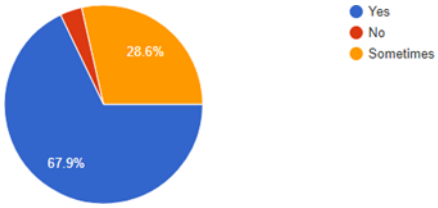

Fig. 4

- How would you like to place an order at restaurants?

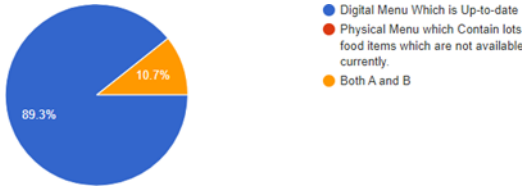

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Fig. 5

- Would you like to use an automated system forordering food at restaurants?

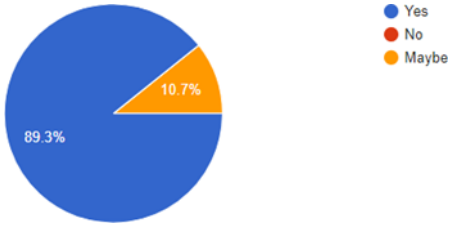


Fig. 6

- Would you like to know the quality of ingredients and calories intake of a food item before ordering?

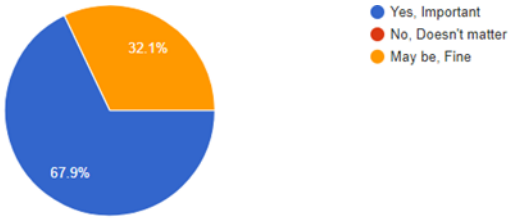


Fig. 7

- Have you ever experienced issues regarding onlinepayment at restaurants?

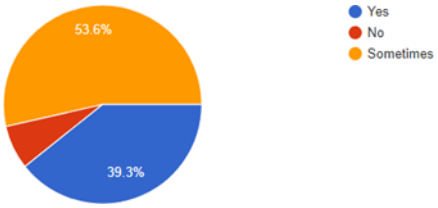


Fig. 8

- What do you think about future of self-orderingsystem at restaurants in India?

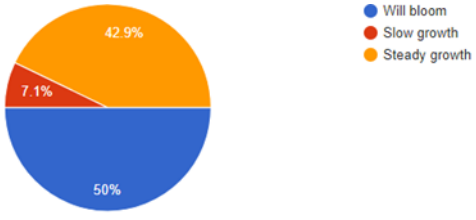


Fig. 9

III. PROBLEM STATEMENT

As the technology is increasing but still in restaurant, we use the same old-fashioned way of ordering food were waiter write the orders from customers, takes these orders to the kitchen, updates them in records, delivers the ordered of food items at the

exact table and then makes the bill and as we all know It doesn't matter where your table is within a restaurant, you can never find a waiter when you want your bill or when you want to order another drink.

Key issues

- In this Covid situation people wants contactlessservice.
- Fewer Staff increases waiting time for orderingfood.
- While ordering large amount of food in restaurants people don't have an idea of bill amount which can create problem at the end.
- Introverts' interaction problem with waiters.
- Getting orders wrong mistake is a classic.
- customized orders are often neglected by waiters.
- Allergic/Vegan etc. people face problems while ordering food because waiters don't know the exact ingredients in the food.

IV. METHODOLOGY

This project proposes a solution to design a self-ordering system named as foodera using an android application for ordering the food. This system works when a user scans the QR code placed on the table and download the application and after login he will be able to see the digital menu and through that he can place the order and can also see the description, calories, ingredients and can choose the best dish by seeing ratings and feedback and if he wants, he can customize it as well once the order is decided customer needs to pay to place the order once the payment is not done E-Bill will get generated.

Fig. 10 System Architecture

The process begins with the arrival of the customers. If there are available seats, the waiter will assist the customers to the available table. But if not, the customer will have to wait until seats become available. When seated, waiter will hand the menu and ask for their orders The customers will then choose their orders from the menu and the waiter will give them to the kitchen staff and to the cashier, so that the cashier will be able to initially process the customer's bill. The kitchen staff will prepare the orders that the waiter will serve. Once finished, the customer will ask for the bill from the waiter, and the waiter will get it form the cashier. After receiving the bill, the customer will then pay the bill.

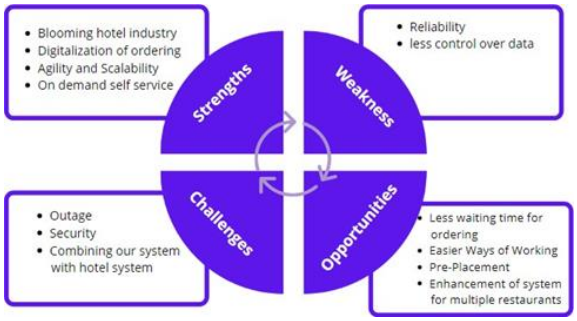


Fig. 11 SWOC Model

Upon sending of customer orders, the kitchen staff can be notified by the system as to the table number, order quality and descriptions. Once the orders are completed, the kitchen staff will notify the waiter thru the app. Payment Module The customer may use the app in viewing his bill for payment. The cashier can print an Official Receipt if the customer wants a copy. Below is the screenshot of the Payment Module.

The results show some areas for improvement in the quality of their service and Responsiveness maybe considered as critical factor.

Failure Points	Issue	Dimension
1. Wait for available seat	Customer sometimes has towait before being seated	Responsiveness
2. Ask for Menu	Waiter is unable to respond promptly	Responsiveness Empathy
3. Delivery of order	Waiter sometimes is unable to deliver the correct order	Reliability
4. Ask for bill	Waiter is unable to respond promptly	Responsiveness Empathy
5. Wait for bill	Processing of bill takes time	Responsiveness
6. Receive receipt and change	Waiter is unable to give receipt and change right away Processing of customer's payment takes time	Responsiveness

Table no: 1 Failure Points of the Restaurant's

V. RESULT AND DISCUSIION

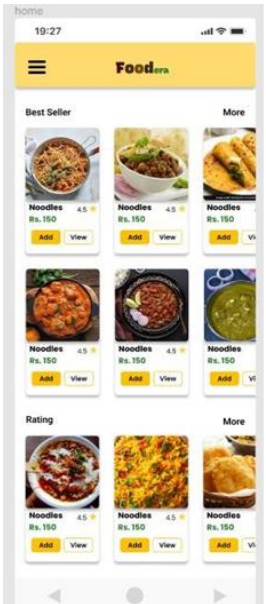
This system has developed a user friendly which can be used by anyone very sufficiently. The customer will scan the QR Code which is placed on the table. Then the customer will be redirected to

the ordering site and may choose the order from the menu. The menu indicates the quantity of the customer's order and the customer must click the "add to cart" option to complete the order. The app will show if the order is successfully added to the cart. If thenotification of the successful ordering does not pop up, then the order is not added to the cart. When the customer accesses their cart, it will show the summary of their order. When a customer is ready to submit order, he then clicks "Submit Additional Order". System will ask for confirmation (Figure 4) since customer is not allowed to cancel their order once submitted. These orders will be received by kitchen staff.

Fig. 12 QR Code Scanner

Design Prototype

- User Interface



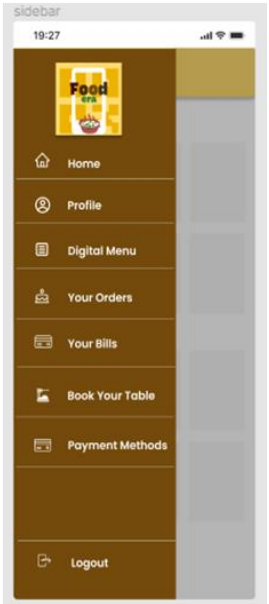


Fig. 15 Home screen

Fig. 13 Splash Screen

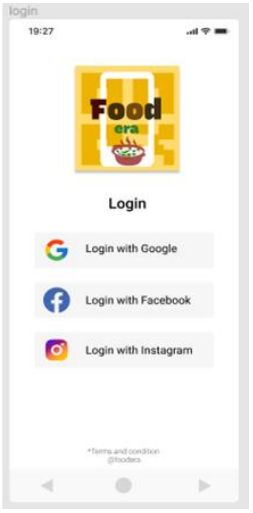


Fig. 14 Login Page

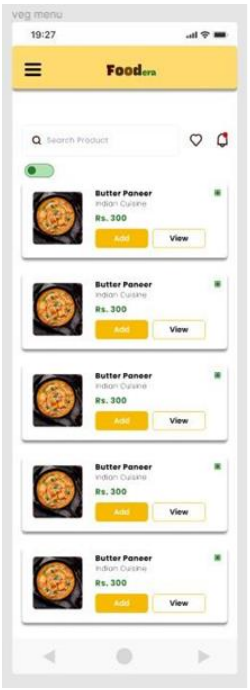


Fig. 17 Digital Menu

Fig. 23 Admin Menu Management

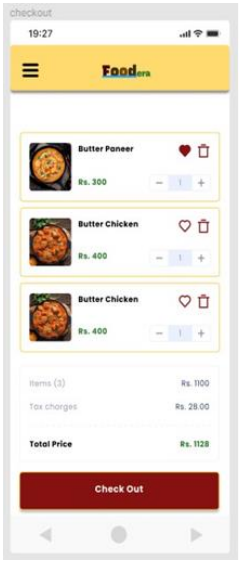


Fig. 19 Checkout

Fig. 20 Bill

- Admin Interface

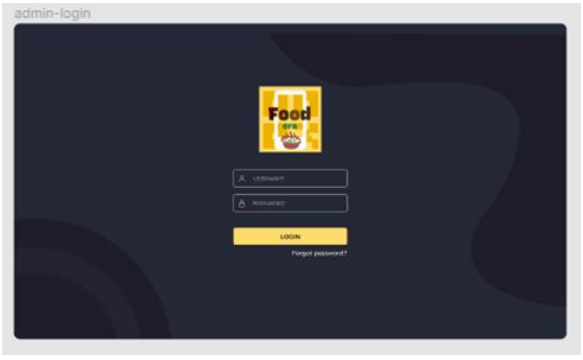


Fig. 21 Admin Login Page

Fig. 22 Admin Home Page

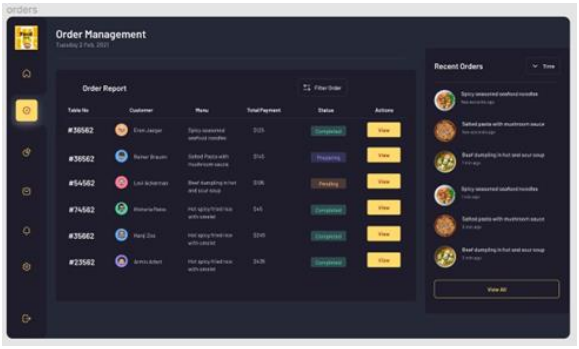


Fig. 24 Admin Order Management

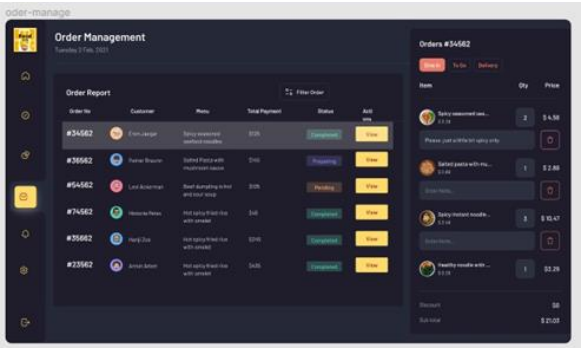


Fig. 25 Detail Order View

Fig. 26 Revenue Analysis

VI. FUTURE SCOPE

This proposed system can be enhanced in future by introducing new features such as multiple restaurant access can be done with the help of single application, table booking, hall booking can also be added in this application. We can also include in this application to order a foodbefore reaching restaurant to save time.

VII. CONCLUSION

This proposed system the potential to attract customers to the restaurant and changing their dining experience in efficient way, even will help in completing the dream of digital INDIA. It will help to ease this process and will make the restaurant task much easier and more efficient. With reduction of man-power required for order taking it is not going to

be cost efficient for restaurant but it will also increase their efficiency in table turnover and they can take serve more customer in less time. The researchers recommend setting an ordering system containing delivery option to cater to increasing demand. Customers prefer their food being delivered to avoid travelling and falling in long queues. There should also be a function to monitor inventories to avoid over/under stock. The researchers also recommend a function that can monitor the employees' payroll and tips. This function will definitely help to automate the manual recording of payroll every month. This can lessen the errors and make sure that the recording and computation of absences and leaves can be easily generated. On the tips, since the restaurant has a centralized tipping policy, this function will help compute the tips based on the days and time they work to have a fair division of tips. Moreover, for further improvements, data visualization techniques to allow analysts to more easily derive insights about data and make wise decisions must be incorporated [20]. Thus, charts/ graphs about fast selling or slow moving items,

VIII. ACKNOWLEDGEMENT

We gratefully acknowledge the support, guidance, and encouragement of my Dissertation Guide Associate Professor Dr. Prachi Janrao ma'am for this novel work.

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Design and Development of Vendor based E-commerceapplication with predictive data analytics

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Abstract— **With the substantial increase in electronic commerce, companies are looking for technological advancements and innovative ways to manage the vast amount of data generated and to extract meaningful insights from it for better decision-making. Predictive analytics has been recognized as a key aspect in business decision-making and a potential driver of strategic decisions. Despite this recognition, many e-commerce businesses have yet to fully integrate analytical capabilities into their processes. This paper highlights the significance and role of using predictive analytics models in our e-commerce project. These tools have become crucial for gaining valuable knowledge for decision-making through their ability to make predictions and through various applications used by global e-commerce firms. The paper accomplishes its goal by constructing a predictive analytics model for sales forecasting in our e-commerce project and analyzing an online transaction dataset. The results from the model are presented, and insights extracted from the prediction model are discussed.**

Keywords—Generative Predictive analytics; Predictive models; Online Transactions; e-commerce; Search Behavior, Conversion Rate, Computational Models

I.INTRODUCTION

The electronic commerce industry is experiencing rapid growth worldwide, with retail e-commerce sales reaching 3.53 trillion US dollars in 2019 and projected to reach 6.54 trillion US dollars in 2022 [2]. This growth is attributed to the recognition of e-commerce as a critical tool for competitiveness in the global market, enabled by technological advancements in internet technology [3]. E- commerce provides companies with strategic planning, customer services, cost reduction, and the ability to enhance productivity and efficiency, leading to prosperity and growth and creating new market opportunities [4]. As a result, companies are incorporating the latest technological advancements into their e-commerce processes to stay ahead in the industry. Our solution facilitates this by translating audio and synthesizing the translation in the speaker's voice and lip movements, making it appear as if the speaker is speaking the translated words. Predictive analytics is a rapidly growing and crucial application of technology in the big data field, and it is becoming the cornerstone of all business decision-making [6]. Predictive analytics

is a type of data analytics used to forecast future outcomes by analyzing historical data to uncover patterns and relationships [7]. It uses statistical algorithms and machine learning techniques [7]. A report [8] estimated that the global market for predictive analytics would grow at a compound annual growth rate (CAGR) of around 25% from $1.7 billion in 2013 to $5.24 billion in 2018 and projected to reach approximately $10.95 billion by 2022. This suggests that more and more organizations are turning to predictive analytics to gain a competitive advantage [8].

Predictive analytics is also used to predict future outcomes by analyzing historical data and making better preventive decisions. The application of predictive analytics models uses machine learning to analyze customer reviews, click-through actions, preferences, and past purchase history to improve sales prospects and understand the reasons for customer churn in real-time [9]. Retailers around the world are also using predictive analytics for price optimization, merchandise planning, and evaluating the effectiveness of promotional events to determine the most appropriate offers for consumers [10].

II LITERATURE SURVEY

In Over the past couple of years, there have been several studies in business analytics that have utilized machine-learning models to predict customer purchase behavior [11]. These studies include da Silva's (2014) research, which created four machine- learning models on a clickstream dataset, Fernandes' (2015) study, which built a sequence model to predict real-time purchase likelihood, and Vieira's (2016) use of deep learning algorithms to analyze purchase behavior. These studies have made important contributions to the field of business analytics by applying machine-learning techniques [12] and demonstrating the potential of using these techniques to better understand customer interactions with e- commerce websites.

However, due to limitations in the available data, these studies have used limited, aggregate-level features such as the number of page views for a customer over the past week [13, 14]. This results in less detailed insights and makes it harder to translate the findings into practical actions for e-commerce websites.

A. Predictive Analytics:

Predictive analytics is a form of data analysis that utilizes forecasting, regression analysis, pattern matching, multivariate statistics, and predictive modeling to determine the likelihood of future events [15]. Kopp [16] defines it as a method for identifying an event before it occurs using big data. The applications of predictive analytics are based on advanced data mining, machine learning, artificial intelligence (AI), and deep learning algorithms [17, 18]. It has a long history in computer science and information

systems, and has been demonstrated to be effective in a range of domains, including sales forecasting, strategic sales management [20, 19], recommender systems [21], and fraud detection [22]. Predictive analytics models are built using quantitative techniques, usually machine learning algorithms, to construct predictive models [23]. It is an integral part of business intelligence [24] and decision support systems.

B. Predictive Models Techniques

• Classification: Classification models answer questions that require a yes or no response (e.g., "Is this customer about to churn?" or "Is this a fraudulent transaction?") by providing broad analysis and guiding a decisive variable (target or class). The construction of the model is based on decisive or numerical variables (predictors or attributes) [25].

• Clustering: Clustering is an unsupervised machine learning method that sorts data into separate groups, each containing similar attributes [26]. This process helps to uncover unknown relationships in a dataset, such as using a cluster model to separate customers into similar groups based on common characteristics and develop strategies for each group on a larger scale [27].

• Association Rules: Association rules are a rule-based machine learning method used to find important associations in observations [30]. It means finding all item sets that have support greater than the minimum support and then using large item sets to generate rules with confidence greater than the minimum confidence [31].

III. Survey Analysis

Survey analysis involves reviewing and examining the outcomes of customer surveys (and others) to extract meaningful insights that can be used to make informed business decisions. The process of analyzing survey results is crucial as raw data alone is meaningless without proper interpretation

Q1. How often do you use e-commerce applications?

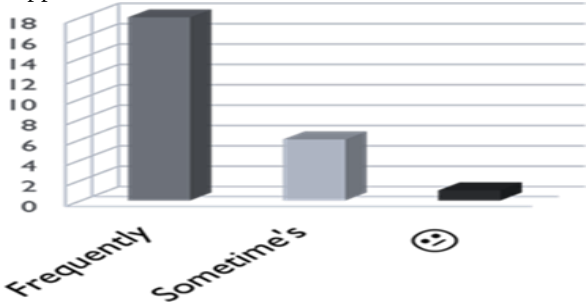

Fig 2 Use of E-commerce

Q2. Major concern related to user experience while using an E- commerce Application?

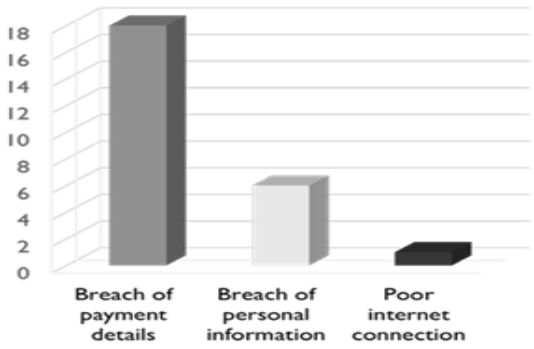

Fig 3 Concerns about data privacy

Q3. What big data analytics tools eCommerce firms prefer?

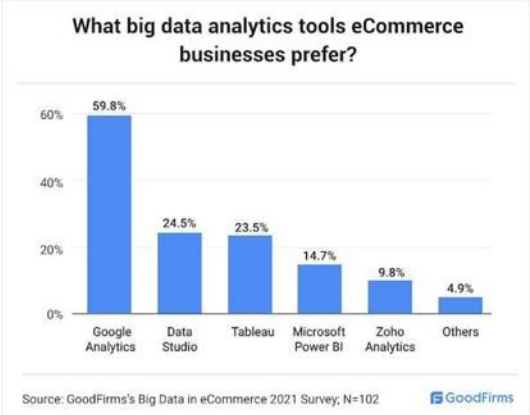

Fig 3: Use of tools in E-commerce firm

I. Proposed Work

We are creating a full-fledged cross platform application, where admin of the application can add products which vendors can sell, and users(consumers) can buy. ChkOUT will be a platform where user can buy product & vendors list their Product It will Consist of 3 Interfaces:

• Mobile App: for User to Buy Listed Products.
• Web Application: for Vendor Registration & Product Listing
• Web Application: For admin for Moderation and Verification of Vendors, Listing Products & Manage Users.

This app will be very much user friendly with great User Experience. Sellers must register themselves to the app and list their products on vendor registration page which on after verification fromadmin will be updated on app. Guest user can view products without any registration but have to register in order to make anypurchase.

As we know that there going to be a lot of data for this project as we discuss in the introduction and literature review. So, we are going to use these for predictive analysis. This will be going to help Vendor as well company to manage their product inventory and making

profit from the collect data. Now, the detailed information is disused in the next section Methodology.

II. METHODOLOGY

1. For making website and mobile application:

Sequence Diagram & Flowchart: Using the Unified Modeling Language (UML), a sequence diagram depicts the flow of messages that are delivered and received by objects during an interaction. A sequence diagram is a collection of objects represented by lifelines and the messages they exchange throughout an interaction. Here, wecan see all of the system interactions and system reactions.

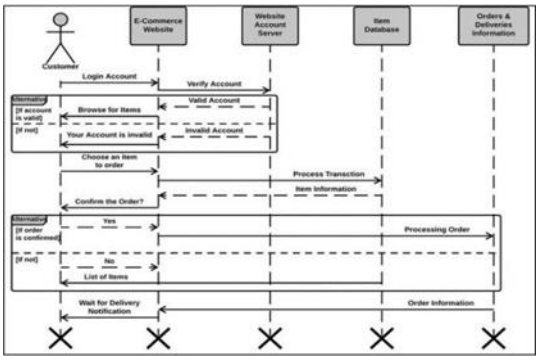

Fig 4: Sequence diagram

• Architecture Diagram: A software system's physical implementation of its component parts is mapped out visually in an architectural diagram. It displays the connections, restrictions, and limits between each piece as well as the overall structure of the software system.

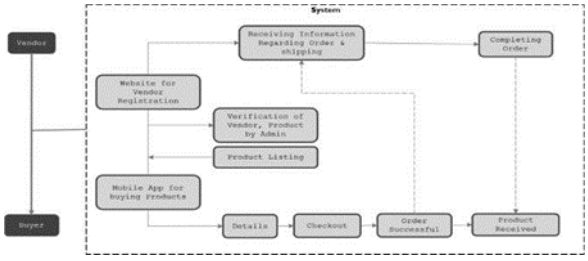

Fig 5: Sequence diagram

2. Data analytics

In this part, we provide examples of the framework for predictive modelling in detail as it relates to the problem at hand. The six steps of the predictive analytics process are depicted in figure 6. The problem is characterized in the first stage (the identification of the issue) using the model's suggested results, objectives, scope, and deliverables. The subsequent step (the gathering and preparing of the data) involves gathering and analyzing data from numerous sources. The third phase, analysis (data analysis and model creation), calls for pre-processing techniques including data cleansing, transformation, and modelling to ensure that meaningful data is retrieved for future processing. Use statistical models to confirm the primary hypothesis after that. The following stage (placement, monitoring, and management of the Predictive modelling is the process of predicting the future. After implementation, results can be used to inform daily decision-making. The model is monitored at the final stage to make sure it is producing the desired results.

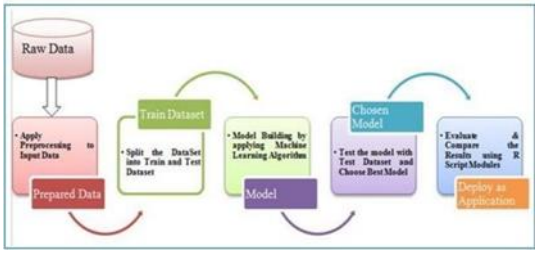

Fig 6: Predictive modeling framework

VI. IMPLEMENTATION DETAILS

To make the proposed solution accessible to people, all the above-mentioned components are modularized and connectedto each other in backend by referring to the system design created and serve it as an Application Programming Interface (API). To make this service accessible a web-app has been developed.

• Server-Side: Development For developing thebackend logic we have used Node js , Express js, and MySQL database. Its flexibility in organizing the project structure as per our preference and the ability to write async code makes it a better choice than other frameworks. As an outcome, our proposed solution can be served on a server and can be accessed by calling the API.

• Client-Side: Development To make our solution to general public, a Web-App needs to be developed which connects to the API developed. The web-app is developed using front-end technologies like HTML5, CSS, JavaScript & React js. The designing part is handled using HTML and CSS and JavaScript is added to provide various functionalities to make user experience better. The Mobile application is created using Flutter with Blocstate management.

• Data Analytics: For predictive analytics Power Bi, Tableau, Machine Learning algorithms and Deep learning are used for better prediction and clustering of the customer into different groups or chunks.

VII. SYSTEM DESIGN

• Data Flow Diagram

Level 0 DFD is often referred to as a context diagram. It offers a broad overview of the entire system or process under or being modelled. In what is meant to be an overview view, the system is shown as a single, high-level process along with its connections to external entities.

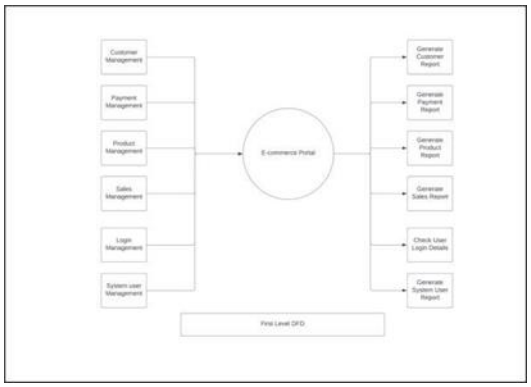

Fig 7: 0 Level DFD

Compared to a context diagram, as per fig 8: Level 1 DFDs go into more detail while still giving a general picture. In level 1 DFD, the single process node from the context diagram is broken up into sub-processes. As more processes are implemented, the diagram will need more data flows and data stores to connect them.

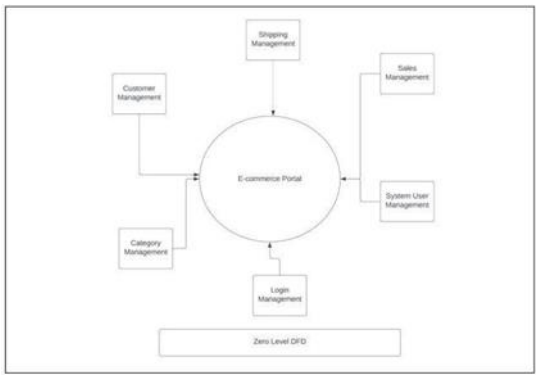

Fig 8: 1 Level DFD

This level two data flow diagram (DFD), in fig 9 template can map out information flow, visualize an entire system, and be shared with your stakeholders.

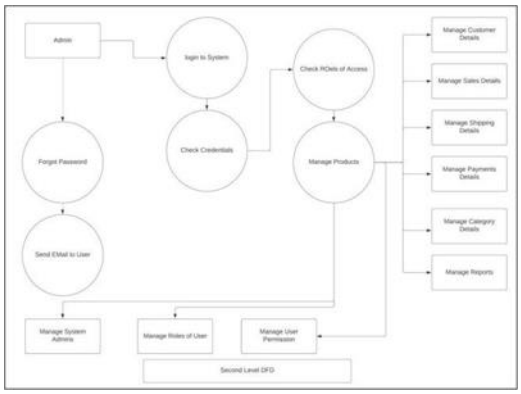

Fig 9: 2 Level DFD

VIII. APPLICATIONS

As we know e-commerce for electronics and many items

are huge in future and today itself.

1.This E-commerce project will help many small and new vendors to expand their business online.

2.This project going to target the electronics market, so using this project will boost all the electronics seller to sell their product online with ease.

3.As we are also providing the predictive analytics that will going to help the predict customer behavior in future and help to make future discussion for making higher conversion rate and make higher profit.

IX RESULT AND DISCUSSION

This study set out to shed light on the value and function of applying predictive analytics models in e-commerce projects, where these tools have grown to be essential tools for gathering crucial information for better decision-making. Predictive analytics was applied to an online transaction dataset gathered through an e-commerce company for predicting product category sales in order to achieve this goal, and the dataset has been studied.

The predictive model was then created to demonstrate how it may be utilized to gather important information. In order to provide adaptive decisions, predictive modelling is essential, and businesses today must use the most cutting-edge analytics to compete. Such models could be useful for the ecommerce firms to make high operational efficiency, improve customer satisfaction, and robust revenue and profit levels.

Only 71,159 (4.9%) of the 1,530,738 transaction records are conversion cases; the rest are non-conversion records. The outcomes of the model construction as well as the descriptive statistics are both presented below.

Results of the random forest model the 15 predictor variables and one target binary variable with two levels were included in the RF creation process (buying and not buying). We used the R package caret to carry out the RF model's tuning and training. The only variable that has to be changed is the number of variables chosen at random at each split, or mtry.

Mtry	Accuracy	Accuracy SD
1	0.6805	0.0050
2	0.6998	0.0049
3	**0.7008**	**0.0049**
4	0.6998	0.0048

Fig 10: Accuracy for Random forest

Results of the logistic regression model: The logistic regression method was used to build the second model. The VIF (Variance Inflation Factor) and the LASSO approach were both utilized to choose variables to minimize the problem of variable multicollinearity because the 15 predictors are potentially correlated.

Performance:

Classifiers	Accuracy	Sensitivity	Specificity
Random Forest	0.76	0.73	0.82
Logistic Regression	0.61	0.61	0.60

Fig 11: Comparison for random forest and Logistic regression

	Random Forest		Logistic Regression	
Prediction	Actual (Reference)		Actual (Reference)	
	True (buy)	False (not buy)	True (buy)	False (not buy)
True (buy)	135,621	50,614	93,402	59,990
False (not buy)	24,373	109,397	65,805	100,014

Fig 12: confusion matrix for Random Forest and Logistic regression

IX. CONCLUSION

The transition required today from business to become data- driven, evidence-based organizations is mandatory due to the global boom of big data in all facets of the business world. Big Data has brought about a fundamental change in how firms are set up and managed. Therefore, the use and deployment of data analytics tools is seen as an essential component of the decision-making processes in all businesses, but particularly in ecommerce firms.

In order to demonstrate the value and impact of using one of the data analytics models in this e-commerce project, a predictive model example for a dataset of online transactions is described in this paper. The huge volume of data being produced enables e- commerce businesses to make quick decisions that can help save money and improve operations.

For example, by analyzing big data, including customer online behavior, purchases, and product searches, it is possible to better understand consumer behavior and preferences. Few studies have been able to conclusively link search activity with conversion decisions, despite the substantial body of literature on various elements of search behavior in the context of e-commerce. In this study, we built a random forest prediction model using 15 search behavior factors. The model's online conversion forecast accuracy was 76%. The RF model also offered a rank of variables according to their significance in the model's development. As a consequence, whereas devices, query length, hour of the day, and query position do not significantly influence the prediction model, page and session dwell duration, user type, click entropy, and click position are the most crucial variables. The work has a number of restrictions. The way server log analysis is done is one of its main limitations.

Due to the queries that are stored on the local system or proxy servers, the logged data does not accurately reflect user behavior. Additionally, the session-level analysis depends on the accurate identification of the session borders, which is difficult without programs that keep track of the start and finish times of sessions.

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Design and development of an application of financial recommendations and algorithmic trading

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Abstract: **The stock market has abundant opportunities. The satisfaction of keeping a stock with conviction and seeing it grow to multiple-bagger status is unmatched. However, because of how complex the stock market has become, it is likely to not get lucrative results if we try manual trading to gain profits. Also managing all the trading accounts is difficult and time- consuming as information available for analysis is enormous. The recent development in trading strategies allows the use of algorithms to buy/sell the stocks automatically. This automation can improve the trader time management and efficiency. This paper proposes real-time trading strategies on broad range of stock markets by closely monitoring the trade results and news in real-time to detect patterns that can enable stock prices to go up or down. The proposed system in this research paper is an algorithmic trading web application that has the potential to make rapid, data-driven trading decisions, reduce emotions and biases and increase efficiency and automation in the trading process. Algorithmic trading web application can also help traders to manage their risks more effectively, and to diversify their portfolios across multiple assets and strategies.**

Keywords: financial, algorithmic trading, research, technology, efficiency, stock market, algorithms, automation.

I. INTRODUCTION

Artificial intelligence is now more important to human life than ever before. According to University of Georgia research, people trust computers more than people. Both stock market investors and traders may envision how technology is a part of everyday life for trading. Algorithmic trading, commonly referred to as "Algo trading," enables investors and traders to transact on the stock market by employing automated procedures. In 2008, algorithmic trading was introduced to India, but very few individuals were aware of it. It was created to automatically carry out numerous market trades at precise timing and speed, which is impossible for people to perform.

The history of algorithmic trading dates to the late 1970s, when computers first started to be used in the financial markets. The first use of algorithms in trading was for simple execution of trades, such as routing orders to market centres to achieve best execution. Over time, algorithms became increasingly sophisticated, incorporating more advanced mathematical models and artificial intelligence techniques. In the 1990s, electronic trading systems became more prevalent, leading to a growing use of algorithms for a wider range of trading strategies.

The development of the internet also made it possible for traders to access real-time market data and execute trades from anywhere in the world.

The early 2000s saw the rapid growth of high-frequency trading (HFT), which uses algorithms to make rapid trades based on minute-by-minute market movements. HFT quickly became a dominant force in the financial markets, accounting for a significant portion of all trading volume. Today, algorithmic trading is a key part of the financial industry, and its use continues to expand as technology improves and new trading strategies are developed. Despite some concerns about fairness and stability in the financial markets, algorithmic trading remains a popular and influential tool in the world of finance.

The ability to create automation in some stages of the trading process greatly improves the reaction time of a trader, by processing and incorporating the information as it arrives and managing a growing number of accounts. This can increase the trader efficiency and profit margin. In the new electronic market, algorithmic trading is an essential tool for the trader and is widely used. In 2014 first quarter, algorithmic trading was responsible for 17 to 25% of the total market volume per month.

Currently all the major companies in investment banking offer algorithmic services packages to their clients. The algorithms can be categorized according to their function in the following manner:

- Impact-Driven - Minimize the impact of the trade on the market. Orders with big quantities can have a negative impact on the market, as its required quantity can be larger than the number of orders offered at a certain price level, causing the order to “walk on book” and be fulfilled at increasingly worst market prices.
- Cost-Driven - The objective of cost driven algorithms is to reduce the general cost of trading. They must take into consideration all factors that can influence the cost. Similar to the impact-driven algorithms, they must take into consideration market impact, but not to the point of avoiding it in its totality.

The concept of the proposed paper is to define and implement a real-time algorithmic trading system using trading APIs and web technology. Users can perform algorithmic trading methods, keep an eye on their trades and portfolios, and access real-time market data and statistics with this web application. The web application app provides access to the powerful tool of algorithmic trading in a simple way that is understandable to all.

II. LITERATURE SURVEY

In this paper [1], the author reviewed the most advanced techniques to forecast financial asset trends and answer

the question of whether those techniques can be used to successfully trade the complex financial markets. The systems use deep learning (DL) and machine learning (ML) protocols to investigate phenomena and non-obvious relationships that affect the likelihood of successful trading. Their forecasts are based on linear or nonlinear algorithms that are frequently supplemented with sentiment analysis or pattern identification from social media investors.

In this paper [2], the author's research aims the creation of an algorithmic trading approach that will automatically trade user strategies alongside its own algorithms for intraday trading based on various market conditions and user approach, and throughout the day invest and trade with continuous modifications to ensure the best returns for day traders and investors.

In this paper [3], the author proposes a novel DRL trading policy so as to maximise the resulting Sharpe ratio performance indicator on a broad range of stock markets. The training of the resulting reinforcement learning (RL) agent is entirely based on the generation of artificial trajectories from a limited set of stock market historical data. In order to objectively assess the performance of trading strategies, the research paper also proposes a novel, more rigorous performance assessment methodology.

This paper [4] identifies the most preferred platform for Algo-trading and challenges encountered by the investors adopting these strategies. Finally, the study arrives at a meaningful conclusion and provides scope for further research in this area of study.

In this paper [5] discuss about Algorithmic Trading and trading strategies with Quantopian platform, to create intelligent trading algorithms as well as back testing them to see how they would perform on historical data. The set of trading algorithms example includes strategies and how would it be helpful for all the others and how we can utilize these strategies in real live trading to make profit and most important to understand the market data.

This research paper [6] talks about how algorithmic trading works using Artificial intelligence technology and discusses the top five trading strategies adopted in algorithmic trading and the key advantages of implementing them. This research paper also emphasizes on evaluating the critical differences between discretionary trading and algorithmic trading and why traditional traders should consider switching to algorithmic trading platforms.

This paper [7] presents a rule-based trading approach for algo trading by incorporating the concepts of Elliott waves. The study consists of three phases. In the first phase, we select a technical indicator.

In the second phase, we define the rules for conducting trade using the selected technical indicator. In the third phase we analyse the trend using Elliot waves. The study is aimed at adoption, deployment, and development of analgorithmic trading system.

This paper [8] is an exploration of the application of algorithmic techniques at a retail investor's scale. Using simple quality and value factor models to machine learning techniques like Random Forest and AdaBoost, we have explored if a retail investor can participate in the capital markets and earn better returns than by investing in ETFs. Given that factor investing and various rules-based strategies have previously been studied in academia, we fill the gap in the literature by providing our own approach as well as testing performance across two geographical regions. The empirical analysis performed in this thesis suggests smart beta algorithmic trading or AI based strategies outperform on risk adjusted basis. We therefore conclude that retail investor can leverage on algorithmic techniques and AI based strategies such as smart beta or factor investing to create medium to long term trading models.

III. PROBLEM STATEMENT

Traders are looking to improve their performance and manage risk in today's complex and fast-paced financial markets. With continued advancements in technology and new trading strategies being developed, automated tradingis likely to play an increasingly important role in the financial industry in the years to come.

The objective of our system is to obtain understanding of how the financial market operates and to develop a functioning prototype of an algorithmic trading, taking into account its already created infrastructure. We learn the fundamentals of the financial market, then implement the most popular trading algorithms while leaving some room for modification based on our analysis of our clients' demands and most desired features. Understanding a system's inner workings is crucial in order to deal with technology that is directly tied to the financial market.

The work proposed in this paper addresses the following issues:

- In today's era of digitization, staying updated with financial trends is a necessity for businesses to both outsmart the competition and achieve desired business growth.
- Machine learning-enabled technologies can give advanced market insights, algorithmic trading models allow trading companies to make better trading decisions by closely monitoring the trade results and news in real-time to detect patterns that can enable stock prices to go up or down.
- Our application will provide an ecosystem for financial monitoring, smart investment predictions, financialadvisory and algorithmic trading.

IV. METHODOLOGY

The proposed system is a software platform that allows traders to execute trades based on mathematical algorithms and models. The algorithms analyse market data, such as prices, volumes, and economic indicators,

and use that information to make automated trading decisions. The web application provides traders with a user-friendly interface for defining their trading objectives and constraints, as well as for testing and implementing their algorithmic trading strategies. The algorithms can be programmed to execute trades automatically, or they can provide signals that the trader can use to execute trades manually.

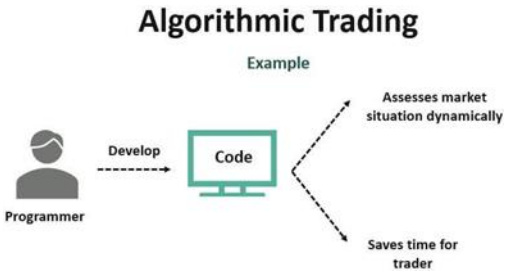

Figure 1. Algorithmic Trading Overview

Overall, our system provides traders with a powerful tool for making informed investment decisions and maximizing returns, while reducing the risks associated with manual trading. In the next section the building blocks of our trading system will be defined.

A. Define trading objectives and constraints.

The first step in developing an algorithmic trading strategy is to define the trading objectives and constraints. This includes determining the type of assets to be traded, the desired risk/return profile, and any other constraints such as maximum trade frequency or position size.

B. Data collection and preparation

In order to make informed trading decisions, the next step is to collect and prepare the relevant market data. This includes historical price data, economic indicators, news events, and other relevant data. Free information sources, Google and Yahoo both provide stock data. The disadvantage of using the python package yfinance to download historical stock prices from yahoo finance is that it only offers historical data—not real-time data.

Paid APIs (application programme interfaces) as Zerodha's kite Connect, FXCM Forex trading, Market Stack, EOD Historical Data, Alpha Vantage, IEX Cloud App, Tiingo, Intrinio, Quandl, and Polygon can be used for real-time data. The data is cleaned, transformed, and transformed into a usable format for further analysis. Our system makes use of FXCM forex trading API and Alpha Vantage API.

	time	open	high	low	close	volume
999	2018-04-27	146.8400	147.2500	145.6600	146.4800	3205482
998	2018-04-30	146.8600	147.3800	144.9600	144.9600	4415533
997	2018-05-01	144.6500	145.0200	143.4700	145.0000	4433393
996	2018-05-02	144.4600	144.8200	142.0700	142.4500	5194917
995	2018-05-03	142.1300	142.2300	139.9000	141.9900	5018592
...	...	...	...	...	...	...
4	2022-04-08	128.0100	128.7800	127.2700	127.7300	3143309
3	2022-04-11	127.9500	128.1750	126.1800	126.3700	3202545
2	2022-04-12	126.4200	127.3400	125.5835	125.9800	2690998
1	2022-04-13	125.6400	126.6700	124.9100	126.1400	3064918
0	2022-04-14	128.9300	130.5800	126.3800	126.5600	6384180

Figure 2. Historical trading data of IBM stock

C. Algorithm development:

The next step is to develop the algorithmic trading strategy. This involves the use of various mathematical models and algorithms, such as regression analysis, decision trees, and machine learning algorithms. The strategy is based on the objectives and constraints defined in step one and is tested using historical data to ensure that it meets the desired risk/return profile.

Technical Indicators

Technical indicators are mathematical calculations based on the price and/or volume of an asset and are used to provide traders with information about market trends, potential buy and sell signals, and other aspects of market behaviour. Technical indicators are widely used in algorithmic trading, as they help traders to identify trends, make informed investment decisions, and manage risk. Our system uses multiple technical indicators in combination, to gain a more comprehensive understanding of market conditions and to generate more accurate trading signals. Some of the most common technical indicators used in algorithmic trading include:

- MACD (Moving Average Convergence Divergence):

The MACD is a trend-following momentum indicator that is calculated by subtracting the 26-period exponential moving average from the 12-period exponential moving average.

$$\text{MACD} = \text{12-Period EMA} - \text{26-Period EMA}$$

Algorithm:

Step 0: Input the current year.

Step 1: take the historical data of price for 6 values say onJan 1st, March 1st, May 1st, July 1st, Sept 1st, November1st.

Step 2: Calculate the moving average value of the above databy using the above-mentioned formula.

Step 3: Repeat the above steps for the previous 5 years from the current year.

Step 4: Plot the MA values in graph using Visual Prolog Features

- RSI (Relative Strength Index)

The Relative Strength Index (RSI) is a momentum oscillator that measures the strength of an asset's price action. The RSI is calculated by comparing the magnitude of an asset's recent gains to the magnitude of its recent losses over a specified number of periods, typically 14periods. The RSI ranges from 0 to 100, with values above 70 indicating that the asset is overbought, and values below30 indicating that the asset is oversold.

$$RSI_{\text{step one}} = 100 - \left[\frac{100}{1+\frac{\text{Average gain}}{\text{Average loss}}}\right]$$

$$RSI_{\text{step two}} = 100 - \left[\frac{100}{1+\frac{(\text{Previous Average Gain}\times 13)+\text{Current Gain}}{-((\text{Previous Average Loss}\times 13)+\text{Current Loss})}}\right]$$

- OBV (On Balance Volume)

The On-Balance Volume (OBV) is a momentum indicator that uses volume data to predict changes in an asset's price. The OBV is calculated by adding the volume of an asset on up days (when the price increases) and subtracting the volume on down days (when the price decreases). The basic idea behind the OBV is that an increase in volume usually precedes a change in price. If the OBV is rising while the price of an asset is also rising, this is considereda bullish signal, as it suggests that buying pressure is increasing and that prices are likely to continue to rise. Conversely, if the OBV is falling while the price is also falling, this is considered a bearish signal, as it suggests that selling pressure is increasing and that prices are likely to continue to fall.

$$OBV = OBV_{prev} + \begin{cases} volume, & if close > close_{prev} \\ 0, & if close = close_{prev} \\ -volume, & if close < close_{prev} \end{cases}$$

D. Backtesting

Before implementing the algorithmic trading strategy in a live environment, it is important to backtest the strategy using historical data to ensure that it performs as expected. This involves simulating trades using the algorithm and comparing the results to actual market data. Any issues or problems with the strategy can be identified and addressed during this stage. Backtesting is the process of testing a trading strategy using historical market data to evaluate its performance. The purpose of backtesting is to simulate the performance of a trading strategy over a specified time period, and to determine how well the strategy would have performed if it had been in use during that time. During backtesting, the trading strategy is applied to historical market data, and trades are executed according to the rules defined by the strategy. The performance of the strategy is then evaluated based on metrics such as profitability, risk-adjusted return, and maximum drawdown.

Backtesting is an important step in the development of an algorithmic trading strategy, as it allows traders to evaluate the effectiveness of the strategy and to identify any weaknesses or limitations before implementing it in a live trading environment. By conducting backtesting, traders can avoid costly mistakes and ensure that their strategies arerobust and effective. Overall, backtesting is a critical component of algorithmic trading and helps traders to refine and improve their strategies, reduce risk, and maximize returns.

We backtested the momentum trading strategy using MACD technical indicator on various stocks such as Apple, Amazon, Cisco, Facebook, Microsoft, Qualcomm, Intel, Verizon and plotted their returns, Sharpe ratio and Max Drawdown.

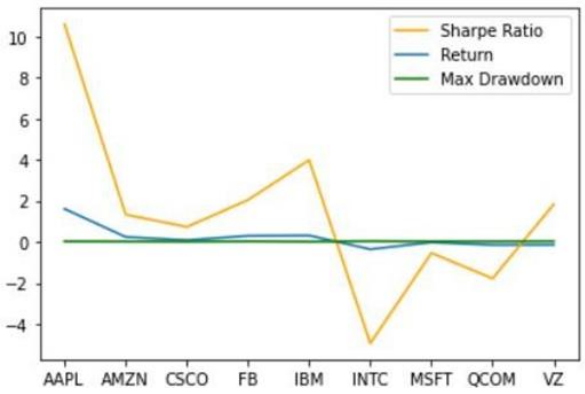

Figure 3. Sharpe Ratio, Returns and Max Drawdown of stocks after trading

E. Implementation:

Once the algorithmic trading strategy has been tested and refined, it can be implemented in the web application. The implementation should be automated and incorporate riskmanagement features to ensure that trades are executed in line with the trader's objectives and constraints. The trading data is passed through the gateway to the respective systems as shown in Figure (4) below usually this process will be deployed in the cloud.

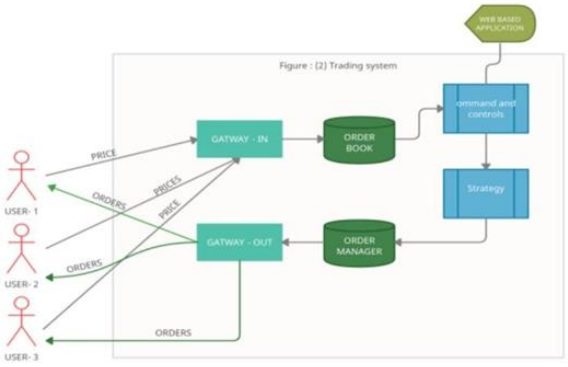

Figure 4. Trading system design

Design and development of an application for financial recommendations and algorithmic trading

G. Snapshots:

Fig 5 illustrates the flowchart of the algorithmic trading process to be integrated into the web application. After identifying the trading strategy, the next step is to translate it into code. This involves writing algorithms that will execute the strategy, taking into account various market conditions and parameters. We implemented the trading algorithms using Python as programming language.

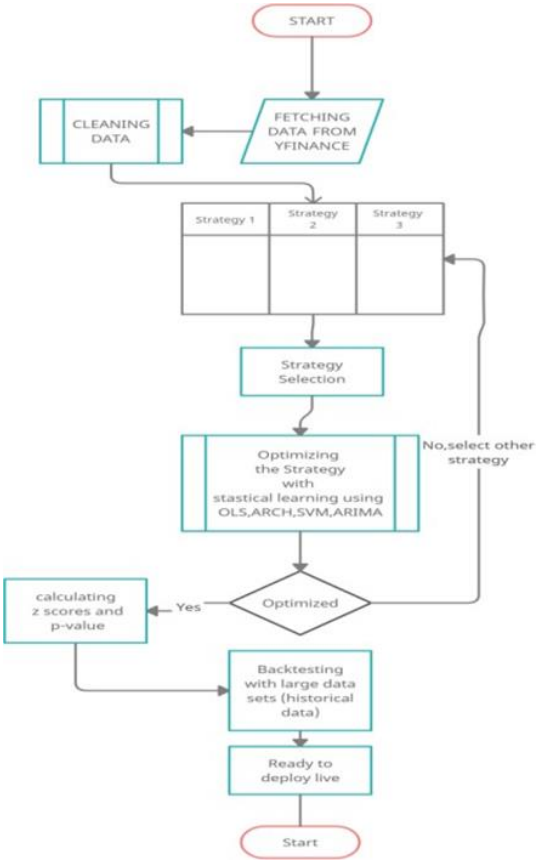

Figure 5. Algo-Trading Flowchart

F. Monitoring and maintenance:

The final step is to monitor the performance of the algorithmic trading strategy and make any necessary updates or adjustments to ensure that it continues to meet the trader's objectives and constraints. Monitoring includes the ongoing analysis of algorithmic trading systems to identify potential issues or areas for improvement. This can involve the use of backtesting and real-time simulations to evaluate the performance of the algorithms, and to identify any errors or potential areas for optimization. Maintenance involves the regular updating and improvement of algorithmic trading systems. This can involve fixing bugs or addressing other technical issues, as well as making updates to the algorithms or software programs to improve their performance. Maintenance is also an important component of risk management, as it helps to ensure that algorithmic trading systems are operating in a stable and secure manner.

Figure 6. Algo-Trading Homepage

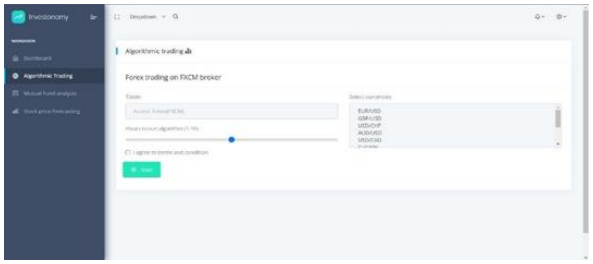

Figure 7. Algorithmic trading page

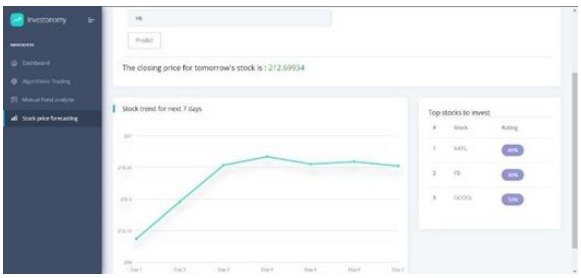

Figure 8. Stock market analysis

V. CONCLUSION

In conclusion, algorithmic trading has revolutionized the financial markets by introducing a more systematic and efficient approach to trading. With the use of advanced algorithms and technology, algorithmic trading has been able to achieve faster and more accurate decision-making, leading to improved trading performance. However, the increased use of algorithmic trading also raises concerns about fairness, transparency, and stability in the financial markets. To ensure that algorithmic trading continues to benefit the financial markets, it is important to continue to monitor and regulate the use of these algorithms.

Our system allows users to access and execute algorithmic trading strategies using our website. Our web application includes features such as real-time market data, portfolio management, and the ability to place trades based on algorithmic signals.

Users can also typically set up alerts and notifications, monitor their trades and portfolios, and access various analytics and reports. It provides traders with the ability to make informed trading decisions on-the-go, without needing to be tied to a desktop computer. By leveraging

thepower of algorithms and web technology, traders can potentially improve their trading performance and make more informed investment decisions.

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Entertainment Assistant for the Digital Inclusion of Elderly People

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Abstract—**Nowadays, there are many social media platforms like Instagram, Facebook, Telegram, and many more for social connection. The aged people who are not adaptive to the Technologies face a lot of difficulties to engage. Which leads to stress, anxiety,depression, and many more. To Overcome this problem,this paper discusses an application that is quite useful tointeract with elderly people this application provides a user interface for elderly people to engage and listen to avariety of stories, music, and for other entertainment purposes. They will also have an audio chatbot. This machine learning-based chatbot, created with the help of Rasa and AimyBox, will enable user voice commands. The user interface, created for the android platform, is so friendly that it is very easy to operate. We have also created a section for storytelling which will help the users reminisce. Our application is useful for the entertainment of old people as well as for helping them cope with their day-to-day needs. The solution discussedin this paper also contains features like reminders, chatting platforms, etc., which will improve the users' lives.**

Keywords—machine learning, natural language processing, natural language understanding, digital assistant, entertainment, reminiscing

I. INTRODUCTION

Old people have a lot of free time and comparatively fewer activities to do. Not being able to utilize this

extra time properly may cause anxiety or depression in them. Depression is a major mental health problem, which is yet to be recognized as an important public health challenge. About 322 million people are affected by depression worldwide [1]. Depression is the singlelargest contributor to global disability (7.5%, 2015) anda major contributor to suicides (~ 800,000 annually) [2]. In India, elderly persons (60 years and above) constitute 8.6% of the total population (India Census 2011), which is projected to reach 19% by 2050 [3]. Thus, depression among the elderly population is likely to be a major cause of disease burden in the future. Theelder people need to socialize with people of their ownage to cope with these problems [3]. Connecting to other people is one of the basic needs of these people. This is psychologically beneficial, as it boosts stable emotions and minimizes depression and loneliness. Older adults tend to be in a better place emotionally if they can remain active in familiar communities in meaningful ways. Thus, entertainment and communication are the key points.

A few kinds of research were studied to know the current situation in the field. In all the research done till now, the aspect of creating better conversation has beengiven more importance than entertaining the users. Sometimes, only conversations aren't enough to makea person stay away from boredom and loneliness. Also,

there are some existing applications in this field, but they lack some or other things every time. All the solutions focus on one problem at a time. There is no such solution where all the functionalities are combined together.

In this paper, we are going to integrate various functionalities helpful to the elderly, with the help of a voice assistant. For this, we are going to use theAndroid platform to build all the required functionalities such as storytelling, joke platform, chat rooms, reminder application, etc. When the user speaks the waking keyword, the assistant will start listening. Then, the assistant will convert the speech to text form,for further processing. From this input, the assistant will find the intention of the user, such as if the user wants to record a story, or he wants to hear a joke, etc.This will be done using various NLP and NLU techniques provided by RASA. Then, the assistant willgive a command back to the system, which is called intent in Android terms. Using this intent, the application will perform whatever was requested by the user.

The following sections of this paper will thoroughly discuss the problem statement of the paper, all the researched literature, including the papers studied and

the existing applications analyzed, give a brief explanation of the working of the application proposedin this paper.

II. PROBLEM STATEMENT

Depression and anxiety have become a major problemin the society especially among elderly people. Senior citizens are most vulnerable because of issues related to loneliness and boredom. To help them, we need a system which is easy to use and provides to the need of their entertainment and a basic form of communication.

Reminiscing is very important to reduce loneliness and depression. With the generation gap and less communication among family members, reminiscing has become more and more difficult for elderly people.Thus, we need an application which may help them reminisce.

III. LITERATURE SURVEY:

For this paper, we referred to some research papers about digital solutions for the problems of elderly people. Most of the papers proposed AI-basedconversational agents. These papers with their work and identified gaps are discussed in the table below:

TABLE 1: LITERATURE SURVEY

SN	Year	Title of paperand Name of author	Work Done	Results	Gaps Identified/Future scope
1	2021	Conversational Agents for Elderly Interaction [1]	Study different conversational chatbots for the elderly to find answers to 5 research questions related to the topic.	(1) Most used input type is speech (2) The main engagement strategyused is personalizing	(1) limited dialogue leads to a decrease in acceptance and satisfaction by the users (2) Only conversations provided, no further usage
2	2021	Entertainment chatbot for the Digital Inclusion of Elderly People Without Abstraction Capabilities. [2]	Designed an entertainment chatbot for elderlypeople with a newsservice as a base. Used face recognition to improve user experience.	(1) Users would getthe latest news. (2) Users mood dependent responseswere given by the chatbot	(1) confused users were particularly baffled by chatbot interruptions when they paused for too long. (2) No much functionality above entertainment and news service.
3	2021	Assistive technology for elderly people:State of the artreview and future research agenda. [3]	This study aims to analyze the progressof academic research in assistivetechnology for the elderly in the past two decades using a systematic literature review.	(1) Assistive technology researchhas accelerated in recent years, especially in regionsthat have aging issues. (2) Though some of the latest technologies like IoT, AR, VR, and AI have been used to implement AT, there is still scope for leveraging themto personalize users' experience. .	(1) The social significance factor needs more attentionand holistic outcome-based technology implementation and evaluation to be considered. (2) The ethical implications of technology used for elderly assistance needto be analyzed as it has animpact on human values.
4	2017	A Context- Aware Platformfor ComprehensiveCare of ElderlyPeople:	This paper presentsthe architecture thatwill take SAFER (“Smart Assistance platform For Elderly care”). The	Many elderly peoplewere made to use the app developed and following suggestions receivedfrom them:	(1) There are different systems that focus on the care of the elderly, each of them provides aspecific service, which contributes to their

		Proposed Architecture.[4]	objective of this platform is providing, in an integrated way, a setof smart services that improve the quality of life and social integration ofelderlies.	• To use large lettersto read the messageswithout effort. • To employ friendly colors to take care eyesight. • To locate the application buttonsin the center of the screen. • To follow the less number of steps to get a result. • To make clear and precise recommendations.	care. The most optimal option would be to integrate in a single platform several intelligent services that contribute to their physical and social care. In this platform several options must beoffered so that the elderly can lead a more independent life.
5	2013	Context-Aware Elderly Entertainment Support SystemIn Assisted Living Environment. [5]	This paper proposesa novel context- aware elderly entertainment support system. It focuses on the design of this system by identifying its requirements from the perspective of the elderly and caregivers.	Issues discussed: (1) Contextawareness (2) Entertainment media recommendation (3) Rule definition (4) Media rendering	(1) The expected involvement of a "caregiver" in the system context that hasboth advantages and disadvantages.

The survey showed that all the efforts have been doneon better conversations. The aspect of creating better conversation has been given more importance than entertaining the users. Sometimes, only conversations aren't enough to make a person stay away from boredom and loneliness. Thus, the major and common gap identified in all the above papers is that they don'tconsider the overall entertainment, and focus only on conversations. The purpose of this paper is to bridge this gap, and provider a one complete package application for the entertainment of the elderly.

We also studied some existing applications which are very useful to people in the age group. These applications were majorly focused on the entertainment and healthcare of the elders. Some of them, which arerelevant to the proposed solution are listed in the tablebelow:

TABLE 2: GAP ANALYSIS

SN	Name of Application	Work Done (Hardware/Software) (Structure) (Method/algorithm)	Results	Gaps Identified/ Future scope
1	Pill ReminderPro	Keeps track of medication. Sends reminders every day about which medications to take and when. Also, an option for selecting days of the week for certain medicines which areto be taken weekly.	Easy to schedule medications daily or weekly. Notifications do not require any typeof connection.	User Interface is not readable for older adults.Could be betteroperable with a voice-activated assistant. Only one feature, i.e.,reminder
2	Audible	Provides Audiobooks and podcasts tolisten to. Elders can enjoy listening tothe stories for hours. Can be used withAlexa, to enable voice commands.	Voice commands makeit very much user- friendly, especially forelder people. A huge number of audiobooks and podcasts are available.	Recording audiobooks is not feasible forall users. Only one feature, i.e.,audiobooks
3	Kindle	Provides a huge number of books and eBooks. Very efficient readability. Can be used with Audible to sync audiobooks with eBooks.	Good interface, readable to elders. Theoption to enable audiobooks through audible makes it even more satisfying for elders.	Writing a book on kindle is notan easy process.Only one feature, i.e., eBooks
4	LibriVox	One platform to download/listen tomany audiobooks/stories.	A large number of audiobooks are available, categorizedby genres and authors.	Interface is not friendly for older adults. Only one feature, i.e.,audiobooks.
5	Pillboxie	Keeps track of medication for you andyour family. Detailed GUI. One can save information for multiple patientsin the family as well.	Supports multiple patients. Interesting andengaging GUI.	Not operable for older adults.Only one feature, i.e., reminder

The above survey showed that there are many solutions provided for older adults, but they lack some or other things every time. Also, all the solutions focus on one problem at a time. There is no such solution where allthe functionalities are combined together. Some of those have voice assistants, but others need to be operated manually, which is a little difficult for the agegroup we are targeting. This paper gives the solution toall these gaps in the existing system. With the voice assistant and all the features combined, it is a single platform where all entertainment will be given to the elderly.

IV. METHODOLOGY

Taking all the existing systems and previous work into consideration, and identifying the gaps these projects had left, we have proposed a solution that will help keep the elders entertained and thus reduce manypsychological and emotional problems of the older adults.

As discussed above, the existing solutions lack integration of many functionalities. The proposed solution is to combine all the functionalities that are useful for older adults into one single application and empower that application with a voice assistant.

We conducted a survey, asking people whether eldersin their house would prefer using a voice-controlled application or a UI-controlled one, and the results showed us most of the elders would prefer a voice-controlled application.

The proposed application will have various features that are helpful for the elders. These features are listedbelow:

A. Story Feature

During the survey and research, we found out thatelderly

people like to indulge in past stories of themselves and other people. Hence we decided toinclude a story-telling feature wherein the users can share their own stories and see other people'sstories, the visibility of these stories will be similarto the posts we see on social media. The extra features planned along with story-telling is to likeposts, audio feature, favorite a post, share a post, comment on a post, etc. With the power of digitalassistant, posting and reading/listening stories willbe very easy for the users.

B. Reminders:

Frequent reminders setting will help the users to be able to set reminders about the tasks that they intend to carry out. This feature will help add-on the list of basic features that the app will provide.

Task-management and scheduling will become easier for the user once this feature is integrated instead of installing another application that fits this very purpose.

C. Joke platform:

Funny posts in the form of jokes provide thenecessary humour and entertainment necessary for the application to cater to the user's needs at the time of use of the application in a better way. These jokes will usually be auto-generated with the help of a joke-generator functionality in the back-end of the application. The users might alsobe provided to contribute with their own funny jokes in a separate panel in the jokes section itself.These joke will be added in the list of jokes that other people can view along with credits to the original author. This will increase engagement along with facilitating entertainment.

D. Chat room:

Users will be able to chat with one another about the topics they want to, and share posts using the app itself instead of sharing them on third-party

applications like WhatsApp or any other chatting applications. Multiple users can also create chat groups to chat with multiple usersat the same time. This feature will enable the users to create chat rooms, where other online users mayjoin in to have a nice chit-chat. A user can create achat room by specifying a topic for the discussion,and all the other interested users can join it. Also,a link to join a particular chat room can be sharedacross any other social media as well.

E. Music:

The users in our target age group, are generally interested in devotional songs and bhajans.Considering this fact, a customized musing feature will be provided in this application. Even if a useris not into bhajans, the obvious choices of peoplein the age group, such as old melody songs will beconsidered while creating this functionality.

All these features, combined with the digital assistant,will provide the best possible solution to the problemsof older adults.

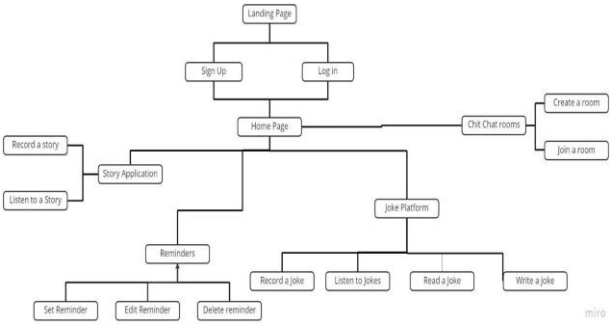

Figure 1: Block Diagram for the Application

The following platforms are used to develop the voice assistant:

A. RASA:

Rasa is an open-source conversational AI platformthat enables programmers to construct and

implement unique conversational AI systems, such as chatbots and voice assistants. Rasa offers libraries and tools for creating, testing, and deploying conversational models. It also supportsa variety of messaging services, including well- known ones like Facebook Messenger and Slack,as well as bespoke API interfaces.

With Rasa, programmers can build conversationalmodels that comprehend inputs in natural language, retrieve pertinent data, and offer suitable replies depending on the circumstances. Rasa trains its conversational models using machine learning methods and offers tools for monitoring and assessing the models' performance over time.

B. AimyBox:

AimyBox is a platform for building AI-powered voice assistants that gives programmers the resources and tools they need to make unique voice assistants. AimyBox interacts with well- known speech-to-text and text-to-speech engines, like Google Cloud Speech-to-Text and Amazon Polly, and enables developers to create voice-enabled applications for a variety of platforms, including Android, iOS, and Raspberry Pi.

AimyBox offers a complete set of tools for creating voice assistants, including an intent recognition system, a dialogue manager, and a voice assistant API. The dialogue manager offersa practical way to monitor and control the flow ofthe discussion, and the API makes it simple for developers to include the voice assistant into their apps. The voice assistant can comprehend user requests thanks to the intent recognition algorithm and produce pertinent responses based on theconversation's context.

As shown in Figure 2, the input from user, which is in speech form, is converted into text, and fed to the dialogue API. This API is created with RASA. It findsout the intent and sends it back to the application. The application will know which action to perform throughthis intent. Also, the API will send a response, which will be converted to speech form, and returned to the user. This whole process is controlled by AimyBox. AimyBox

basically allows the integration of RASA with the Android application.

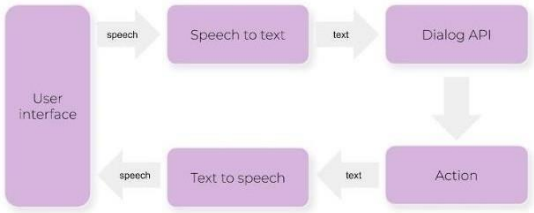

Figure 2: General flow of the application [13]

The Prototype of the UI of the proposed solution is given below:

Figure 3: landing page

Figure 4: log in page

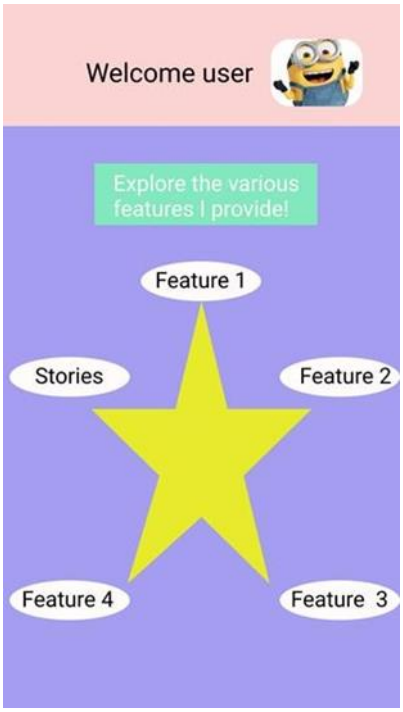

Figure 5: Home page

Figure 6: Stories home

Figure 7: Read a story

Figure 8: Record a story

V. RESULTS AND CONCLUSION:

This paper reviewed papers and articles about mental health of senior citizens. From this literature review, itwas found that the main reason for damaged mental health, depression and dementia is loneliness and lack of socialization. Reminiscing, that is, recalling and/or sharing happy past memories and experiences, can helpa lot to reduce the effects of loneliness.

This paper was ideated by keeping the social aspect in mind. The objective is to make elderly people feel comfortable around digital gadgets, and while doing so, keep them entertained and taken their care of as well. The paper will also help them reminisce over past memories. Reminiscence is proven to be very effective against loneliness and depression, especially in old agepeople. Also, this paper will help them socialize through the chat rooms. This, combined with the easeof use provided by the voice assistant, and many otherfeatures, will be very helpful to the elders.

With The help of this paper:

a. Older people will have a means of entertainment.

b. Through this entertainment, they will be introduced to new technology.

c. They will be included in the new digital era.

d. Reminiscing will help improve their condition a lot

e. Social involvement of the old people will increase.

f. Healthcare will be improved.

g. The solution shall be useful in addressing the

problem of loneliness for the elderly generation.

h. The story feature can help the elders reminisce about their past, which is proven to help overcome loneliness and depression in elders.

i. The reminder function will help improve their overall health by not letting them miss any medication.

j. The chat function will help them socialize, which is another method to avoid loneliness.

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Furniture E-Commerce Portal With Augmented Reality

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Abstract: **The administration of corporate websites or e-commerce systems can be improved by new buying behaviors that combine cutting-edge features with customary online shopping. This paper is a combined epitome of the widest optional invention corridor that depends on AR partnerships and avoids the use of physical commerce with the product. The use of online shopping has evolved dramatically over time. Augmented reality (AR) may play a major role in enhancing the web-based purchasing system, particularly for furniture and bulky items. The development of new AR innovations can become valuable if they can replicate the features that have made online shopping the most preferred purchasing source in the present. With the help of Google's AR Core or Apple's AR Kit SDKs, AR can operate in a system. Before displaying anything through the augmented view so that the user can see it in their actual spaces, it is simple to create a 3D model. Deliveries of 3D models are made using a game engine and AR SDKs in the consumer device, which is managed by numerous systems built in an IDE. By assisting online merchants in reducing gain expense and providing their customers with all the more profitable and witty ways to purchase through their widgets, AR shopping is revolutionizing the online retail industry. Imaginative AR setups allow users to continuously daydream about their things from the comfort of their home. It may also be a crucial factor in the artificial revolution in industries where physical presence is a huge barrier. The most typical use of augmented reality (AR) is e-businesses using mobile/web cameras to display their products (clothes, accessories) as a 3D protuberance in a virtual changing room. However, we attempted to address the issue of purchasing heavy and bulky goods in large quantities, which buyers typically deny, claiming they only trust physical retail outlets where they can see the furniture's size. Through augmented reality, we usually allow the viewer to experience the entire product in their own house, choose their own specifications, and then place an order, which boosts the order rate and the viewer's level of trust. Overall, the study's findings demonstrate that the AR e-commerce system can aid customers in forming more informed judgements.**

Keywords: Augmented Reality, AR kit SDKs, E-commerce, Google AR core.

I. Problem Definition/ Objective

Although the introduction of e-commerce in this modern period has undoubtedly streamlined the consumer experience, some things, such as furniture, interiors, clothing, etc., don't truly provide the customer a realistic idea of how it will actually look in a particularsetting. This has an effect on the sales of these goods and hinders the expansion of this industry.

As a result, we came up with the concept to apply augmented reality in the furniture ecommerce industryto help customers see the furniture in their homes before making a purchase and improve their decision-making.In this way, they can simulate the physical presence ofan object, like a sofa, on their phones.

II. Introduction

The use of augmented reality (AR) to overlay computer- generated images in the actual environment is beneficial. The representation technique can be consolidated in AR and used in a variety of applications. For representation connectivity in a device, a vision- based AR framework was introduced. AR also facilitates perception of undetectable concepts or events by superimposing virtual items or data over real-world objects or circumstances.

Entrepreneurs are experimenting with new marketing strategies in today's concept of staying current, one of which is augmented reality (AR). It is a real-time, direct or indirect view of an actual, physical environment, with computer-generated sensory input like music, video, graphics, or GPS data enhancing its aspects. As a result, technology works through improving how one now perceives reality. Typically, augmentation takes place in real-time, within a semantic context, and withthe user's surroundings. Advanced augmented reality (AR) technology makes it possible to incorporate computer vision and object recognition, for example, and makes the information about the user's immediate surroundings dynamic and digitally manipulable. On top of the real world, artificial information can be superimposed about the surroundings and its inhabitants. Research investigates the use of computer-

generated imagery in real-time video broadcasts to improve the view of the outside environment.

Customers who shop online get an immersive experience thanks to the usage of augmented reality in ecommerce web design, which enables them to interact with products in real time while staying in their own area. AR fills the gap that shoppers see between in- person and online buying experiences. Due to the Covid-19 pandemic's restrictions on retail businesses' opening hours, which prevent customers from physically handling things in stores, there is a gap thathas become even wider.

With the aid of a variety of technological advancements, augmented reality (AR) enables the real-time fusion ofcontent developed on a PC with a

live visual display. The real world is surrounded by computer-generated virtual things in augmented reality, which combines the virtual and real worlds. According to one of the most commonly accepted definitions, augmented reality (AR) is a cutting-edge approach that requires three essential elements: combining real and virtual items in a real environment, altering real and virtual items with one another, and real-time interaction.

In order to be considered an AR framework, an application must meet the following three criteria: (a) be able to combine real and virtual content in a real environment; (b) be continuous and intuitive; and (c) be able to incorporate virtual content in a 3D environment. An application that satisfies the following three qualities, specifically (a) the combination of virtual and real substance in the actual world, (b) is realistic & intuitive, and (c) may enlist virtual substance in 3D environment, is formally classified as an AR framework.

III. LITERATURE SURVEY

The car sector was the first to use the term augmented reality in advertising. By combining augmented reality with it, e-commerce can undergo a significant transformation. 77% of consumers prefer to utilize augmented reality (AR) technology to preview products and product variations including color, size, style, and differences. AR marketing and advertising is a major concept that integrates computerized (digital) data or objects into the subject's perception of the real world, frequently in collaboration with other media, to uncover, communicate, or exhibit consumer benefits to achieve hierarchical aims. In 2015, the market worth of augmented reality was 640.4 million, and by 2020, it must generate $120 billion in revenue. In that sense, enterprises and customers are embracing AR to a great extent. AR is used in a wide range of industries, including manufacturing, correspondence, healthcare, retail, transportation, the military, education, gaming,

and online commerce. This evaluation is based on the use of augmented reality in online commerce, taking into account how well this remarkable innovation can simulate an in-store purchasing experience. The tool can modulate 3D objects in many locations, enabling users to interact with ease and sophisticated delivery to their own location. Companies like IKEA and converse are using augmented reality to let customers gradually visualize household items in their homes using mobile applications. The apparent benefit and satisfying experience of the buyer can be attributed to the growth in the development of AR apps.

When it comes to implementing augmented reality (AR) technology in online businesses, Ecommerce companies must enhance their mechanical proficiency by developing 3D object models using 3D modelling software and programming tools, as well as having a strong innovative team.

AR marketing and advertising is a major concept that integrates computerized (digital) data or objects into the subject's perception of the real world, frequently in collaboration with other media, to uncover, communicate, or exhibit consumer benefits to achieve hierarchical aims.

This project was necessary for us to create in order to get around the difficulty of seeing actual furniture items through online shopping. This will undoubtedly increase sales of these difficult-to-see objects that can be seen through AUGMENTED REALITY. In the next ten years, the e-commerce industry is expected to rise by over 600 billion dollars. The furniture industry is a big part of this and might make a significant contribution in the years to come if AR is used now. We, the computer engineering students, have the desire and capacity to create this app and successfully combine the thriving e-commerce sector with the AR vision technology. Additionally, large corporations like IKEA and Urban Ladder have begun to consider it and have begun integrating their platforms with AR vision for a better customer experience and ultimately greater sales.

Sr.No.	Year	Author	Title	Objective		Gaps
1.	2021 (Jan)	Navneet Garg, Ankita Parek, Ajinkya Lale	Evolution in E-Commerce with Augmented reality	According to this study, new online purchasing strategies with different benefits from traditional online shopping can enhance the management of corporate websites.		It is quite expensive to use it on a daily basis, and small enterprises would have less access to it. Since AR is now fairly expensive, it is still challenging to implement on a large scale from the perspective of ecommerce.
2.	2008 (Oct)	Yuzhu Lu, Shana Smith	Augmented Reality E-Commerce: How the Technology Benefits People's Lives	The goal of the study paper is to create a specialized real-time multi-platform chat application that natives may use to share information and converse more quicklyand easily.		The approach to the problem is quite generalized as no key differentiating featurehas been introduced to encourage large-scale adoptability of the productand is limited to a few selected subset of users. Thus is difficult to translate into a profitable business model.
3.	2021	Indira Amaris	Consumers Perceptions and attributes on Augmented Reality in Online Retail.	The purpose of this research is to comprehend how consumers view augmented reality and determine whether or not the retail sector will actually gain from it.		This solution's limitation to just private networks and smaller sample size is a disadvantage. Additionally, the paper's qualitative structure seems to rule out any pragmatism in its solution.
4.	2019	Mehmet Karakus Aaron Clark	Augmented Reality In Education: A Bibliometric study.	This study examines how augmented reality technology can be used in the education industry, such as in mechanical engineering or MBBS.		The paper suggests good options to integrate AR into the education sector. However for the retail or business point of view it doesn't give a detailed idea on exploring the market size or making a business out of it.
5.	2007	Yuzhu Luand Shana Smith	Augmented Reality: E-commerce assistant.	This article offers ideasfor how to create an augmented reality application that might serve as a consumer's e-commerce helper. It provides information on a variety of complex problems that this assistant can help the user address.		The proposed paper is excellent for creating applications, but imposing it on a retail website will take away access to the main augmented reality function and may overwhelm consumerswith technology.

IV. IMPORTANT FINDINGS.

give them power over digital aspects in their physicalenvironment.

According to a Google consumer AR poll, 66% of respondents are interested in utilizing augmented reality to assist them with their purchases. High return rates are one of the major issues facing online shops as consumers continue to prioritize online purchasing. AR gives customers the exceptional chance to try before they purchase since it offers an immersive experience with 3D visuals, virtual try-ons, and product demos. Due to the ability of customers to make an informed purchase, which will ultimately result in a decrease in return rates, augmented reality technology helps to battle high return rates. The use of augmented reality technology fosters greater consumer involvement with online retailers, which may ultimately lead to higher conversion rates.

Before making a purchase, a customer can evaluate

goods or services based on the reasonable look of the item in their daily lives thanks to augmented reality implementation in e-commerce. Through legitimate web interfaces, customers can do more than just browse products; they can also test them out. Retailers may overcome physical limitations and provide access to each item's components, thereby bringing more customers into the sales funnel for higher conversion. "See It In Your Space" and "Try Before You Buy" Online buyers love augmented reality because it allowsthem to see how the goods will look before they buy. AR is used by furniture and home décor companies to show buyers how various things will look in their homes.

Brands increase customer confidence by making online products "physical," which in turn lowers return rates. Sales are increased because customers are more inclined to click "add to cart." They are less likely to send things back, saving businesses money on shipping, restocking, and repackaging expenses. Both the company's bottomline and their customers' delight are winners. The interactive nature of augmented reality in e-commerce enhances the purchasing experience. Customers feel more a part of your brand and the product when you

V. Conclusion

Around the world, e-commerce is expected to expand rapidly. The potential for augmented reality to surpassthe search engine in e-commerce is great. Using augmented reality, customers can be encouraged to make the best decision while purchasing goods. Additionally, customers will have the ability to obtain in-depth information like surveys and related things, which is useful to the merchant in terms of persuadingtheir target interest group.

By superimposing 3D things in various locations, augmented reality (AR) can give customers an in-store buying experience while allowing them to comfortably interface with enhanced delivery to their own location. Even defining top-down manufacturing policy as a heuristic about future customer wants might benefit from the beneficial feedback provided by data collected from the implementation of AR approaches in marketing.

VI. ACKNOWLEDGMENT

I gratefully acknowledge the support, guidance and encouragement of my Dissertation Guide Associate Professor Mr. Vikas Singh for this novel work.

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Online Food Ordering System using Route Optimization

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Abstract-- **Our proposed system is an onlinefood ordering system that enables ease for the customers. It overcomes the dangers of the conventional queueing system. Our proposed system is a medium to reserve online meals problem loose from restaurants in addition to messcarrier. This device improves the approach of taking the order from purchaser. The web meals ordering device units up a meals menu on-line andclients can without difficulty place the order as according to their desire. Also with a meals menu, customers can without problems tune the orders. This system furthermore allows a feedback tool wherein the user can give the feedback, ratings about the orders also, the proposed system can recommend accommodations, meals, primarily based at the ratings given by way of the consumer,the resort workforce will be knowledgeable for the enhancements together with the quality. The charge may be made online or pay-on-delivery machine. For extra secured ordering separate debts are maintained for each user by supplying them an identification and a password.**

Keywords— Automated Food Ordering System, Dynamic Database Management, Route Optimization

I. INTRODUCTION

The online food ordering system sets up a food menu online and customers can easily place the order as per they like. Additionally with a meals menu, online clients can without difficulty locate the orders. The management maintains customers database and improve food delivery service. The restaurant management structures motivates us to expand the machine. There are numerous facilities furnished so

that the user of the system gets service successfully. Additionally, the machine considers eating places as well as mess facility to the customers. Again, the idea comes that mainly mess customers are character who are shifted for diverse reason in new cities. So, they're interrelated. Growing use of smart telephones is also taken into consideration as a motivation, so that any customers of this system get all provider on single click on. Another motivation can be considered as the device could be designed to avoid customers doing deadly mistakes, users can exchange their personal profile, users can book their meals items through customers can offer feedback and recommendations and might supply rankings, it's going to give appropriate feedbacks to restaurants / mess carrierproviders. Due to lack of a full fledge application that can fulfil the customer requirements by providing himfood from restaurants as well as from mess service, there is a need for the system. This proposed gadget may be used by the folks that keep moving from citiesto cites. As nicely because it can be useful for the students studying in different towns. The proposedsystem will provide the flexibility to the customers/users to reserve from both eating places or mess. It will also provide Recommendations to the customers from the restaurants/mess owners uploadedon a daily basis. In the proposed system, there might be no issue on the amount of order the purchaser wants. Also, same application can be used as a Startup Business for the developers. It'll provide real time clients remarks and rankings at the side of the remarksto the restaurants/mess owner. It offers appropriate feedbacks to customers, so if there is any error took place, then there can be a remarks conversation towards customers. The proposed system is designed to keep away from users doing fatal errors and inappropriate action. Scope of proposed gadget is

justifiable because in massive quantity peoples are transferring to one-of-a-kind cities so extensive varietyof humans can make a use of proposed system. The system/interface will take input from the user. The primary attributes so that it will supply input to the dataset are:. Name, cope with, email-identity, cell no, different non-public related values, and so forth. The output will include consumer/purchaser's order, invoice, remarks and fee alternatives. First of all there might be 10 to 12 eating places and mess offerings considered internal 2 to 3 regions. The reason why to choose this venture is the concept in the back of mission this is to solve problem of humans which they're facing after they shift to specific city. The device isn't always simplest for consumer however additionally for company who gives meals provider. This system is for making green communique among consumer and producer of the food system if you wantto then results in the suitable and powerful system.

The online food ordering system sets up a food menu online and customers can easily place the order as per they like. Also, the online clients can without problems locate their orders. The management keeps consumer's database and improve food delivery carrier. This system furthermore allows a feedback tool wherein theuser can give the feedback, ratings about the orders also, the proposed system can recommend accommodations, meals, primarily based at the ratingsgiven by way of the consumer, the resort workforce will be knowledgeable for the enhancements together with the quality. The price may be made online or coins or pay-on-delivery machine. For extra secured ordering separate debts are maintained for each user by supplying them an identification and a password.

II. LITERATURE REVIEW

In [1] an automated food ordering system is proposed which will keep track of user orders smartly. Basically, they implemented a meals ordering system for specific form of restaurants wherein person will make order or make custom meals via one click handiest. By way of android application for tablets pcs this system was carried out. The front end was developed using html, css, javascript, reactjs and at thebackend mysql database was used.

In [2] patron using the smart device is taken into consideration as a simple assumption for the device. While the patron approach to the eating place, the saved order may be confirmed with the aid of touching the telephone. The listing of selected preordered items will be proven at the kitchen screen, and when confirmed, order slip will be published for further order processing. The solution gives smooth and

convenient manner to select pre-order transaction form clients.

In [3] there has been an try and layout and implementation of virtual dining in eating places the usage of android technology. This system was a simple dynamic database software system which fetches all statistics from a centralized database. Efficiency and accuracy of restaurants as well as human errors were improved by this user-friendly application. Earlier drawbacks of automated food ordering structures had been triumph over with the aid of this system and it requires a onetime funding for devices.

In [4] an application of integration of hotel management structures with the aid of web services era is offered. Ordering System Kitchen Order Ticket (KOT), Billing System, Customer Relationship Management system (CRM) are held together by the Digital Hotel Management. Add or expand of hotel software system in any size of hotel chains environment was possible with this solution.

In [5] research work aims to design and develop a wireless food ordering system in the restaurant. Technical operations of Wireless Ordering System (WOS) including systems architecture, function, limitations and recommendations were presented in this system. It was believed that with the increasing use of handheld device such as pdas in restaurants, pervasive application will become an important tool for restaurants to improve the management aspect by minimizing human errors and by providing higher quality customer service.

In [6] along side customer feedback for a restaurant a layout and execution of wi-fi meals ordering system became done. It enables restaurant owners to setup the device in wi-fi surroundings and update menu shows without problems. Smart phone has been integrated in the customizable wireless food ordering system with real-time customer feedback implementation to facilitate real-time communication between restaurant owners and customers.

In Paper [7], the purpose of this study was to investigate the factors that influence the attitude of internet users towards online food ordering in Turkey among university students. A Technology Acceptance Model (TAM) developed by Davis in 1986 was used to study adoption of Web environment for food ordering. Trust, innovativeness and outside affects are added to the model as primary factors at the side of tam.

In Paper [8], the research work aims to automate the food ordering process in restaurant and also improve the dining experience of customers. Design implementation of food ordering system for restaurants were discuss in this paper. This system, implements wi-fi facts get right of entry to to servers. The android application on user's mobile will have all of the menu information. Kitchen and cashier gets the order details from the patron mobile wirelessly. These order details are updated within the important database. The eating place proprietor can control the menu adjustments effortlessly.

In paper [9], this research works on efforts taken by eating places owners also to undertake facts and communique technologies such as PDA, wireless lan, pricey multi-contact screens and so on. To decorate dining experience. This paper highlights a number of the limitations of the traditional paper primarily based and pda-based food ordering software and proposed the low-value contact display primarily based eating place control gadget using an android cellphone or tablet as an answer.

III. USABILITY STUDY

Shortest path algorithms are mainly separated into two wide groups. The first group is called the single source shortest path (SSSP). Purpose of SSSP is to find out the distinguished from the single supply vertex to all different vertices. The second group is called all pair shortest path (APSP) and the purpose of this path is to dig out the smallest path among all sets of vertices shown in the graph [20]. The calculation of this smallest path could be exact or roundabout solution. The use of the best algorithm is depending on the features and requirements of the program. Like, the purpose of the shortest path algorithm is to generate the quick reply even in the existence of a huge input graph. From between these two algorithms, Dijkstra and Bellman's ford depend to get the fast and efficiently smallest path between two vertices. Java languages are used to find the shortest path along with requirements. The name of the program is mentioned as shortest path optimization system and to elaborate its functions from the Unified Modelling Language (UML) class diagram java language is used.

This Section discusses the results obtained after running the simulation of the two algorithms. Foralgorithms of Dijkstra and Bellman-Ford, they areused for finding the solution for single destination and single source with single pair of the shortest path problem. For Bellman-Ford algorithm, it works well with negative edges and is capable of detecting anegative edge cycle in a graph. However, for Dijkstra algorithm, it works well with positive weights in a

directed or undirected graph. The performance of the Bellman-Ford algorithm is most effective when the graph has a small number of nodes, while Dijkstra's algorithm can work better when the graph has a large number of nodes. The results for the running time are shown in Table

No. of nodes	Dijkstra (in ms)	Bellman-Ford (in ms)
5	1351	513
10	3724	756
50	2072	9577

Table 1:Time count of Dijkstra & Bellman-ford

Based from Table 4, for Bellman-Ford algorithm, when the number of nodes is small, the running time is better than Dijkstra algorithm. However, Dijkstra algorithm has better running time when the number of nodes is larger. Our results are same to other researchpapers. For example, in [21], the authors showed that Dijkstra is most effective for a massive variety of nodes. In [23], for higher number of nodes, the Dijkstra's algorithm is better and efficient. Also, in [], Dijkstra's algorithm emerged to produce shorter time in both small and big graphs. Dijkstra's algorithm takesa time on a graph with edges E and vertices V can be represented using the Big-O notation as a function of

|E| and |V|. Dijkstra's algorithm takes time 0(|E|+|V|Log|V|). And the time taken by the algorithmof Bellman-Ford is O (| V | ·| E |) as shown in Table 5. Based on the time complexity, we can conclude that Bellman-Ford algorithm takes more time than Dijkstra algorithm.

For example, an individual wants to calculate the shortest distance between the source, A, and the destination, D, while calculating a sub path which is also the shortest path between its source and destination. Let's see here how Dijkstra's algorithm works; It works on the fact that any sub path, let say a sub path B to D of the shortest path between vertices A and D is also the shortest path between vertices B and D, i.e., each sub path is the shortest path. Here, Dijkstra's algorithm uses this property in the reverse direction, that means, while determining distance, we overestimate the distance of each vertex from the starting vertex then inspect each node and itsneighbours for detecting the shortest sub path to those neighbours. This way the algorithm deploys a greedy approach by searching for the next plausible solution and expects that the end result would be theappropriate solution for the entire problem.

IV. PROPOSED WORK

To overcome the limitations of above system, an Online Food Ordering System based on Route Optimization is proposed. To develop a reliable, convenient and accurate Food Ordering System is considered as a general Objective of the study. To develop a system that will surely satisfied the customer service will be considered as an objective. One of the Objective is to design a system that is able to accommodate huge amount of orders at a time and automatically compute the bill. To evaluate its performance and acceptability in terms of security, user-friendliness, accuracy and reliability is an important objective. To improve the communication between the client and customers is one of the objective. The figure.1 represents the simple system architecture of the proposed system.

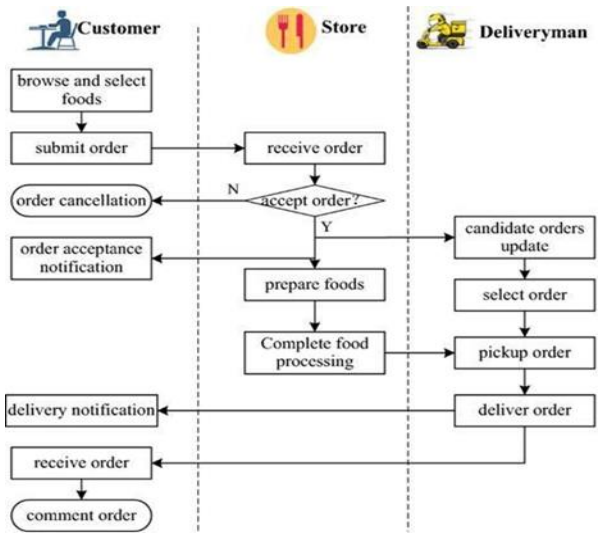

Fig 7: System Architecture

The architectural design consists of 3 main users: - Service Consumer, Owner of Mess/Restaurant, and Employee of mess. When a person shifted to newcity he has to find source for hygienic and quality food,so he/she will search and select restaurant or home- based food service based on his category and as well as service that is veg or non-veg.

Here the main function is, in what pattern user will search the service so for that purpose a part of Dijkstra's algorithm allows us to find the shortest pathbetween any two vertices of a graph.

It differs from the minimum spanning tree because the shortest distance between two vertices might not include all the vertices of the graph.

How Dijkstra's Algorithm works

Dijkstra's Algorithm works on the basis that any subpath B -> D of the shortest path A -> D between vertices A and D is also the shortest path between vertices B and D.

Djikstra used this property in the opposite direction i.ewe overestimate the distance of each vertex from the starting vertex. Then we visit each node and its neighbors to find the shortest subpath to those neighbors.

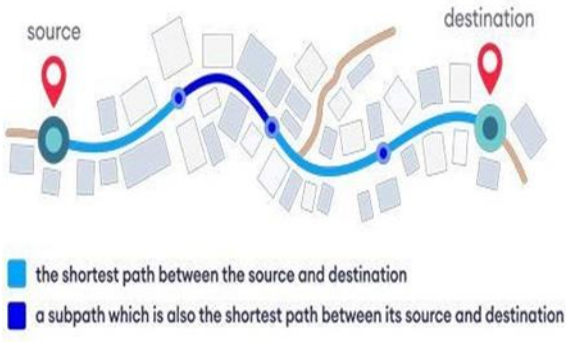

Fig 8: Dijkstra's Algorithm Example

The algorithm uses a greedy approach in the sense that we find the next best solution hoping that the end result is the best solution for the whole problem.

Dijkstra's Algorithm Applications

- To find the shortest path
- In social networking applications
- In a telephone network
- To find the locations in the map

Another example would be that the firefighter department wants to develop a system that finds the shortest distance between the closest firefighter department and the house being burnt to avoid the extra delay. Or logistics companies want to develop a system that finds the shortest distance between the warehouse and destinations to avoid extra spending and time.

V. RESULT & DISCUSSION

This paper presented the comparative analysis in termof shortest path optimization between two algorithms. The two algorithms are compared which are Dijkstra and Bellman-Ford algorithms to conclude which of them is more efficient for finding the shortest path between two vertices. Our results show that the Dijkstra algorithm is much faster than the algorithm of the Bellman ford and commonly used in real-time applications. Many researches have discussed shortest path algorithms to solve the shortest path problem in

these applications. In this study, a very popular algorithms called Dijkstra algorithm and Bellman-Ford algorithm are used to make a comparison between them on the basis of complexity and performance in terms of shortest path optimization. Our results show that Dijkstra is better than the BellmanFord interms of execution time and more efficient for solving the shortest path issue, but the algorithm of Dijkstra work with non-negative edge weights.

VI. CONCLUSION

Therefore, conclusion of the proposed system is based on user's need and is user centered. The system is developed in considering all issues related to all user which are included in this system. Wide range of people can use this if they know how to operate android smart phone. Various issues related to Mess/Tiffin Service will be solved by providing them a full-fledged system.

Thus, implementation of Online Food Ordering system using route optimization is done to help and solve one of the important problems of people.[15]

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Design of CRMSOFT: A Customer Relationship Management System using Analytical tools.

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Abstract- **A CRM (Customer Relationship Management) system is a software solution that helps organizations manage customer interactions and data throughout the customer lifecycle with its ability to provide services such as sales, inventory management, employee tracking, workflow management, report generation, and file storage. CRM system designs were created in order to satisfy businesses and/or customers by developing new CRM business models. Moreover, one of CRM's biggest challenges is keeping up with a manufacturing sector that has been rapidly moving from a product-centric to a customer-centric focus. In this paper, we present our work focusing on the CRM implementation challenges from four different perspectives: sales, user interface, forecasting, and inventory. Considering these perspectives in CRM implementation projects, organizations can realize several benefits, such as reducing costs and saving time or extra effort.**

Keywords: Customer Relationship Management, CRM, Analytical CRM, Inventory System, Sales, Billing System

I. INTRODUCTION

Customer Relationship Management (CRM) is not a clear concept according to Pohludka and Štverková [1]. CRM "refers to a strategy, a set of tactics, and a technology that has become indispensable in the modern economy" [2]. CRM is a wide concept [1] that initially focused on keeping customer loyalty [3] and developing strong customers' relationships. However, this side of CRM represents, today, only the tip of the iceberg. CRM has been gaining interest from scholars [4];

[6] because of its multidisciplinary role in "marketing, operations, sales, customer service, R&D and IT" [7]. CRM grew into a field that interrelates people, processes, and significantly more technology [9], but why? "Since CRM uses IT as an enabler, the importance of its implementation has been revealed by different authors in both academia and industry".[14] Hence, technology makes CRM an interesting topic [7] to explore because of its advances in CRM systems [10]

A CRM system is an information system (IS) aiming to develop and leverage customer relationships digitally [11]. A CRM system can have different goals like providing digitalized customer support or generating sales, for instance [12]. "CRM and its system are gaining increasing interest from smaller businesses" [13]. However, literature express a gap of knowledge, having mainly examined the implementation of CRM systems for large companies [7] without testing these ones on small companies. Small companies lack research on implementing CRM systems fitting their organizational size.

The motivation behind CRM System is to provide a software that organizations use to manage day-to-day business activities by providing services such as billing system, inventory management system, order system, payment gateway, employee tracking system, workflow management, report generation, file storage. It also includes enterprise performance management, software that helps plan, budget, predict, and report on an organization's financial results.

Plenty of companies struggle with a legacy system which may once have done the job but is now woefully inadequate to do the job of the modern CRM System. Eventually you'll find that this is no longer sustainable, whether through lack of vendor support, a knowledge gap created when users leave or just plain old lack of functionality stopping you from getting any meaningful information. Furthermore, the humble spreadsheet might once have been a fantastic resource to store your data and even provide some basic analysis of that data but it's long been surpassed by CRM system. Multiple spreadsheets in companies are still a common occurrence but as your company has grown, you've probably got too much information to be handled by your existing spreadsheets alone. Do you really want to add yet another spreadsheet to your mix? A CRM system replaces spreadsheets whilst bringing together all your data and giving you real time answers. In today's accountable society, many jobs require accurate traceability.

Problem definition

The problem that needs to be solved is the lack of a comprehensive CRM system that can effectively manage different aspects of a business such as billing, inventory, payments, reports, and orders. Many businesses struggle to manage these areas efficiently due to the absence of an integrated system that can address all these functions. This leads to challenges such as delayed payments, inaccurate billing, inefficient inventory management, and delayed order processing. To overcome these challenges, the proposed solution is to design a CRM system that leverages analytical tools to address these issues effectively. The system should provide a comprehensive view of customer interactions, streamline billing and payment processing, enable efficient inventory management, generate timely reports, and automate the order processing system. By providing an integrated platform, businesses can streamline their operations, reduce costs, and enhance customer satisfaction

bjective of the project

1. Increasing the customer base - CRMSOFT is a whole system where everything is provided in an

organized manner. The customer base increases due to the high-quality of services being provided to them. It helps in interacting with the customers in a better manner.

2. Insights in real time - This system keeps you updated in real time which helps in a faster decision-making process. None of the things need to be maintained manually. The data can be accessed needless of time zones and places.
3. Offers complete mobility – You can access it anytime, anywhere regardless of the devices. Mobility will also help in expanding your business. It will also help the business to run in an efficiently.
4. Cost management - This one source is accurate, in real-time and helps in reducing the operation costs. If the right solution is selected by user and the right vendor too who are able to meet user needs then user are bound to see a powerful ROI.
5. Security - One should be not worrying about their data once you have it in CRMSOFT. This new system will help you in improving the accuracy, consistency and the security of the data with the help of the built-in resources and the firewalls. The restrictions of data will be enhanced by managers of the solution so that the software can be as secured as you want it to be.

The software is majorly segregated into different modules like customer management, transaction management, product management, report generation, inventory management etc. Till date one of the major algorithms used for inventory management are XYZ analysis, ABC analysis etc. The proposed software is intended to implement both the algorithms to extract the benefits of both the existing algorithms.

ABC analysis is an inventory management technique that determines the value of inventory items based on their importance to the business. ABC ranks items on demand, cost and risk data, and inventory mangers group items into classes based on those criteria. While XYZ analysis is a way to classify inventory items according to the variability of their demand or derived/forecasted consumption. XYZ analysis can be used to plan material requirements and inventory levels so that waste, production delays, or excessive inventory levels can be avoided.[7]

Another important module of CRM system that defines the key and important feature of the software is sales forecasting. The major algorithms used till date are ARIMA, SARIMA, SARIMAX, VARMAX etc.

Given a multivariate time series, the VARMAX procedure estimates the model parameters and generates forecasts associated with vector autoregressive moving-average processes with exogenous regressors (VARMAX) models. Often, economic or financial variables are not only contemporaneously correlated to each other, they are also correlated to each other's past values. The VARMAX procedure can be used to model these types of time relationships. In many economic and financial applications, the variables of interest (dependent, response, or endogenous variables) are influenced by variables external to the system under consideration (independent, input, predictor, regressor, or exogenous variables). The VARMAX procedure enables you to model the dynamic relationship both between the dependent variables and also between the dependent and independent variables.[8]

II. LITERATURE SURVEY

The candidate papers are selected based on title and abstract searches related CRM and its equivalent, model or architecture or framework and personalization. The selected articles are based on background search. Every component, tools and techniques most commonly used by previous researchers will be done ranking process, to see which is the most widely used or proposed. Based on these findings, the authors will further study and be considered as the basic platform for proposing or developing a new, personalize Customer relation management. Finally, this literary study will be able to answer research questions related to common components, tools and techniques to build a personalized CRM System.[5]

i) Title: Design and implementation of bank CRM system based on decision tree algorithm

This paper realizes in-depth analysis and mining of customer data information through data mining and other methods, and transforms customer data information into customer knowledge model. Help bank decision makers make better decisions and help banks to have more advantages in the process of market competition. This paper considers the development status of the bank, summarizes the existing customer data information through the decision tree algorithm, and realizes the design of the bank customer relationship management system based on data mining technology. The system implements customer-centric, collates and summarizes existing customer information, and transforms the mined business data into customer knowledge and models. This paper realizes that when the user implements a series of system operations, the required data information can be obtained conveniently and quickly. Moreover, by implementing the establishment of a decision tree, the intelligent technology implements the division of the acquired customer information on a percentage basis. In this way, from the user's point of view, it is closer to the user's way of thinking, which helps to improve user satisfaction.

1. System login interface

When the user opens the system, the first interface that comes out is the system login interface, so the login interface must give the customer a good impression. The requirements for the login interface are very convenient to operate, and the interface should be simple and clear.

2. Custom Management Analysis

The purpose of the system customer management module

is to provide users with uniform and complete customer information. Through this module, users can easily understand all customer information. This will help users to provide products and services to customers in a targeted

manner and maintain good customer relationships.

3. Customer statistical analysis

In the CRM system, the bank practitioners are required to use the data analysis in the system to classify the customers, and according to the data, the customers are classified according to the level to understand their risk values and which financial products are suitable for them in the daily business process, to improve the bank's profits.

4. Analysis of system test results

In the process of system testing, based on the customer information data, through the implementation of specific functional tests, and then the data information is stored in the server. when there are 1 million data traffic, the processing performance of the system is relatively stable, especially the way the system uses data mining technology to display and analyze.[16]

ii) Title: Web Based Customer Relationship Management Application for Helping Sales Analysis on Bike Manufacturer

This application is able to support the performance of sales representatives to conduct business processes, because the sales representative can maintain relationships with their customers. Sales representative can store their data safely and regularly so they can get the latest information and accurate report about the customer and company. This application comprises 5 sub-systems:

1. Data setting

This sub-system manages the spread of news and files to sales representatives, sales managers, and customers.

2. Dealer information settings

This sub-system collects data for new customer. After collected the customer data, the customer can be sales lead.

3. Leads and opportunity determination

In this sub-system there are several stages to determine customer position.

4. Sales tasking

In reaching on their targets, sales representative must do some tasks to manage and this sub-system help sales representative to know and doing their task.

5. Dealer visit

6. This sub-system collects date and time dealer visited by sales-representative.

Sales representative can store their data safely and regularly so they can get the latest information and accurate report about the customer and company. Based on questionnaire that has been distributed, it can be concluded that the system can help the sales agent for daily process, it is supported by the user's opinion both in the ease of application use, design and suitability needs. For the next step need to add live chat to help sales representative communicate with their sales manager or their customer. [17]

iii) Title: Sales Forecasting Using Deep Neural Network and SHAP techniques

They propose a multi-layer neural networks algorithm to forecast the sales in the next 28 days of Walmart. they introduce experimental results and utilize RSSM as the

evaluating metrics, and our NN model has a better approximation than the SVM algorithm and linear Regression. and evaluate the contribution of the features in model to the results, by using SHAP to get the SHAP summary plot. It was able to forecast the summary by using the SHAP Summary plot and it forecast the which product is have most important and the higher demands.

They introduce our NN sales forecasting model. Neural networks are series of algorithms that endeavor to recognize underlying relationships in a set of data through a process that mimics the way the human brain operates. And the neural networks of simple processing elements operating on their local data and communicating with other elements. There exist many types of neural network,but the basic principles are similar. Each neuron in the network need to receive input signal, to process them and to send an output signal. Because of the limited information provided by the dataset, a neural network should be a good choice as it can auto select the hidden features and fit the data accordingly. The common simple multi-layer neural networks should be sufficient enough to output one value for each input feature. They used it to predict the sales in the next 28 days. [18]

iv) Title: Implementation of Improved Billing System

In this paper, There is a total of 8 steps involved in the implementation of this billing system. First, they have created a layout of the system using Tkinter. Then, the store's database is created using SQLite. Connection between database and the GUI is created using Python and also cart module is created where products are added using Python. A module is created to generate the bill. "pyzbar" is used to create bar code reader (decoder) module and "QRcode" is used to create the QR code generator module. Android studio is used to create QR code scanner application for android devices.

This project was about improving the existing billing system by making it digitalized. A better way of billing system was implemented. Instead of a printed bill, the customer obtained a digital copy of it, which reduced the wastage of paper. This also helped the seller to save the cost of buying paper. The bill was first stored in the

seller's system in an organized manner. After that, a QR code was generated, and this QR code could be scanned by the customer and be transferred to their device. This also ensured the customer wouldn't lose their bill. This project was implemented to make the process of billing more efficient.[19]

v) Title: A NOVEL FUZZY MCDM MODEL FOR INVENTORY MANAGEMENT IN ORDER TO INCREASE BUSINESS EFFICIENCY

In this paper, two novel integrated fuzzy inventory management models have been developed in order to achieve a more rationalized and economical business. Based on the reports of marketing logistics subsystems and the organization of warehousing systems, multi-phase models of sorting and inventory management have been formed, taking into account the multi-criteria function. Based on the following criteria: quantity, unit price, annual procurement costs and demand, the classification of inventory has been performed primarily with the novel integrated fuzzy FUCOM – fuzzy EDAS model. The developed integrated model has shown exceptional characteristics for solving the problem of inventory classification and management. In this particular case, the classification of inventory into groups A, B and C has been performed in a range according to the following restrictions: group A all values >= 1.00, group B >= 0.50 < 1.00, group C < 0.50. In addition, it has been developed a novel fuzzy FUCOM – ABC model that can be used to sort inventory for all multi-parameter inputs. The greatest contributions of the research are the newly developed fuzzy models that provide a better insight into inventories, which is causally related to the cost function of the entire company. The developed integrated models have been verified through a comparative analysis with traditional ABC analysis approaches, taking into account the single-criterion function since they showed significantly better performance. total number of steps in the proposed methodology is four, consisting of several activities each, which makes a total of 11 activities. The following section of the describes in detail all the steps with the presented methods that are applied.

The first step – defining inputs

The second step – data collection and processing

The third step – forming and application of integrated fuzzy MCDM (Multi-Criteria Decision-Making model.

The fourth step – results and sensitivity analysi - ABC analysis, Comparison analysis [15]

Table 1 Summary Table

r.No.	Work Done	Result	Future Scope
	This paper realizes in-depth analysis and mining of customer data information through data mining and other methods, and transforms customer data information into customer knowledge model. This paper considers the development status of the bank, summarizes the existing customer data information through the decision tree algorithm, and realizes the design of the bank customer relationship management system based on data mining technology. The system implements customer-centric, collates and summarizes existing customer information, and trans- forms the mined business data into customer knowledge and models.	The most important details in this text are the system login interface, Customer Management Analysis, Customer Statistical Analysis, and Analysis of System Test Results. The login interface must be convenient to operate, clear, and provide users with uniform and complete customer information. Customer statistical analysis is used to classify customers according to their risk values and which financial products are suitable for them. Analysis of system test results is done based on customer information data, and the processing performance of the system is stable when there are 1 million data traffic.	Only 2 algorithms discussed, more algorithms need to be discussed along with their efficiency in detail under different circumstances and operating capabilities
	This application comprises 5 sub-systems: • Data setting • Dealer information settings • Leads and opportunity determination • Sales tasking • Dealer visit	This application is able to support the performance of sales representatives to conduct business processes, because the sales representative can maintain relationships with their customers. Sales representative can store their data safely and regularly so they can get the latest information and accurate report about the customer and company	It doesn't include customization to satisfy the particular business model also system is not able to predict the which SKU will work better for the future

	They propose a multi-layer neural networks algorithm to forecast the sales in the next 28 days of Walmart. they introduce experimental results and utilize RSSM as the evaluating metrics, and our NN model has a better approximation than the SVM algorithm and linear Regression. and evaluate the contribution of the features in model to the results, by using SHAP to get the SHAP summary plot	It was able to forecast the summary by using the SHAP Summary plot and it forecast the which product is have most important and the higher demands.	The model need improvement to improve the prediction effect, and we need to apply different algorithm to this model to overcomes other sales problems.
	The 8 steps involved in the implementation of this billing system include creating a layout using Tkinter, creating a database using SQLite, creating a connection between database and GUI, creating a cart module, creating a module to generate the bill, creating bar code	This project was implemented to improve the existing billing system by making it digitalized. Instead of a printed bill, customers obtained a digital copy of it, reducing the wastage of paper and saving the seller money. The bill was stored in the seller's system and a QR code was generated	A simple payment model using basic cryptocurrency features can be proposed to reduce costs and guarantee integrity and nonrepudiation of electronic payments.
	reader (decoder) and QR code generator modules, and creating a QR code scanner application for android devices.	to be scanned by the customer and transferred to their device, ensuring they wouldn't lose their bill.	
5	The proposed methodology consists of four steps: defining inputs, data collection and processing, forming and applying MCDM, results and sensitivity analysis, and ABC analysis.	Two novel integrated fuzzy inventory management models have been developed to achieve a more rationalized and economical business. Based on the reports of marketing logistics subsystems and the organization of warehousing systems, multi-phase models of sorting and inventory management have been formed. The classification of inventory has been performed with the novel integrated fuzzy FUCOM – fuzzy EDAS model.	Fuzzy MCDM models, ABC, and XYZ analysis can be used to create a universal fuzzy MCDM model for a larger number of companies, create inventory management policies, and combine them for precise inventory management.

III. TOOLS & TECHNOLOGY

Table 2 Tools & Technology

Software	
Programming Languages	JavaScript, Python
Operating Systems	Windows Operating System
Databases	Mongo dB, S3bucket
Others Technologies	UML, Node, React, RE-React, Visual Studio 2008, Postman,
Web Server	Apache

The software is majorly segregated into different modules like customer management, transaction management, product management, report generation, inventory management etc. Till date one of the major algorithms used for inventory management are XYZ analysis, ABC analysis etc. The proposed software is intended to implement both the algorithms to extract the benefits of both the existing algorithms.

Table 3 Combined Analysis of ABC-XYZ

	A	B	C
X	High value percentage Continuous Demand High Predictive value	Average value percentage Continuous Demand High Predictive value	Low value percentage Continuous Demand High Predictive value
Y	High value percentage Fluctuating Demand Average Predictive value	Average value percentage Fluctuating Demand Average Predictive value	Low value percentage Fluctuating Demand Average Predictive value
Z	High value percentage Irregular Demand Low Predictive value	Average value percentage Irregular Demand Low Predictive value	Low value percentage Irregular Demand Low Predictive value

IV METHODOLOGY

The proposed software deals with integrating the features of existing CRM system with the benefits and features of enterprise resource management. Also, the software is intended to add value to the data that it collects in the form sales, finance inventory report by performing various algorithms on it and help in providing the future insights that may help to increase and scale the business and profit of the company. The techniques and methodology used for collection of data will be secondary sources and all quantitative method for the research will be used to finish the study which is related to the initiatives regarding development and learning effectiveness. Quantitative method also aids for collection of data for verifying the hypothesis.

ABC analysis is an inventory management technique that determines the value of inventory items based on their importance to the business. ABC ranks items on demand, cost and risk data, and inventory mangers group items into classes based on those criteria. While XYZ analysis is a way to classify inventory items according to the variability of their demand or derived/forecasted consumption. XYZ analysis can be used to plan material requirements and inventory levels so that waste, production delays, or excessive inventory levels can be avoided.[15]

Another important module of CRM system that defines the key and important feature of the software is sales forecasting. The major algorithms used till date are ARIMA, SARIMA, SARIMAX, VARMAX etc.

Given a multivariate time series, the VARMAX procedure estimates the model parameters and generates forecasts associated with vector autoregressive moving-

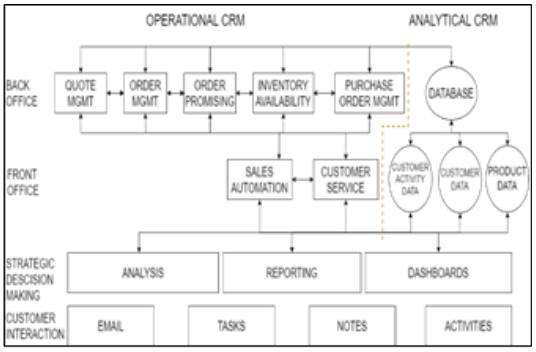

Figure 1 Flow Diagram of CRMSOFT

average processes with exogenous regressors (VARMAX) models. Often, economic or financial variables are not only contemporaneously correlated to each other, they are also correlated to each other's past values. The VARMAX procedure can be used to model these types of time relationships. In many economic and financial applications, the variables of interest (dependent, response, or endogenous variables) are influenced by variables external to the system under consideration (independent, input, predictor, regressor, or exogenous variables).

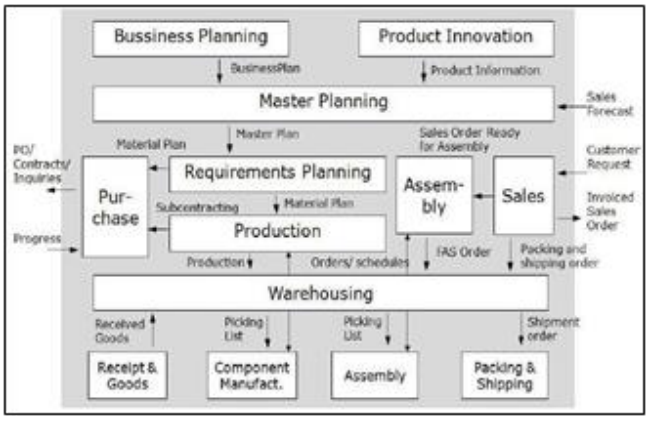

Figure 2 Functional Model of CRMSOFT

The VARMAX procedure enables you to model the dynamic relationship both between the dependent variables and also between the dependent and independent variables.

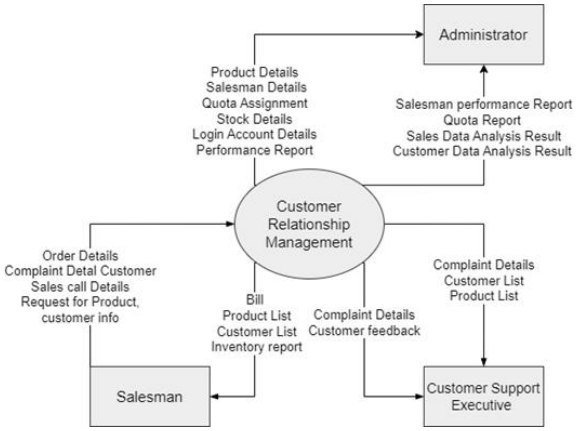

Figure 3 Structural Diagram of CRMSOFT

V RESULT & DISCUSSION

Having a centralized system and database for all of your business-critical data means that everyone in the business has access to the same key information, which is the same no matter which department is looking at it. You also have the opportunity to integrate your software with other systems like Customer Relationship Management (CRM) to ensure that data is up-to-date, relevant and consistent across all systems. It can also be managed and controlled using group policy, which not only makes the whole thing more secure, but ensures that all users are getting a consistent experience and access to the data and tools they need to do their job. By reducing the need for manual data entry and re-entry, CRMSOFT removes the risk of human error, and can help you facilitate and collect infinitely more accurate data that can be accessed in real-time. This allows you to perform more accurate reporting, as well as forecasting, enabling you to make better business decisions. As systems become more user-friendly, it also becomes easier for both management and end-users to generate their own highly accurate reports and forecasts, without the need for IT or business analysis resource. From an operations perspective, manufacturers, in particular, will

begin to become more reliant on Internet of Things (IOT) devices and applications to collect data and run certain parts of their processes. High levels of accuracy will be key to a successful and streamlined process. In operations, real-time data from this software can help management make reactive decisions around labour and machinery utilization, allowing for quick and easy improvements to be made and problems to be solved. This results in better lead times and lower costs per unit.

V CONCLUSION

In this paper we have discussed the importance of CRM system can be used to automate tedious, repetitive and manually completed tasks. With time-consuming tasks taken care of, your workforce can focus on more on the activities that will have the most impact on business success. No more jumping between different programs. With information stored in one centralized location, your operations can move faster and with more efficiency. With all of your applications easily accessible from one spot, you can plan, execute, and analyse in one cloud- based system to drive profitability and productivity across your business. This new system will help you in improving the accuracy, consistency and the security of the data with the help of the built-in resources and the firewalls. The restrictions of data will be enhanced by managers of the solution so that the software can be as secured as you want it to be.

VI FUTURE RESEARCH

The business functions of start-up companies, especially the SMEs and MSMEs, are initially processed and streamlined manually using basic digital systems. The day-to-day activity of these trading entities is managed directly by its owner(s) or under their direct supervision. As the business takes shape and expands in terms of clientele, revenue, expenditure, manpower, technology, production capacity, logistics, geographical presence, etc, it becomes difficult to contain the management of the business within the scope of simple digital solutions and manual supervision. This is where the need arises for an efficient software like CRMSOFT. It also interlinks each department with the other so that necessary information could be accessed for making the right business decisions and for efficiently accomplishing all business functions. It rules out data misinterpretations and communication gaps by storing all business data in a common repository and by granting role- specific access to uniform data for all authorized personnel. Internet-powered remote access to business empowers business stakeholders to do business in real-time at any time and from anywhere, even while on the move. These faculties empower business decision-makers and managers to make data-driven, precise and profitable decisions. By deploying a world-class digital system like CRMSOFT, businesses can integrate disparate entities, eliminate wastage and redundant activities, maximize utilization of resources, optimize

productivity, empower business stakeholders to make timely correct decisions, ensure absolute statutory compliance, always be in real-time touch with the business irrespective of time and space, and increase User Experience as well as Customer Experience.

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College Enquiry Chat Bot

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Abstract-: **Chat bots are the knowledgeable systems that understands and responds to the question asked by users in their own language. Chat bot responds in voice communication a touch like however a person's move with each other. throughout Institute's tutorial Admission procedure there is a massive queue at the enquiry window. Students simply have to be compelled to add question range to the chatbot and it can answer to student question. A login and register system webpages can also be additional inside the system to forestall unknown users from gathering details. The user might offer their suggestions through the suggestion box. The system replies exploitation AN economical Graphical worm that suggests that as if a real person is interacting with the user. This Chatbot is usually a sort of service that is in a position to be your agent providing you enquiry data regarding faculty.**

- ***The college enquiry chatbot intends to contour the method of question resolution***
- ***The chatbot is supposed to make students feel as if they are speaking with college professionals, and their queries are answered through informal text.***
- ***The final goal of our web site is to save|to avoid wasting} lots of time and energy and additionally to be updated with faculty activities.***
- ***A login and register page is added inside the web site to prevent unknown users from gathering data.***
- ***In modern era, generation has keen interest in texting rather than using mails, participating them through chatbots are aiming to be a good alternative for our projected system.***

Keywords: Chat Bot, Virtual Assistant, College Enquiry, Web Application, Queries.

I.INTRODUCTION

Chat bots are sort of a virtual agents which might converse like humans' interaction. they're going to attempt to answer your queries or doubts through chatting medium as if human is interacting with you. This project deals with creation of a chatter bot will answer which may connected queries quickly as potential. As a undergraduate or unaware person we want basic information to know regarding college, this application will facilitate in providing such enquiry information through chatting medium. A chatbot is associate instance of emotional calculation system that mirrors human conversations to supply instructive, esteem based totally, andinformal organizations. This chatbot would be developed concerning college amenities, faculty and placement and their facilities. This project is mainly college, fee structure etc.

- Log out.

II. LITERATURE SURVEY

A chatbot is an instance of emotional calculation system that mirrors human conversations to grant instructive, esteem based and informal organizations. These type of chatbot provides answers to the queries of the students. Objective of the project is to develop a chatbot system which is able to establish answers related to user submitted queries. A database is developed, which can store knowledge relating to queries, answers, keywords, logs and feedback messages. A chatbot aims to form a language between every human and machine. The machine has been embedded data to identify the specializing in creating a chatbot to use by students to induce their queries responded simply from the faculty web site. Enquiry Chatbot has the potential to make friendly conversations respond the course and college details, supply the tutorial calendar, answer the usually asked queries and provides the timings, address, contacts and events data of the departments.

A. Aim

- This project aims to develop a enquiry Chabot that answers any queries post by students like college details, course-related queries, location of the school, fee structure etc.
- One among the prime goals of chatbots is to favor an intelligent human and build it tough for the receiver of the conversation to understand the important alongside aboard various architectonics and capabilities for his or her usage has wide fill out.

B. Objectives

- The main objective of the project is to develop associate rule which is able to be used to establish answer related to user submitted queries.
- The college enquiry chatbot intends to contour the method of question resolution
- The chatbot is supposed to make students feel as if they are speaking with college professionals, and their queries are answered through informal text.
- The final goal of our web site is to save|to avoid wasting} lots of time and energy and additionally to be updated with faculty activities.
- A login and register page is added inside the web site to prevent unknown users from gathering data.
- In modern era, generation has keen interest in texting rather than using mails, participating them through chatbots are aiming to be a good alternative for our projected system.

C. Features

- Login and Register page.
- About Us Page
- Suggestion Box
- Answers to users' queries
- Replies using an effective GUI
- Also answers queries post by students like college details, course-related questions, location of the

sentences and making a decision itself as response to answer a question. The user message i.e. question is hold on to the response principle. The information of chatbot are stored within the database. The development of Chatbot application in numerous programming language had been finished making a computer program to send input and receive response. Structured query language (SQL) for pattern matching had been used within the program.

II.METHODOLOGY

A. On-Line Enquiry

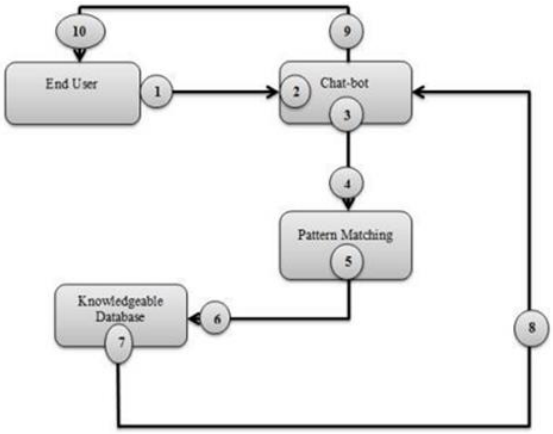
Students will enquire concerning facilities and question associated with exams, academics, fee structure, etc.

Students can even ask queries related to cultural and social activities carried out in the college.

B. On-Line Chatbot

The result may be showed to the user in the form of card format or in text format. The question are going to be answered on the basis of queries asked and also the response media created. Users that wish to enquire about the college at the time of admission or any competition held within the college will question to the chat-bot.

C. Given below is the system architecture of this chat-bot



The basic rule which will be enforced for operating of this planned system is as follows: Step 1: Start.

Step 2: Get the input question from the user. Step 3: The question is pre-processed.

Ste 4: Fetch the remaining keywords from the question.

Step 5: Match the fetched keywords with the keywords in knowledge base, and supply an acceptable response

Step 6: Further the database module is employed to call correct services using entity data to seek out correct information.

Step 7: The keywords are matched with the assistance of keyword matching algorithm. Step 8: It returns the question response to the chatbot.

Step 9: Chat-bot packages the info into correct response for display by the client. Step

10: Exit.

III.MODELING AND ANALYSIS

A. Problem Definition:

College Campuses are immense in terms of the area they cover. If a certain person has a question that he needs to enquire, he/she would need to visit varied departments gathering segments of the solution to the question he had. As we see, whenever admission days are nearer all college members strive their best to guide parents and students to induce into course they want. College Enquiry Chatbot will reduce half the work by giving students brief information concerning admission, courses, fees and lots of additional. All the queries by students will be answered through the chatbot.

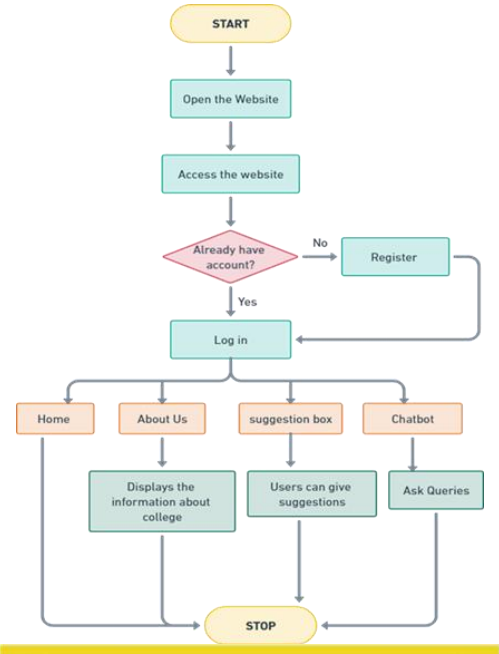
B. Framework used is chatbot:

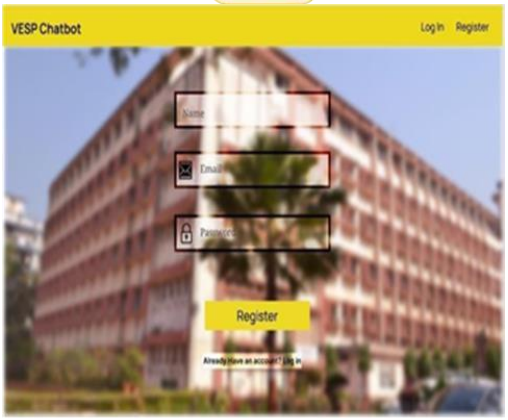
Flask:

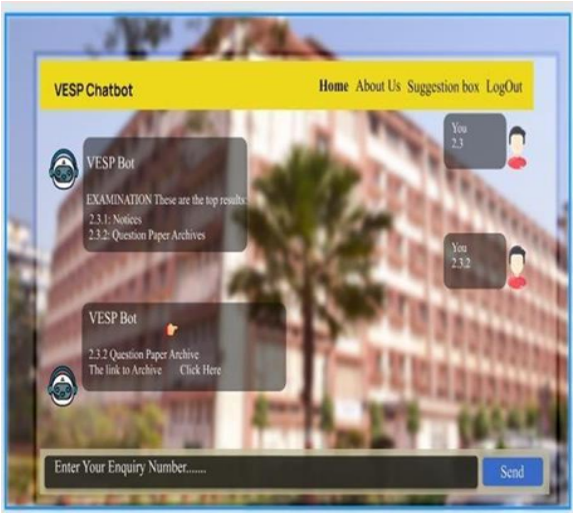
Flask may be a little and light-weight Python web framework that has helpful tools and options that build making web applications in Python easier. It offers developers flexibility and may be a additional accessible framework for new developers since you'll be able to build an online application quickly using solely one Python file.

Flask is known as a micro-framework as a result of it's light-weight and solely provides elements that are essential. It also provides the mandatory elements for web development like routing, request handling, sessions and so on. For the opposite functionalities like data handling, the developer will write a custom module or use an extension. This approach avoids unnecessary boilerplate code, that isn't even getting used.

C. Flowchart:







VI. CONCLUSION

Chat bot are often utilized by any college and Universities on their web site in order that external stakeholders will raise their queries anytime. And it'd be considerably effective to simplify the admission method additionally as this chatbot isn't solely providing college data. A database is developed to store all connected data's and to develop a web interface. The web interface developed had one component which is for the administrator. A information system was designed, that stores data relating to queries, answers, keywords, logsand feedback message. Chabot framework is carried out to satisfy scholarly requirements of the clients. Generating reaction from a Chabot is information based one. At the point once a user starts asking queries within the Chabot Graphical interface (GUI). The question is looked within the data base. On the off chance that the reaction is found within the data base it's shown to the client else the framework tells the administrator regarding the missing reaction within the data set and provides a predefined reaction to the user.

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A Novel Survey on Artificial Intelligence in Cyber Security

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Abstract— **Artificial intelligence (AI) and Cyber security are closely related to each other. Today computers, mobiles and networks have reached every home. These tools are no longer just entertainment. Technology is becoming advanced day to day. Educated and un- educated people get benefit from these advanced technologies. Recently Government involved the topics of AI and Cyber Security in education curric- ulum. As technology develops, so do the users, cus- tomers, business advances and this is where cyber threats come in the picture. This paper elaborates Cyber Security and need of Artificial Intelligence for cyber security. The role of AI become important for cyber security viz. Application security, Net- work security, Device security, Information secu- rity, Cloud security, IoT security.AI has the ability to potentially detect misleading information. AI can be used as a tool to mitigate breaches on the cyber space and it can be used by the nation for some good work**.

Keywords-Artificial Intelligence (AI), Cyber Security, machine learning (ML), Cyber-attacks, Internet of Things (IoT), Denial of Service (DoS), Cyber Physical Systems (CPS).

I. INTRODUCTION

Artificial Intelligence means -the way in which computers can be made to copy the way humans think. Cyber security is the practice of defending computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks. The task of detecting attacks and intrusions using systems is becoming increasingly difficult. Cyber security is an important component of national security. Information is unavoidable when it comes to Nation security. A major res- ervoir of information is social media. Identifying threats may require some sophisticated techniques. This information is given by gullible people through social media like twitter, Facebook, etc. In this case, the ad- vantage of the attackers is to target someone, defame them, and gain money. Only Artificial Intelligence in action can protect a nation from an attacker. Cyber at- tackers are benefited by anonymous providing infor- mation to the media, free speech, talking to unknown people on social media and giving confidential infor- mation. Some people are making money by spreading fake news and the security of the country is deteriorat- ing [1].

II. LITERATURE SURVEY

The biggest cyber security threats are Phishing, Ransomware, Botnet, DoS attack, social engineering attack, Cryptocurrency hijacking. These attacks are done for fraud, exploitation, extortion, causing disrepute and for personal revenge. To survive from the above attacks, we need AI with modern technology. AI is capable to protect against such attacks. AI is revolutionizing the role of information. Its experiment could help un- ravel the complexities of cyber space.Even in medical applications, we can design and implement the cyber security with the help of AI. In this, AI plays an important role in finding vulnerabilities in the applications. A public auditing scheme can be developed in health systems by tooling AI [2]. It enables the modern paradigm to make promising gains in the health sector. Trusted Auditing, information measurement, cyber physical devices/systems (CPS), Internet of Things (IoT) can be leveraged at the end user. Medical-CPS have maintained the reliable relation between data owner and proxy authorizer.AI provides strong computation process on cloud server. It provides better authorization, data management and trusted auditors. These systems provide guarantee to se- cure the data in place of the owners only. It also pro- vides patient secrete information anonymity and confi- dentiality.

Cyber attacks are increasing with the devel- oping technology and attackers are also upgrading their targets. It is necessary to know the cyber threat to understand the attacker characteristics. For this it is necessary to gather detailed information about the attack. The more information we get, the faster we can take protective measures against it. A country like USA has developed such AI mechanisms that integrate intelligence of cyber threat and develop the cyber security taking into account advanced threats. It is possible to improve and upgrade the existing cyber security by col- lecting information about cyber incidents, malwares.

In 2020, the fight against covid-19 disease was going on all over the world, the government of each country was preparing plans through consulting their doctors and experts. At that time, most of the countries collected patient's information to predict the possible development pattern. Healthcare sector is a more vulnerable target than any other for attackers and at the same time it is easy target. Hackers steal patient's data

from healthcare. Hackers know that if patient data or healthcare systems are compromised, they can demand large ransoms. AI system can be used to protect against such ransomware attacks. Cyber security should be implemented using AI, deep learning technology.

Today billions of people in the world are con- nected to each other using social media such as Twitter and Facebook. Many organizations are also connected among themselves through social media. Cyber attackers collect maximum information from social media and carry out cyber-attacks. Cyber attackers manipulate the information to spread rumors about diseases, ex- pose people's privacy, spread violence among various group of people. This can be controlled by using AI and social media systems can be kept safe.

Of course, every device that improves human life includes more computer systems. The production of digital data has also been done a lot. Managing this data in a smart manner has also become essential. The old data processing method recommendations are very ex- pensive and somewhat risky. AI, block chain, deep learning and machine learning techniques enable detection and mitigation of anomalies in DOS attacks, double spend attacks, malware and advanced persistent threats. They all have a high degree of accuracy [3]. Security challenges and attacker's motives (financial gain, anonymity and isolation attacks) get categorized in AI system. AI system includes various aspects of information such as integration, transaction, classification, anomaly detection and privacy protection.

The maritime industry has seen a lot of growth and financial gains over the past few decades. However, the introduction of serious and potentially new types of threats has a significant impact on the mar- itime industry. Hence, there is a need to develop effec- tive, preventive and corrective tools and techniques to address cyber security threats [4]. IoT devices, sensors and some modern devices are used in the ship. AI can be used for cyber risk, potential threat reduction and for severity determination. Despite the advancements in field sensors, communication, navigation technology along with rapid technological advancements, new avenues for cyber-attacks have opened up. A ship lacks technical persons to handle an attacking scenario during a crisis, so we can use AI systems. It has cyber security characteristics to deal with cyber-attacks.

Internet usage is increasing day by day. AI can detect new attacks faster than humans. AI is ready to save companies from intrusion. Many companies have implemented AI related applications. It has been tested and found to be effective in combating cyber-at- tacks. AI algorithms are also needed to fight crime [5]. Cybercriminals are also stealing intellectual property using computer systems. The possibility of AI-automation can include data protection and instant protection. Many elements of AI are important for cyber defense. One of them is detection capability. There are also some AI programs available to detect specific steps and be- haviors. AI systems can monitor any system 24 x 7. Therefore it is considered very effective detection sys- tem. This factor has led many organizations to imple- ment AI-based security. Detection, prediction and re- sponse time skills of threats are the main features of AI.

Internet connectivity and intelligence devices provide improved services to humans. However human are facing technical challenges. Cyber security, privacy resistance and physical security are aspects used in IoT. It is necessary to protect the tools from vandalism and theft [6]. Many aspects can also be provided by AI for IoT security such as antitheft, communication circuits, sensing devices, biometrics, current plan analyzer, tracking methods, etc.

Artificial intelligence is increasingly used in cyber security applications. AI is capable of intrusion detection, malware detection, spam filtering, detection of cyber-attacks and threats, and avenues for defense. Where cyber-attacks become more varied and complex there is the trust of human users on the AI model.[7] The next generation will surely understand every model made on the basis of AI. Therefore, there is a need to focus on literature, research and applications of AI in cyber security.

Fiber optic network is considered a very im- portant part of the world's telecommunication compa- nies. Fiber optic network is spread all over the world. Actuators are used to operate intelligent devices in a small part of the world. During the covid-19 pandemic, all the companies asked their employees to work from home using the public internet. Such networks are vulnerable so this can easily be done by a DOS attack by an attacker [8]. But AI and machine learning have created algorithms that can detect DoS attacks quickly and efficiently.

The Industrial Internet of Things(I-IoT), a network which connects wireless devices using a sys- tem that bring people physically together to improve productivity and performance of industrial processes. In I-IoT there is a need to detect attacks accurately and quickly to avoid the sophisticated consequences that cyber-attacks can have [9]. Some algorithms are implemented in AI to detect such attacks. They include Decision Tree, Random Forest, Logistic Regression etc.

Cyber-attack is done by finding the vulnera- bility of any software. It is necessary to design detectors to eliminate their vulnerability. AI and deep learning are effective for this. AI is also perfect for digitization, literature review, availability of data center and many other such features [10]. AI can also suggest how to

classify which algorithms to use and when. Representation with the help of graphs is the need of the time. Also, we can make applications with the help of AI in embedded systems.

The rest of the paper is organized as follows: Section III deals with Methodology and Section IV deals conclude the result.

III. METHODOLOGY

Artificial intelligence (AI) - The study of computer sys- tems that attempt to model and apply the intelligence of the human mind.AI is a branch of science, borrowing characteristics from human intelligence and applying them as algorithms in a computer friendly way.

Machines are better than Humans in:

1. Alertness.
2. Speed and Power.
3. Sensor Detection outside Human range.
4. Routine work.
5. Computation.
6. Short term memory storage.
7. Simultaneous activities.

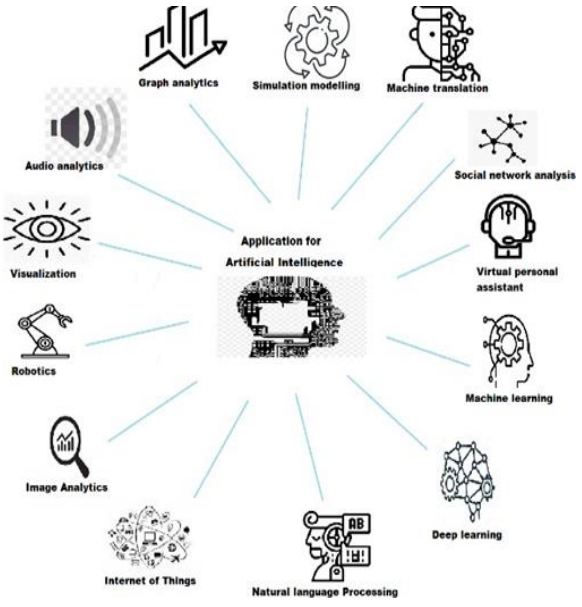

Fig.1 Applications for Artificial Intelligence

Fig.1 shows the applications of AI in differ- ent fields. Using the same applications, we can create many types of models for cyber security, which will be useful to humans in daily life. Some machine learning (ML) algorithms in cyber security are used to automat- ically respond to cyber threats. Various security tech- niques of threat intelligence are used for such security. "Machine learning is the process of mechanical learning which can take different forms with different characteristics and predictive abilities. The three machine learning types are supervised, unsupervised, and reinforcement learning." [12]

A) Supervised Learning:

"Supervised Learning is where a machine learns from training data, and maps out inputs and outputs, based on rules provided in said training data, and from inferred functions. In Supervised Learning, the dataset is labelled, wherein there is a target variable. The value of which the ML model learns to predict, using different algorithms. For instance, it may do this based on IP ad- dress location, frequency of web requests and so on. From this, an ML model can then predict if the IP was part of say a Distributed Denial-of-service (DDoS) at- tack, and more. To design any security model with ar- tificial intelligence and machine learning require Da- taset'' [13]. Dataset is nothing but collection of large data This data set is divided into two parts. One is the training data and the other is the testing data. The trained data is used to train the machine learning model and the testing data is used to check the accuracy of the learning model. The main goal is for the machine to ex- tract the information from the unlabelled data sets, that could aid performance and increase productivity.

B) Unsupervised Learning:

'In Unsupervised Learning, there is no labelled data, thereby, no prediction of a target variable. Unsupervised Learning tries to find interesting associations, or patterns, within a dataset. For instance, clustering can be applied in user analytics where application users can be grouped together. By doing this, it is possible to see what data should belong to a specific group, or not.

Machine learning is about developing patterns and manipulating those patterns with algorithms. In order to develop patterns, we need a lot of data that has complete, relevant and rich context. It is not just about the quantity of the data, but also the quality' [12].

C) Reinforcement learning:

'Reinforcement learning is a sub-branch of Machine Learning that trains a model to return an optimum solution for a problem by taking a sequence of decisions by itself' [12].

One simplified mechanism is derived phase wise to design cyber security. The phases are as follows:

1. Data Set:
   - Data collection from data source (Net- work activity, Database activity, Appli- cation activity, user activity.
   - Data identification.

2. Pre-processing:
   - Cleaning.
   - Data conversions.
   - Clear missing, duplicate values.
   - Visualization.
   - Feature engineering vectorization.
   - Encoding.
   - Normalization.
   - Feature extraction.
3. Sampling:
   - Training set. (Data preparation, model training)
   - Testing set. (Data preparation, model test)
4. Train Model:
   - Kernel function, Kernel scale.
   - Cross validation.
5. Model evaluation:
   - Accuracy.
   - Precision.
   - Recall.
   - Score.
6. Result:
   - Virtualization.
   - Production.
   - Required action by user.

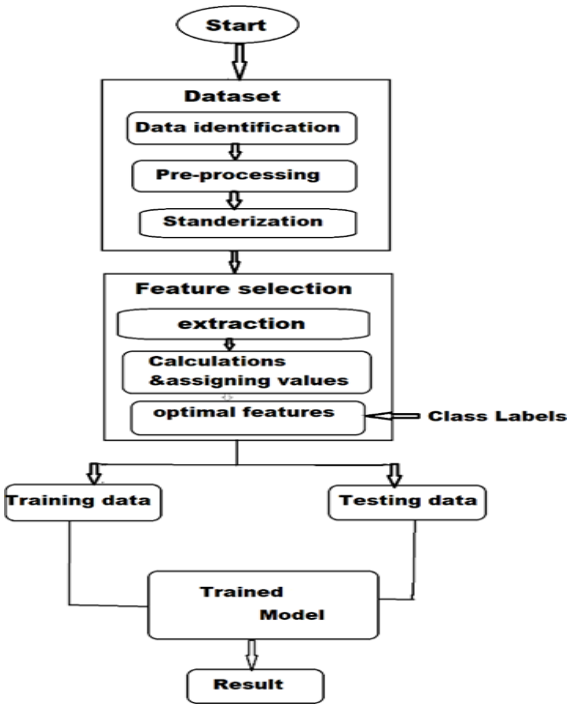

Fig. 2 Block diagram security mechanism with artifi- cial intelligence and machine learning

Table 1 shows different types of algorithms suggested to prevent various categories of attacks. These types of algorithms can be used to design security mechanism.

Table1. AI applications in defending mechanisms against different categories of cyber-attacks.

Cyber attack types	**Learning models (Techniques)**
Malware	• RF- Random Forest Algorithm • CNN-Convolutional Neural Networks • DT-Decision Tree Algorithm • GNB-Gaussian Naive Bayes Algorithm • SVM-Support Vector Machin Algorithm
Spam	• XGBoost-Extreme Gradient Boosting • NB and RF-Naive Bayes and Random Forest • RNN-Recurrent neural network • CNN-Convolutional Neural Networks
Botnet	• DBSCAN-Density based spatial clustering of applications with noise • LSTM-Long short-term memory • VAEs-A variational autoencoder • ML-Machin learning
Fraud	• GNN-Graph Neural Networks • LGB-Light Gradient Boosting • Transfer learning • Sequential modeling
Phishing	• Phishpedia-A Hybrid Deep Learning Based Approach to Visually Identify Phishing Webpages • NB and RF-Naive Bayes and Random Forest • SVM-Support Vector Machin Algorithm • MMHAM- Multi-modal hierarchical attention model
Network Intrusion	• Neural Network and attention • XGBoost-Extreme Gradient Boosting • BiLSTM- Bidirectional Long Short-Term Memory model • Stacked RF
Denial of Service	• XGBoost-Extreme Gradient Boosting • DNN-Deep neural networks • ML-Machin learning

IV. CONCLUSION

Using techniques such as artificial intelligence and machine learning, we may be able to develop analytical

methods. using AI deep learning technology, we can predict the possible development pattern in medical sector and can implement Cyber Security. We can make social media more secure by taking advantage of AI. CPS and IoT systems are made saturated with the help of AI. By using AI, we are able to control ransomware attacks.AI can be used in Enhancing Security and Pri- vacy in Smart Environments. Cyber risk can also be reduced with the help of AI in the Maritime Industry. AI and machine learning algorithms can detect DoS at- tacks and mitigate it. The future of AI will continue to grow due to the increased use of technology. AI can greatly improve our lives.

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Medical Image Processing and Machine Learning: A Study

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***Abstract*— Machine Learning Field is rapidly growing field in the research sector since 2 decades and a growing field in medical imaging processing sector. So, to diagnose the diseases at the early stage machine learning provides the various techniques and algorithm such as supervised learning technique, unsupervised learning technique, Reinforcement learning technique, Active learning, Semi-supervised learning, Evolutionary learning and lastly deep learning. It enables machine to automatically learn data from the past experience and predict things without any need of being explicit programmed. First we need to provide input of the past data then trained the data using some sort of machine learning algorithm then building logical models and finally it provides output. The main aim of these survey paper is to give brief detail regarding how machine learning can be useful in the medical sector.**

Keywords—Machine Learning, Supervised learning, unsupervised learning, Active learning, Semi-supervised learning, K-Nearest Algorithm, Naive Baye's Algorithm, Random Forest Algorithm, K-Means Clustering.

I. INTRODUCTION

Machine Learning is field in the computer science and it is a branch of artificial intelligence. Before 40-50 years the machine learning concept was not in the way but now it has become need and a part of our daily life. In 1936 Alan Turing have gave a theory on how machine can execute somesort of the paper on "Computer Machinery and Intelligence".Today, when data are in the form of the image there are Machine Learning algorithm which interpret the images for further processing.Image Processing is a computer technology that is applied to the images for further processing, analyzing and get the meaningful information from them. Some of the steps involved are as follows:
Some of the data processing steps involved arerepresented as diagrammatic in Fig. 1.

1. Finding the Data
2. Importing Libraries
3. Importing Dataset
4. Find Missing Data
5. Encode Categorical Data
6. Splitting dataset into training and test set
7. Feature Scaling

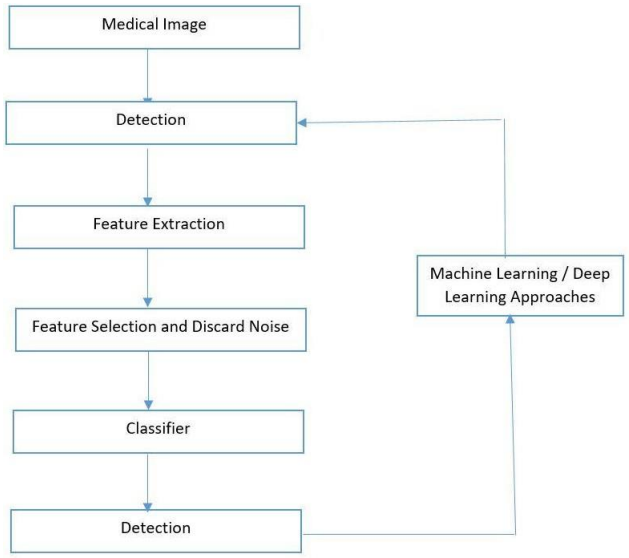


Fig. 1. Image data processing steps

The Life cycle of Machine Learning involves the phases as shown Fig. 2.

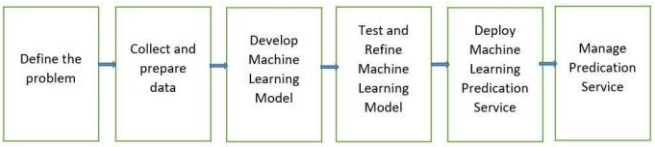


Fig. 2. Machine Learning life cycle

II. MACHINE LEARNING IN MEDICAL IMAGING:

As now a day's medical issues have become a common part of human life so identification of diseases at early stage it is too important so that precautions and care must be taken. For early detection of the diseases machine learning is a way which helps us by giving us various algorithm and to study specific diseases in medical imaging. As there are many

entities such as lesions in medical image which cannot be shown correctly using some mathematic solution [1].So in some recent years if we talk about the skin diseases it has become common in almost entire region of our world. One of the major skin diseases that is skin cancer is found to be deadliest disease in humans. As the skin cancer is found of 2 types that is Malignant Melanoma and Non- Melanoma.So; if we talk about the Malignant Melanoma it is found to be dangerous skin cancer and about 4% population is affected, while 75% death cases are noted by this skin cancer.So to prevent such type of diseases early detection and treatment must be provided to the patient. The presence of Melanocytes which is present in the body is the cause of Melanoma Diseases So; one of the way to examine structure of skin is dermoscopy and till now, the accuracy for detection of this skin cancer is 75%-85%. So some of the stages for dermoscopy image analysis system are as follows:

- Collecting dataset
- Hair Removal
- Shading Removal
- Glare Removal

Also, to identify and classify different data based on different classes; SVM algorithm is used which is a type of supervised learning algorithm (Fig. 3). The performance of these algorithm is very accurate even for small amount of data as compared with other classification algorithm.

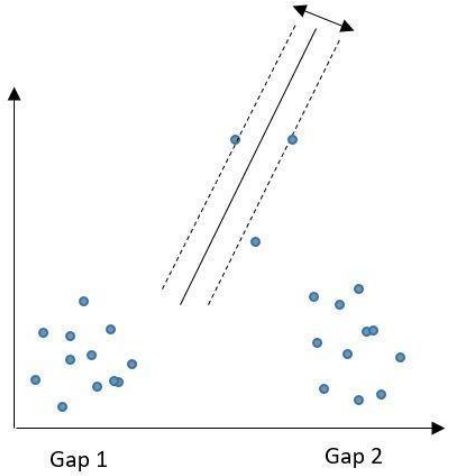


Fig. 3. SVM Classifier

Representation of Block Diagram of Medical image processing in machine learning is shown in Fig. 4.

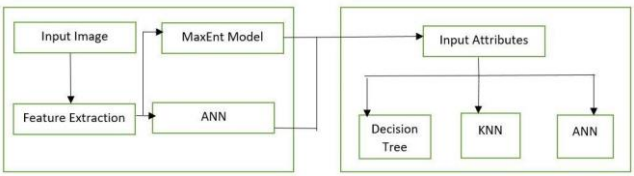


Fig. 4. Medical Image Processing

- Stage 1: Computer Vision: For identification of the skin diseases based on features extracted from the image by using the various image processing technique. The computer vision consists of two phases. In phase one image is taken from any smart devices or camera and some important features are extracted and in the next step the feature that we extracted in phase 1 helps us to identify the skin diseases by using various different model. Some features such as color of the infected area with respect to healthy skin, shape by using edge detection of infected area.

- Stage 2: Machine Learning: For detection and classification of the image various machine learning algorithm are used. The attributes are taken as input such as exocytosis, acanthosis after that it is trained using dataset and finally testing is done by the algorithm. Image processing are now a days have become advances in field such as instrumentation and diagnostics and most of these field are based on image processing. Machine Learning and artificial intelligence have been rapidly progress in the recent years. For supporting such activities as medical image processing, image fusion, image segmentation, retrieval of image analysis of the image. It helps doctor to assist diagnosing and prediction risk of the diseases at the early stage.

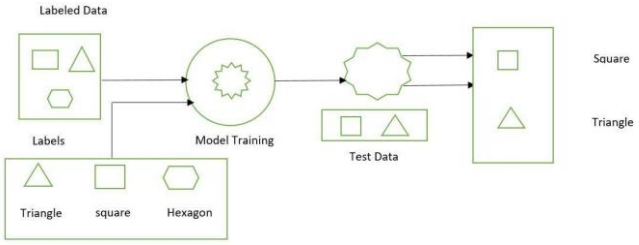
Some of the machine learning algorithm such as SVM, KNN, NN they are being limited in processing of image also some time consuming. So, if we talk about the other algorithm such as CNN, KNN in which raw data in fed, having automatic features which automatically learn rapidly.Although to identify the diseases or to detect the diseases based on CNN in medical image have been given significant accuracy, now a day there are new advancement in machine learning and one of the concept is of deep learning. Basically it is used for the recognition of various objects.Deep learning applied to medical imaging now it has become more popular technology in era of the digital world. Applying deep learning based algorithm to medical imaging have become a growing era. For the cancer detection and continuous monitoring of diseases deep learning is used.The detection of diabetic Retinopathy now a day to manage it manually it is too difficult and also it takes a lot of time. At the beginning of these diseases there are hardly no symptoms at the early stages which actually delay in the treatment. The automated detection of Diabetic Retinopathy provides better accuracy Deep learning also provides accurate result for cardiac imaging, some of the application CT and MRI scan are most of recent use technique of deep learning.So, In order to work with various machine learning algorithm machine Learning is divided as follows:

A. Supervised Machine Learning
B. Un-supervised Machine Learning
C. Semi-supervised Learning
D. Reinforcement Learning

A. Supervised Machine Learning:

It teaches the machine with the labelled data after that model make predictions and provide the output. Basically it helps us to solve real-world problem such as spam detection. Further, it is categorized into two types

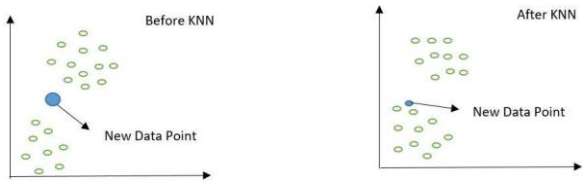
1. Regression
2. Classification



Some commonly used algorithm are:

1. Naïve Bayes
2. Linear Regression
3. Logistic Regression
4. K-Nearest Neighbor
5. Random Forest

K-Nearest Algorithm: KNN is a type of supervised learning algorithm and it is one of the simplest algorithm to implement. Based on the similarity of the new data and available data it classifies a new data point. This algorithm isalso called aa lazy algorithm because it does not directly learn from the training dataset but it stores data at time of classification and actions are performed on the dataset. Suppose we have two different categories named as category A and category B and a new data point X. so to identify that new point lies in which one of the category KNN algorithm can be used.KNN is useful where we want to recognize the patterns toclassify objects. As value of K generally depends on type of the problem. The most preferable value of K=5. By selectingthe multiple value of K it may lead to overfitting.



Steps involved for the KNN are as follows:

- Selecting number K of neighbors.
- Calculate Euclidean distance of K.
- Take nearest neighbor of K as per the Euclidean distance value.
- From the K neighbors, count number of data in each category.
- The number of neighbor which is maximum from given category assign new data point to that category.
- Model is ready to use.

A good example in real life scenario is for heart diseases prediction as in a normal routine life hear diseases is a common disease for death of humankind. According to report of US the death ratio is up to 35% so to avoid such type of issues quality and improvement should be done in the health sector. KNN is one of the frequently used algorithm in prediction of the diseases [4].

KNN and genetic algorithm helps us to improve the accuracy for the given diseases dataset. The algorithm make use of the two parts:

1. It deals with evaluating attributes using genetic search
2. Select the attributes with the high ranked
3. Applying KNN with genetic on subset of attributes which provides maximum accuracy.

Calculate the accuracy of classifier.

Naïve Bayes Algorithm: It is a supervised learning technique which is used for solving classification problems and it is based on Bayes theorem. generally, for text classification where we have a high amount of dataset and for building fast machine learning model that make quick prediction Naive Bayes is useful. It is a probabilistic algorithm which predicts on basis of probability of object.

Bayes theorem is called as Bayes Rule used to determine probability and formula for Bayes theorem is stated as

$$P(A|B) = P(B|A).\ P(A)/P(B)$$

Where, P(A|B) is posterior probability that is probability of A on Event B.

P(B|A) is likelihood probability which means probability of this hypothesis is true.

P(A) is prior probability where it observes evidence before hypothesis.

P(B) is Marginal probability

Some of the advantages of using Naïve Bayes is it is one of the fastest algorithm to predict dataset and also it can be used for multi-class classification.

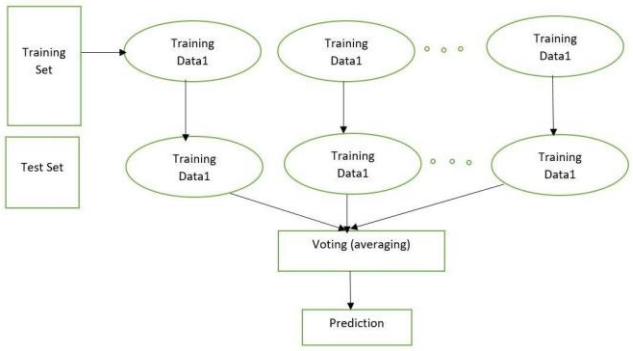
Applications where Naïve Bayes used is:

- Face Recognition: It is used for face recognition as it identifies the face based on features such as nose, mouth, eye, ear etc….
- Prediction of weather: As it is used to identify daily weather conditions.
- Medical sector: As based on patient's information on their medical history it is used to identify certaindiseases such as cancer, heart diseases etc…
- Classification of different news: Based on thesealgorithms whether news is political, educational oriented or world news and so on it helps to predict the news.

The real scenario in field of medical where this algorithm is useful to predict Hemoglobin protein sequences, so based on the protein sequence information which we are getting from the patient for getting better accuracy result these algorithm is used to classify normal and diseased proteins. The data which we are getting from the patient are patient id, patient name and protein sequence related information. After that it will be compared with the training data and classify accordingly. So the result which we get from these is by taking dataset size as 20 accuracy value is 85% and dataset size as 50 accuracy size is 84% [6].

Random Forest Algorithm: It is popular algorithm in machine learning which belongs to the supervised learning technique. This algorithm can be used for classification as well as for regression problems. It combines multiple classification for solving a complex problem to enhance the performance of a model.

Here, in this algorithm it does not rely on one of the decision tree, it takes predictions from multiple tree and based on majority it predicts the output. If tree leads to great number, then high accuracy it will show and it also prevents overfitting.



As random forest predict dataset based on the multiple trees, some predict correct output while some not. But all together predict the correct output. So, two assumptions for better performance are stated as

- Some actual value must be there in the feature variable of dataset.
- Prediction done from each tree should have very low correlations.

As this algorithm takes less training time compared to all other algorithm. The accuracy is high for the output which it predicts and even for the large amount of dataset it runs efficiently. Also, it can maintain the accuracy where at some point large amount of data is mining.

How actually Random Forest Works?

As the random forest works in a two-phase. In First phasewe create a random forest by combining multiple decision tree, and second is to make predictions for each single tree created in phase one.

Step 1: Selection of any random "K" data points from thegiven training set.

Step 2: Building the decision tree with the selected datapoints.

Step 3: Choosing number as N for the decision tree that we want to build.

Step 4: Processing same step 1 and step 2

Step 5: For new data points, finding the prediction for each decision tree and assigning new data point to the category with majority votes.

Some Real life applications of Random Forest Algorithm are:

1. Banking: generally, it helps to make a good decision whether to provide a customer should provide loan or not.
2. Health care: Here, based on the previous medical history patients are diagnose. Past records are viewed for proper dosage of patients.
3. Stock Market: For Financial analysts it is used to identify market for stocks and also enables them to remember the behavior of stock.
4. E-commerce: As based on the past consumption behavior it can predict the performance of customer.

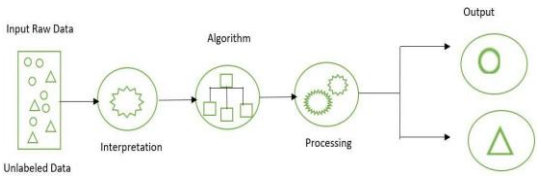
B. Un-supervised Ma

C. chine Learning:

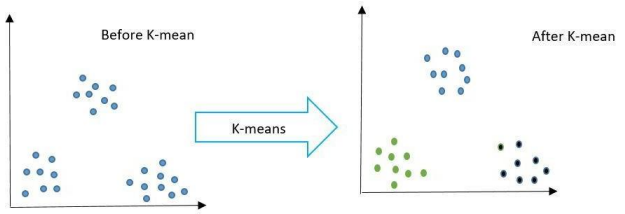
It is a type of Machine Learning in which model istrained with the unlabeled dataset. Here, these technique is used to find hidden pattern from the dataset and group together as per some similar data point.

Unsupervised learning is categorized into two types:

1. Clustering
2. Association



K-Means Clustering Algorithm: It is a type of unsupervised machine learning technique helps us to solve the clustering problems in machine learning. Generally, it groups the unlabeled dataset in multiple cluster. Here, K is the pre-defined cluster which is created in the process. Let's say if value of K=2, it has two clusters, and for value of K=3,there will be three clusters. It is called as centroid based algorithm, where every cluster is associated with the centroid.These algorithms minimize the sum of distance between data points and their corresponding clusters. As in the input it takes the unlabeled dataset and then divides into K-numb of clusters and these process is repeated until it does not findthe best clusters



How does K-means algorithm work?

Step 1: Select the value of K to decide the number of clusters.
Step 2: Solving random K Points.
Step 3: Assigning each data which is closest to centroid and which will form the pre-defined K clusters.
Step 4: Calculating new centroid and variance of each cluster.
Step 5: Repeating the step three, and reassign each data point to the new closest centroid of each cluster.
Step 6: If any reassignment occurs, then move to step-4 else go to finish.
Step 7: The model is ready to use.

How to choose value of K:

To find the value of K one of the method is elbow method it is one popular way to find the optimal number of clusters. The concept uses is **WCSS** which stands for **"Within cluster sum of square"** it is stated as:
WCSS=Σ pi in cluster 1 distance(pic1c1)^2 + Σ pi in cluster 2 distance(pic1c2)^2 + Σ pi in cluster 3 distance(pic1c3)^2

Here, Σ pi in cluster 1 distance(pic1c1)2 is the sum of square of distance between each data point and centroid within cluster 1 and also it is same for the other two terms.

For finding the optimal value this method uses some of the steps stated below as:

1. Execution of K-means clustering for a given dataset for different values of K (range: 1 to 10)
2. For every value of K, it calculates WCSS value.
3. Plotting the graph between number of cluster K and WCSS.
4. If the point which is plot looks like an arm, considered it as best value of K.

B. Semi-supervised Machine Learning: This Machine Learning Technique is the combination of the supervised and un-supervised learning techniques. It combines the algorithm with unlabeled dataset which is used in unsupervised learning and also make use of the labeled dataset similar to supervised learning technique. It improves the limitation of the supervised and unsupervised learning techniques.

C. Reinforcement Machine Learning: In this method it provides rewards for the good one and punishing for undesired ones, also rewards are gained through the experiences when it interacts with the environment.

III. CONCLUSION

As the need of machine learning skills are growing faster in few years. Currently machine learning is in use and they are in the learning process. The use of machine learning in the field of medical image processing plays important inferences for the medication. Along with this Deep Learningare also used in the identification of diseases. Along with thisbased on the different algorithms in machine learning techniques different algorithm such as KNN, Naïve Bayes which have been used for various detection of the diseases. Digital Image processing helps us to identify the image and based on the input data of the image various operations are performed on the image and finally it is trained with the model by applying various different machine learning technique. One of the deadest diseases such as skin cancer which now can be detected at the early stage using machine learning. Here, there are some algorithm listed for different diseases detection.

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A case study of evaluating human activity in industries by using cyber-physical systems

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***Abstract*— Autonomous industries are Introduce, the capabilities in all aspects, are extensively and progressively life via Cyber-Physical Systems (CPSs). On the other hand, people are indispensable for completing activities that humans can only do (often called human-in-the-loop). By fusing people's knowledge and experience with machines' autonomy, human-in-the-loop solutions could deal with demanding jobs in chaotic settings. This article aims to assist designers in their analysis and creation of human-in-the-loop solutions by providing relevant methodologies and procedures. These fixes enhance the human experience, call for interactions that draw in the human, provide natural and intelligible cooperation, and stay out of the human's way. This article outlined the technical hurdles in creating person-in-the-loop CPSs and presented a methodology to aid designers in identifying and specifying how the human and the system should function together, emphasizing the control techniques and implementing the interactions. This method makes the process of designing solutions with humans involved easier. Since our approach frees subject matter experts from solution-focused work, use it early in the software development life cycle.**

Keywords—Cyber-Physical Systems, Human activity, human experience

I. INTRODUCTION:

Human behavior regarding technology systems, decision-making processes, and the boundaries between human and modelled automation control, as seen through the lenses of the research communities focusing on automation and job analysis, is underappreciated. Collaboration and symbiosis studies show how humans and machines might assist each other adapt and thrive in the workplace. Jobs that need specialised skills that machines cannot replicate are highlighted by the labour market when they emerge.

However, because of the immense complexity of CPS and the most recent progress of the supporting technologies, the present research needs to answer the emerging demands for work design better. Value creation in the workplace occurs primarily in the areas of (b) decision-making and (c)creative activity, (d)and (e)social behaviour, all of which pertain more to individuals' daily lives than to their specific occupations. These include, in combination with CPS technologies, a) collecting the talents and other characteristics of the employees and b) understanding and directing the interaction between workers and CPS technologies, which happens at multiple levels (f).

To consider the human role and lead its improvement in production systems, there needs to be more frameworks, methodologies, and instruments that go beyond the physical and procedural viewpoint of labour. Through maximising gains and fostering continuing expansion of this function, There is a need for innovative approaches to improve the design and assessment of work in production settings characterised by the inclusion of human workers and CPS.

II. PROPOSED METHODOLOGY- DESIGN WITH CORRELATED ANALYSIS:

In a greenfield setting, a new manufacturing system must be designed from the ground up; in a brownfield setting, alterations to the existing system and therefore need work design. Most people agree that humans play a pivotal part in production systems since they are the only ones to regulate the systems, deal with unexpected events, and develop adaptable solutions. However, when engineers and designers think about creative technological solutions, they tend to focus on the manufacturing phase and typical working circumstances, limiting their ability to appreciate the human element fully.

The suggested technique seeks to broaden the reach of analyses and designs of human labour by zeroing down on various scenarios that provide a clearer picture of the opportunities and obstacles associated with incorporating humans into cyber-physical production systems. Instances of breakdowns, product swaps, and identifying scheduling-impacting fluctuations are just a few examples.

The technique facilitates evaluations of human-systems combinations to guide design decisions, factoring in all relevant viewpoints and components within a holistic framework. More importantly, this method helps managers and engineers to explain their human resource strategy, cultivates a multi-perspective knowledge of employees' roles, and promotes early identification of any mismatch between top-level plans and technological progress in the factory.

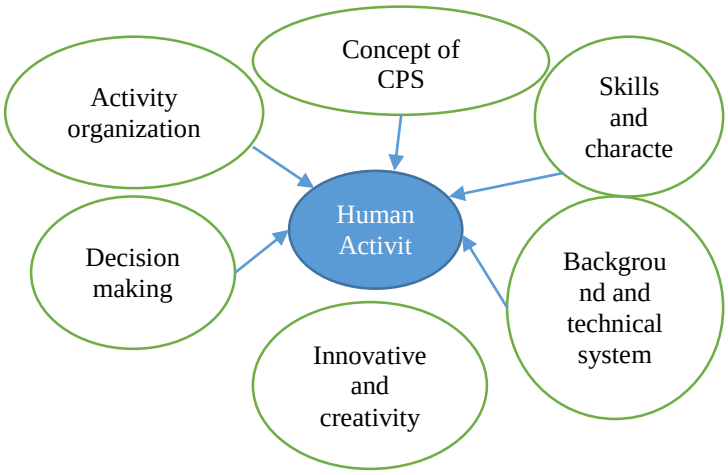

Fig. 1. Figure 1: Frame work

Analysis of the human and CPS components and how they relate to the activities is possible using the given paradigm. The division of the job into discrete blocks is defined uniformly from the four angles.

A. Activity organization:

CPS incorporates the idea of addressing problems on both a physical and a cyber or digital level. An extra holistic dimension, at which human and societal cycles emerge, is brought to light by the abstraction viewpoint. The term " abstraction " refers to the level of organization above which the action occurs, propagates, and has consequences. Using this viewpoint, we can determine which resources would be most helpful and what kinds of talents and abilities would be required. Consider the physical and cyber levels of CPS and the holistic level of human and social loops to determine the abstraction perspective. (Standard American Phrase) (AP) Physical - affecting the physical realm or physical processes (AC) The actions have an impact on the digitalized data, hence the term "cyber" or "digital" is used (AH) All-encompassing: affecting mental constructs.

B. Decision making:

Employees are being asked to take on more responsibility for making decisions and resolving issues. Human activities should be defined in terms of the stages that make up this process. A decision ladder and a job analysis use to break down the many steps of these tasks into three main phases: (DI) understanding the situation, (DII) analysing and making decisions, and (DIII) carrying out the plan.

Additionally, a specific section has been added to the process for handling reporting tasks, which are often overlooked in deliberation evaluations (DIV). Because of the employees' willingness to share their insights, experiences, and expertise with one another and with CPS, these gatherings are crucial. Finally, we have separated the non-productive steps into their own phase (D0). From the viewpoint of the people making the decisions, the following groups of actions have been established:

Diagnosis (DI)(situational awareness); Determination(DII) (analysis and choice making); Development (DIII) (task completion); Description (DIV) (reporting and explanation); and Other (D0) (non value added activities).

C. Innovative and creativity:

Jobs that need originality and imagination are rising in demand while those requiring repetitive activities are decreasing in value due to technological advancements. In this study, we base our categorizations of activities on the human performance models' categories of abilities, rules, and knowledge.

IL) Predicated on custom or established procedure (IM) rule-based and method-based systems rely on established, agreed-upon rules and procedures to solve problems. (IH) One who generates novel ideas and insights.

D. Background and technical system:

Lean Production Systems and the ideas of Socio-Technical Systems may come from different places of origin and perspectives. However, they share an appreciation for the importance of the human element in the workplace. Human interaction-based forms of e-employment are less likely to be mechanized. In this paper, we provide a scale to quantify the amount and quality of social contact, from "none" (no interactions) to "extreme" (benefiting the team's or community's overall social cohesiveness). As the name implies, the minor interaction level signifies the absence of any interactions.

In contrast, the highest level (interactional complexity to reach an understanding via mediated discussion and bargaining) represents the highest level of interaction. Activities have been categorised as follows from this viewpoint: (SL) no or poor social contact, (SM) negotiation/mediation, and (SH) strengthening social cohesiveness.

E. Skills and characteristics:

Employees need specific skills, talents, and knowledge to perform job duties. Several frameworks are available to assist with identifying these things, and each business may use unique descriptions. However, shared models are helpful since they allow for evaluation and cooperation amongst diverse institutions, programmes, and services. More than 900 industries have adopted the O*NET® Content Model1 as a standard. The Employment and Training Administration (ETA) of the United States Department of Labor also offers a relevant resource in the form of the Advanced Manufacturing Competency Model Clearinghouse. In addition, the human factor considers employees' demands for safety, health, and other factors. These may be short-term issues like stress or weariness or more long-term issues like old age or a disability.

In this effort, we focus first on representing the human factor by using the same skills, talents, and knowledge used by O*NET and ETA.

F. Concept of CPS:

The CPS subcomponent of this paradigm is laser-focused on helping people meet their basic requirements and participate in meaningful activities at work. While cyber physical systems' distributed design allows them to perform a wide range of functions in the background, we focus primarily on the service provided to the worker. CPS research is only getting started and that there are no excellent taxonomies for

these programs. We have used the following service categories as a point of departure for this study:
Alerting using an innovative dashboard's visual representation, or more generally,Assistance in making choicesThe Power of Working Together Socially The combination of Worker augmentation and Workplace learning Changes in the Workplace

Advice/Suggestions
Tablets and smartphones, HMDs and other wearables, desktop/HMI, specialized equipment like exoskeletons or collaborative robots, picking systems, put-by-light, etc. systems may use all to supply the services.
Engineers, operations managers, and others may benefit from the suggested technique. Designers of factories and workplaces at large, if they are designing a brand-new production process or preparing to implement minor modifications into a preexisting framework. Even though the theoretical road map described in Generalizability characterizes Figure 2; it becomes CPS-specific when used in the plan for analyzing and creating.
The Problem Setting is the first step on the journey, and it establishes the scope of the problem, the goals of the activity, and the direction in which it will integrate human and technical systems. At this stage, the designers must define the scope of their work, outlining the goals they want to accomplish and the range of possible design solutions. They may, for instance, weigh the possibility of incorporating a health monitoring system into a machine tool's design to keep tabs on its operational state to facilitate predictive maintenance. Evaluate whether or not available employees meet the position's skill requirements and ensure that employees' time is valued appropriately.
Scoping is the second step involving determining what will be measured and how. In the scenario above, designers are thinking about implementing a health monitoring system (TO BE) and want to evaluate it against the current system based on Periodic Maintenance (AS IS). Within this remit is the tagging of a critical scenario and highlighting crucial roles in the goals. The method may be a maintenance technician checking to see whether intervention in machine maintenance is required.
Modelling the workflow is encouraged during Analysis & Design. This workflow consists of a series of individual activities triggered by the scenario's events and involves the relevant roles for the design option. The characterization of each exercise uses the analysis and design framework, with particular emphasis on the perspectives most directly connected to the strategic goals. The beginning of our scenario may be the occurrence. When a maintenance intervention is imminent in the AS IS scenario, the maintenance technician contacts the production planner to discuss whether or not to halt operations. The production planner would account for the scheduled downtime for each machine. In the TO BE scenario, on the other hand, the maintenance technician can assess the plots and the health monitoring application to determine how much longer the system will last before failing and, as a result, whether maintenance adds intervention needs to the production schedule as a maintenance job.

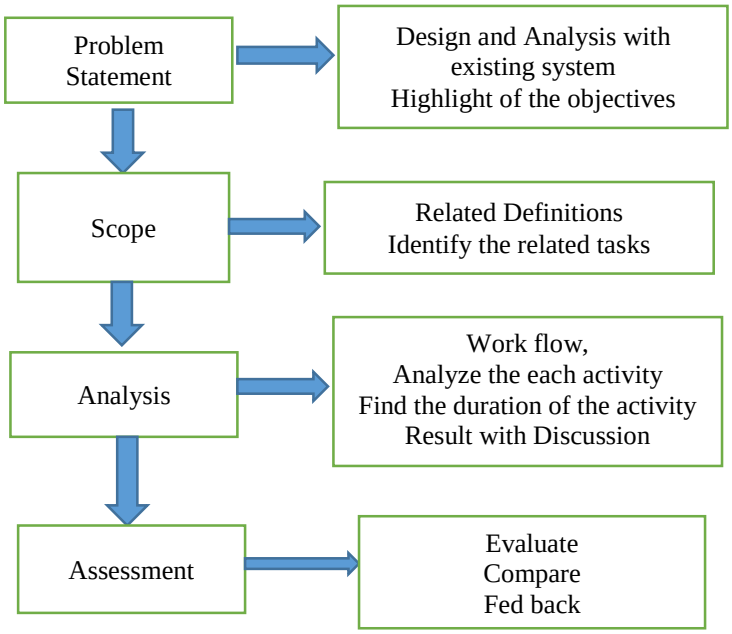

Fig. 2. Work flow

Modelling the workflow is encouraged during Analysis & Design. This workflow consists of a series of individual activities triggered by the scenario's events and involves the relevant roles for the design option. The characterization of each exercise uses the analysis and design framework, with particular emphasis on the perspectives most directly connected to the strategic goals. The beginning of our scenario may be the occurrence. When a maintenance intervention is imminent in the AS IS scenario, the maintenance technician contacts the production planner to discuss whether or not to halt operations. The production planner would account for the scheduled downtime for each machine. In the TO BE scenario, on the other hand, the maintenance technician can assess the plots and the health monitoring application to determine how much longer the system will last before failing and, as a result, whether maintenance adds intervention needs to the production schedule as a maintenance job.
The technique suggests adding quantitative data to the activity modelling, such as the probability of the event and each branch in a split workflow, as well as the time it takes to do an activity.
After the implementing method, a discrete event model will have been created that can be simulated to extract synthetic information about the progression of one or more scenarios to calculate, in a nutshell, how much time was spent on decision-making or utilizing a particular skill. The approach was developed primarily for quantitative data, although it may also infer using qualitative features. Down the case study, it may extract the maintenance technician's whole set of abilities by summarizing the activities throughout the entire process, allowing the technician to zero in on contacts with the production planner.
The systematic process ends with an assessment, where can contrast information about the reference option with the design choice (such as implementing a health monitoring system). May, for instance, include contrasting the two scenarios concerning the necessary expertise levels for

maintenance professionals. It would also emphasise a more streamlined procedure by eliminating the necessity for the repair specialist and the production planner to haggle. High-value activities, such as decision-making or execution, may be prioritised using the criteria and examples from the current capabilities. Hints and suggestions for the human and CPS elements of the design might come from this stage of the process. A skills gap may occur if the Maintenance Technician isn't well trained to analyse and understand the health Monitoring plots and decide on maintenance actions. To further improve the efficacy and efficiency of the operations, Might crate various hypotheses for providing CPS-based services, such as aiding in the forecast of the remaining time before failures.

III. CASE STUDY WITH INDUSTRIAL APPLICATION:

Two industrial use the cases to test the methodology, cosider with various design approaches. The fallowing Sections provide visual representations of the procedures followed and the outcomes.

A. Case-1: Compressor plant:

This facility is responsible for massively producing industrial compressors of the appropriate sizes. Job shop principles govern the production setup, with workers trained to handle specific processes and machines.

The service is preventative, reactive, and remedial. The operator's involvement is crucial in both circumstances since they must determine if the intervention is preventive or corrective. At the strategic level, we use Enterprise Resource Planning (ERP) software and a strict scheduling system. Must determine Scheduling changes on the production floor.

This application of the approach includes detailed annotations of each step:

1. To maximise human effort, we propose a solution consisting of a programme that will assist the operator in producing a pre-diagnosis in case of a breakdown rather than submitting a free-form ticket for maintenance intervention. As this phase progressed, it became clear that the Key Performance Indicator (KPI) to implement this goal may vary depending on the strategic focus of the individual business.
2. Targeting: the current state of use affairs (AS IS) as a baseline against which the design alternative will be evaluated. The operator and the maintenance technician's respective responsibilities in the event of machine failure have been singled out as the primary subject of this case study.
3. Figure 3 displays the simulated analysis and design process, including the sequence of design options and reference case operations.

Specifically, the human element has been defined in terms of skills, chosen from a pool of thirteen that are most applicable to the field of industry, as detailed in:

1) Teamwork is combining efforts with other people to achieve common goals.
2) Work is planned and prioritised so that time efficiently and tasks are completed.
3) The third category is "innovation and invention," which includes developing novel uses for existing processes and goods.
4) The fourth competency is solving issues and making sound decisions based on an understanding of STEM concepts.
5) Use equipment and tools properly, in line with all applicable policies and regulations
6) Look for ways to learn more about methods, equipment, and software that may simplify tasks and boost output.
7) Keep your tools, gadgets, and equipment up to date with regular maintenance
8) Recognize the origins of malfunctions and settle on a course of action
9). Perform maintenance problem diagnosis using standard operating methods
10) Examining, Checking, and Recording Data This includes data entry, transcription, recording, storage, and maintenance in textual or electronic/magnetic format.
11) The Eleventh Step: Use Data-Gathering and Observational Methods
12) Keep all necessary inspection reports, paperwork, and records
13) Other

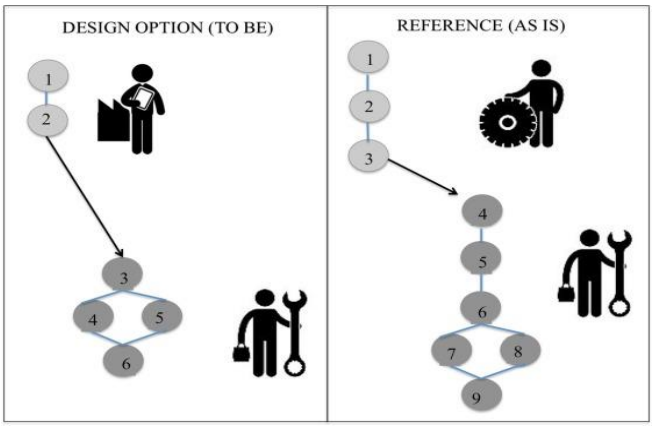

Fig. 3. Human activity flow chart

Using the analysis and design framework, we have described the tasks involved in the design alternative (TO BE) and the baseline (AS IS) workflows.

To evaluate the design alternative (TO BE), Compare the actions of the two active roles in the reference context (AS IS). There was an upsurge in the "Describe" IV activity from the operator. This change might be seen either as a potential loss of production or an opportunity for the operator's expertise to be transferred to the maintenance worker. Moreover, the operator must possess additional skills, specifically skill n.5, to use the option. By eliminating tasks like bookkeeping and reading service tickets to determine whether an inspection is necessary, maintenance technicians can devote more time to actual "fieldwork." Generally speaking, the design is a more efficient use of resources. Assessment phase results included the following recommendations for bolstering human activities.

1. Monitoring service that sends out alarms when certain conditions are met, such as when the temperature, vibrations, or energy usage go beyond a user-defined threshold.
2. In the event of a machine problem, this service application may help the operator inspect the machine and contribute their observations and expertise to the data from the sensors and the machine records to assist in a diagnosis.
3. Service that alerts the technician to potential problems before they occur and offers advice on how to proceed (dynamic interactive troubleshooting guide);
4. Intelligent decision support system (service) to help maintenance technicians decide what kind of intervention is needed.

IV. DISCUSSION:

Two industrial cases have been used to demonstrate how the proposed methodology can be used by manufacturing companies to address work organisation in the context of technological shifts during the design phase. When alternative approaches can be explored, and early feedback on technical projects can be gathered, analysed, and, if feasible, incorporated into the final blueprints.

Based on the examples provided, it is clear that this technique may be used to encompass a variety of approaches to and considerations for human labour, all of which can be described in terms of KPIs that reflect the enterprise's direction. Some key performance indicators (KPIs) are calculated based on the categories used to classify the activities concerning one or more employees and situations. Key performance indicators include the share of time spent on exercise, the percentage of time spent on non-value-added activities, the share of time spent on activities involving high or moderate social interaction, and the allocation of time spent on activities involving high or medium innovation. There are additional key performance indicators that highlight the importance of people. In this context, one example is the number of necessary talents for a specific position. Businesses make their human resource strategy clear by setting goals to improve or improve upon individual indicators and then including these results in evaluating design alternatives. Although these KPIs alone cannot provide a complete picture of a design's human resources consequences, they may help decision-makers become more aware of those implications as they weigh various design alternatives. However, there is some ambiguity in the assessment because stakeholders were only partially involved, there needed to be more expertise with these sorts of concerns, and the primary emphasis was on technology.

Possible solutions were found by analysing the two application situations. Examples of services that might benefit from using CPS to aid and facilitate the human effort. In addition, by generalising from actual business examples Using extrapolations from existing research, we can determine the appropriate categories in light of the four views and the human component of Figure 1's analysis and design framework. This Product, The specifics of the actions that needed backing informed the consistent best practises for auxiliary services made possible by CPS.

V. CONCLUSION:

The importance of humans in the evolving manufacturing environment toward Industry 4.0 has been emphasised by policymakers, industrialists, consultants, and scholars. To maximise performance, manufacturing systems should consider both technical and human-centric factors, although this is seldom done. The suggested approach to modelling and evaluating human actions inside cyber-physical systems helps to close this knowledge gap. Industry examples demonstrate its potential use for evaluating and creating other designs. Improvements to the whole cyber-physical-social infrastructure may involve data gathered from industry applications. As a bonus, these suggestions have been generalised from the specific circumstances and augmented to provide a set of guidelines for labour planning.

Even though it has flaws, the current work offers a unique way to help humans design labour integrated into cyber-physical systems. It focuses on strategic perspectives for human roles in how technology interacts with people.

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Security and privacy policy of mobile device application management system

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Abstract— **Using a variety of sensors, automatic activity recognition systems can continuously monitor a wide variety of physiological signals from sensors con- nected to the user or the user's surroundings. When applied to healthcare, this can greatly benefit areas like automated and intelligent monitoring of everyday ac- tivities for the elderly. This article represents a novel approach to analysing the data using Artificial intelligence. The data was collected from the smartphone's internal sensors using the feature ranking algorithm. These sensors collect data regarding human activities. Classify the collected information using random for- ests, ensemble learning, and lazy learning techniques. The suggested method may lead to intelligent and autonomous real-time development, as shown by extensive tests utilising a public database1 of human activity using smartphone inertial sen- sors. Human activity tracking for use in eHealth situations, including the elderly, the handicapped, and other populations with unique healthcare requirements..**

Keyword- Security, random forecasting, machine learning, smartphones,

I. INTRODUCTION

Most app developers and smartphone owners have helped propel the mobile application (app) ecosystem to the forefront of global economic growth. According to recent sta- tistics, the most downloaded apps in 2022 by users will be according to their require- ments. Studies show that although internet users are increasingly dependent on smart mobile devices (such as smartphones and tablets) for their day-to-day activities and demands, they may not always be aware of or able to influence the processing of per- sonal data using these tools. Moreover, it is frequently difficult to analyse apps' privacy and security features because of the complexity involved in understanding how they function because of their dynamic environment, reuse of software libraries, and inter- action with other networks and systems. Inadequate data protection and security proce- dures are often the result of app developers' lack of awareness, expertise, or understand- ing of how to properly arrange for and engineer privacy and security needs into their products, rather than any deliberate neglect of such standards.

The General Data Protection Regulation governs the collection, storage, and disclosure of personal information using applications (EU)

The present Data Protection Directive 95/46/EC [2] is being replaced by a new one that is immediately applicable in all Member States. While The General Data Protection Regulation (GDPR) strengthens the privacy and security guarantees estab- lished by the Data Protection Directive. offers supplementary safeguards that give users more say over their private information, is extremely difficult to do on a mobile device or the internet5 . Beyond the requirements of GDPR, this also applies to The EU's Di- rective on Privacy and Electronic Communications also has implications for mobile applications. Transmissions EU Directive 2002/58/EC (ePrivacy) [3] are being revised at the moment and compliant with the General Data Protection Regulation. In January this year, the European Commission proposed a new ePrivacy Regulation. Commission and is being discussed at the moment in the European Parliament and the Council. Ees- sential safeguards for users' personal information in mobile applications, including pro- cedures for ensuring the anonymity of users' data and the prevention of data breaches exchange of messages and information, installation of apps and files (cookies) on end- user gadgets and rules governing tracking's effect on users' privacy preferences.

Combining these numbers with the blurring of barriers between personal and company-owned mobile devices, it's clear that mobile app analysis is becoming more vital for businesses. In reality, these applications may expose sensitive information about workers, which cybercriminals might use for social engineering, the practice of tricking people into giving up sensitive information to steal it, or even for exfiltrating data or installing malware (malware). Companies are right to be wary of the ever-ex- panding cyber threat environment, which now includes mobile apps, due to the sensi- tivity of the data they collect from their customers (personally identifiable information, or PII). The term "mobile device management" refers to a method businesses use to deploy and control mobile devices like smartphones and tablets. Rules and an applica- tion make up this framework usually, with the latter used to manage policies that limit an employee's access to install mobile apps and enforce security measures. These reg- ulations are implemented to prevent unauthorised access to sensitive information, such as financial records, social security numbers, and intellectual property, and to ensure that malware is updated and cannot compromise systems (IP). An incident responder or mobile device manager

may remotely erase all data on a lost or stolen employee's mobile device.

II EXPERIMENTAL VALIDATION WITH ACTIVITY RECOGNITION PROCESS:

We utilized a public activity recognition (AR) database1 for experimental validation of our method. This Thirty people between the ages of 18 and 50 have provided labelled data for this database. Every single individual performed. Wearing a smartphone belt case while doing six things, including but not limited to: walking on level surfaces, climbing stairs, swimming, playing a video game, and playing a board game sitting, standing, and lying down, as well as walking up and down stairs. In this case, we uti- lized a smartphone to sensor package with 3-axis linear acceleration measuring accel- erometer and angular velocity measuring gyroscope angular velocity, both at a fixed rate of 50Hz, which is more than enough for recording human motion. The two com- ponents of the database are the raw sensor data that has not been processed and the collection of features data that is processed extracted.

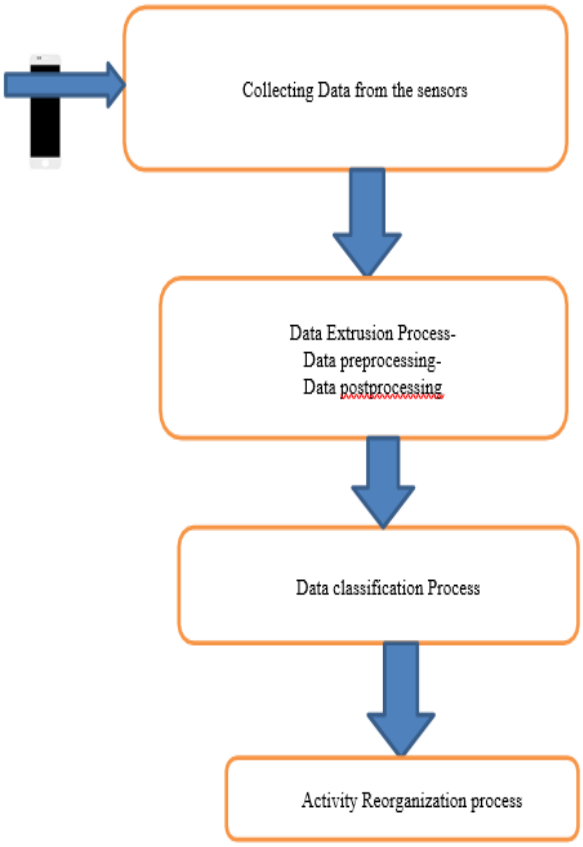

Figure 1: Frame work- Activity reorganization in step by step

At first, 2.56-second fixed-width sliding windows with 50% overlap were used to sam- ple the noise filters of the raw data. There are 17 parameters, that may be extracted from the time- and frequency-domain analysis of accelerometer data.

Another data set has 2.32-second-long vectors with 552 features apiece. Each vector stores information about the interval, including the average, maximum, lowest acceleration and angular velocity along all three axes and other, more advanced features like the Fourier, transform and autoregressive coefficients. We utilised this dataset to test our activity recognition method's efficacy. Figure 1 depicts the block diagram for this dataset's processing. The preceding section will go on to discuss the relevant con- text.

III MOTIVATION OF THE RESEARCH WORK:

There are several benefits of using cell phones for automated activity identifi- cation, including the convenience of the device's mobility and the absence of the need for bulky, unpleasant permanent equipment.

Other well-established methods of activity identification include body sensor networks and dedicated hardware configurations. For example, While such sophisti- cated setups may improve the effectiveness of activity detection, it is unreasonable to expect individuals to wear them regularly in most residential settings due to the effort, time, and convenience involved in doing so. Smartphones have a leg up on the compe- tition for activity detection because of their portability, simplicity of use, and the ability to utilise the phone's many sensors. Smartphone sensor outputs need the development of practical machine learning and data mining technologies for automated and intelli- gent activity detection. While several machine learning approaches are developed, the best algorithm for recognising mobile phone activities remains unclear. It would be a massive boon to the eHealth field if automated activity identification systems could be constructed using the intelligent processing of numerous smartphone sensor character- istics. They focus on remote activity monitoring and recognition in the elderly and dis- ability care sectors.

This article compares the naive Bayes classifier and the unsupervised k-means cluster- ing method. The comparison for activity recognition on several novel machine learning and data mining approaches in smartphones, Adopting the random forests and random committees on the decision tree method. A publicly available smartphone activity iden- tification database 1 reveals that integrating machine learning and data mining signifi- cantly increases recognition performance over earlier smartphone-based activity detec- tion methods. I'll explain the machine learning methods that allowed a mobile app- based activity recognition system.

IV DATA MINING APPROACH TO CLASSIFY THE ACTIVITIES:

In the next stage, work will organize in the form of data mining. Initially, based on the ranking system

preprocessing is implemented. For preprocessing technique, Con- sider real-time smartphones (561 parts). In this case, the data is used to determine the relative value of various constituents, with less important ones being disregarded. In the setting of our very high-dimensional datasets, our attribute selection technique has performed exceptionally well, allowing us to employ almost half as many characteris- tics as before while maintaining the same level of recognition performance. A battery of tests was conducted using a range of feature rankings derived from an information- theory-based ranking technique. These varied from the use of a Naive Bayes classifier as a starting point to those of Decision Trees, Random Forests, Ensemble Learning , and Lazy Learning . Several different classifiers were evaluated for this work, and we offer summaries of each below.

IV.1 Bayesian Classifier:

This classifier uses Bayes' theorem at its core to make inferences based on probabilities. Naive Bayes, the most straightforward Bayesian approach, is explained as a specific example of an algorithm that requires no modification for continuous data. Since it is supervised learning and easily trained, it provides a valuable starting point for evaluat- ing other methods in terms of accuracy and generalization.

IV.2 K-Mean classifier approach:

In this case, the dataset may be unlabeled since clustering is an unsupervised learning technique. Instances are stored into two categories: those that are the same or connected and those that are distinct. K-Means is the most well-known and straightforward tech- nique for determining whether instances may classify based on some criteria. Because of its ease of use and the fact that it can process unlabeled data, it might serve as a benchmark against measuring the performance of other classifiers.

IV.3 Decision tree-classifier approach:

The dependent variable, or the desired outcome for a new sample, is calculated using a decision tree classifier based on predictive machine-learning algorithms. Here, the in- ternal nodes of the decision tree represent distinct qualities, and the branches between the nodes represent the range of values that each attribute may take in the data samples being analyzed. The terminal nodes further indicate the dependent variable's ultimate values (classification). In statistics, the word "dependent variable" refers to the variable whose value is being predicted; in this context, it is the attribute whose values are being anticipated. Consequently, the independent characteristics are the independent varia- bles in the dataset, contributing to predicting the dependent variable's value. The J48 Decision tree classifier employed in our tests has a straightforward algorithmic ap- proach. Whenever it has to categorize anything new, it must first generate a new deci- sion tree using the attribute values from the existing training data. Attributes that dif- ferentiate across samples are used to identify the next batch of items added to the train- ing set. This attribute gives us the most helpful data since it allows us to easily distin- guish between different occurrences of the data, which is essential for accurate catego- rization.

4.4 Random forecasting approach:

When it comes to ensemble learning techniques for classification and regression, Ran- dom Forests are a decision tree ensemble. Additionally, they may be seen as a kind of closest neighbor predictor, as they build many decision trees during training and use the class mean as their output. Random Forests is an ensemble of decision trees (a term used by Leo Breiman15). Through averaging and balancing the two extremes, Random Forests aim to mitigate bias and variation problems. In addition, there aren't many knobs and dials to fiddle with in a Random Forest; in most cases, you may get good results by just utilizing the default settings. Because of these benefits, Random Forests may frequently be used directly from the box to produce a decent, quick, and efficient model, without the requirement for extensive handcrafting or modelling in comparison to other classifiers.

4.5 Random type forecasting approach:

As with other types of ensemble learning methods, the premise of the random commit- tee is that the addition of more classifiers will lead to better overall results. Each indi- vidual classifier in this sort of classifier is built from the same underlying data but with a distinct random number seed. To determine the final output class, it takes the mean of the predictions made by all of the basic classifiers.

4.6 Lazy learning classifier:

Classifiers based on lazy learning store the training instances during the training period and use them later for classification. The IBC classifier resembles the k-nearest neigh- bor classifier in many respects. However, there are ways to speed up the determining closest neighbors by utilising various search methods since most of the learning occurs during the classification phase when these models are often at their slowest. While this study used a linear search strategy, the performance may have been improved using kD-trees, commonly known as cover trees. As the measure of separation, we used Eu-clidean distance. There was no distance-based weighting applied, and just one neigh- bour was utilised.

V RESULT:

Use the 2.56-second chunk of data from dataset 1 that has been pre-processed to include a collection of 561 characteristics to evaluate the efficacy of the recommended data mining approach for independently identifying human activities from smartphone data. Each track displays the following traits:

Body acceleration estimation and triaxial acceleration from the accelerometer.

- The gyroscope's reading of the triaxial angular velocity.

- A time and frequency domain vector of 561 features. That describes its function.

Individual subject identification for the researcher conducting the study.

Table 1: Individual subject identification for the researcher conducting the study.

	Km	Nb	J48	RF	RC	IBK
2	40	50.45	55.32	56.62	61.1	53.12
8	80.8	48.25	62.32	62.01	61.23	60.18
16	81.82	46.57	68304	72.23	72.10	67.82
32	72.00	51.24	71.24	75.16	74.22	71.72
64	58.00	55.23	77.28	76.21	84.71	72.51
128	56.00	54.22	92.48	95.22	95.25	92.91
256	62.00	52.76	93.81	96.62	96.22	97.52
561	64.0	78.20	85	97.83	96.92	97.89

Num Feat	KM	NB	J48	RF	RC	IBK
2	15.1	0.0	0.9	7.3	14.4	0.0
8	20.6	0.0	7.4	16.8	17.7	0.0
16	37.4	0.3	11.4	19.7	23.4	0.0
32	67.9	0.9	25.7	25.7	25.4	0.0
64	119.4	1.7	38.0	29.1	31.5	0.0
128	217.0	4.4	64.6	31.7	30.7	0.0
256	457.5	3.3	52.7	20.1	25.7	0.1
561	582.1	5.8	247.4	14.7	27.0	0.5

Figure 2: Difference between the classifier

In Figure 2, we see the relative merits of various features, as measured by their contri- bution to the Model's performance and the amount of time spent on its construction under various classifier learning strategies. This chart displays the results of our analysis of 2,8,16,32,64,128,256, and 561 features (all features), ordered by infor- mation gain. About 10,000 samples were used in total throughout training and testing. Because there were so many samples in this dataset (10,000 total), we utilised fivefold cross validation to split it into separate training and testing sets. Figure 2 depicts each classifier's Accuracy in Classification and Model Building Time, while Tables 1-3 pro- vide additional metrics, including TPR, FPR, PR, RC, F-m, and ROC. Table III displays the confusion matrix for the best-performing IBk classifier with 128 and 256 ranked features, respectively.

The Naive Bayes Classifier takes the least amount of time (5.76 seconds) to finish building the model, and its 79% accuracy on the massive dataset is seen in Figure 2. Among the ensemble learning methods, however, random forests provide the best combination of accuracy (96.3% on average) and speed (14.65 seconds on average) when developing a model. The other classifiers in the ensemble learning system also perform well in classification accuracy (96%) (random committee and random sub- space). As an unsupervised method, K-Means clustering does poorly, with a classifica- tion accuracy of just 60% and a time to solution of 582 seconds.

In contrast, the slow-learning-based IBk classifier outperforms all other classifiers by a wide margin (90%+ accuracy for 128 and 256 features). To attain maximum perfor- mance, a smartphone-based activity identification system must trade between accuracy and the time it takes to create a model since real-time activity monitoring requires a model to be generated dynamically from the obtained data. Aside from TPR and FPR, other performance measures include Precision, Recall, and F-measure.

Since real-time activity monitoring necessitates the construction of a model dy- namically from the obtained data, an activity identification system implemented on a smartphone must strike a balance between accuracy and the time required to create the model. Additional measures such as false positive rate (FPR), false negative rate (FNR), precision, recall, F-measure, and ROC area should be considered when choosing an algorithm for an automated activity identification system. Table I displays these addi- tional indices of productivity.

Table-2: supplementary efficiency indicators

Features	TPR	FPR	PR	RC	F-m	ROC
IBK(256)	0.976	0.005	0.976	0.976	0.976	0.985
RC(256)	0.963	0.008	0.963	0.963	0.963	0.998
RF(256)	0.956	0.009	0.956	0.956	0.956	0.998
RC(128)	0.951	0.01	0.951	0.951	0.951	0.996
RF(128)	0.943	0.012	0.943	0.943	0.943	0.996
J48(256)	0.938	0.012	0.938	0.938	0.938	0.971
IBK(128)	0.93	0.015	0.93	0.93	0.93	0.957
J48(128)	0.915	0.017	0.915	0.915	0.915	0.96
RF(64)	0.837	0.035	0.839	0.837	0.838	0.969
RC(64)	0.837	0.035	0.839	0.837	0.838	0.969
IBK(64)	0.775	0.049	0.776	0.775	0.776	0.863
J48(64)	0.773	0.048	0.774	0.773	0.774	0.891
RC(32)	0.751	0.053	0.755	0.751	0.752	0.943
RF(32)	0.742	0.055	0.746	0.742	0.743	0.942
IBK(32)	0.717	0.06	0.72	0.717	0.718	0.826
RF(16)	0.713	0.061	0.716	0.713	0.714	0.929
RC(16)	0.711	0.061	0.714	0.711	0.712	0.923
J48(32)	0.702	0.063	0.701	0.702	0.701	0.857
J48(16)	0.69	0.065	0.69	0.69	0.689	0.873
IBK(16)	0.678	0.067	0.681	0.678	0.679	0.812
RF(8)	0.63	0.079	0.63	0.63	0.63	0.889
RC(8)	0.63	0.078	0.633	0.63	0.631	0.872
J48(8)	0.614	0.082	0.61	0.614	0.611	0.868
IBK(8)	0.602	0.084	0.606	0.602	0.603	0.791
J48(2)	0.563	0.092	0.565	0.563	0.562	0.888
NB(64)	0.561	0.093	0.57	0.561	0.515	0.878
RF(2)	0.556	0.093	0.558	0.556	0.557	0.876
NB(128)	0.553	0.09	0.644	0.553	0.523	0.928
NB(256)	0.539	0.092	0.662	0.539	0.505	0.928
IBK(2)	0.532	0.097	0.539	0.532	0.533	0.854
NB(32)	0.523	0.102	0.517	0.523	0.453	0.873
NB(2)	0.495	0.108	0.512	0.495	0.418	0.865
NB(16)	0.486	0.11	0.494	0.486	0.417	0.86
NB(8)	0.483	0.11	0.489	0.483	0.413	0.859

	RC-0	RC-1	RC-2	RC-3	RC-4	RC-5
AC-0	1717	3	2	0	0	0
AC-1	12	1513	19	0	0	0
AC-2	9	25	1372	0	0	0
AC-3	0	0	0	1471	235	71
AC-4	0	0	0	231	1658	17
AC-5	0	0	0	71	28	1845

Table-3: well developed matrix

The top-performing IBk classifier's confusion matrix on datasets with 128 and 256 sorted features is shown in Table II. The confusion matrix (Actual Class (AC-0 to AC- 5) versus Recognized Class) displays the classifier's ambiguities and misclassifications (RC-0 to RC-5). Class 1 (walking) and Class 6 (lying) exhibited the fewest discrepan- cies in the classifier's identification of the six activities tested. There is some ambiguity between sitting and standing, and it's downright impossible to differentiate between ascending and descending flights of steps. When compared to earlier attempts at activ- ity identification using a single smartphone worn at the waist, this is a significant ad- vancement.

VI CONCLUSION:

In this article, By using machine learning, identify smartphone activities. Based on the ranking theory, machine learning automatically takes actions and records. This work is validated using well-known techniques like Lazy learning, random forests, and ensem- ble learning. For analysis purposes, prepare datasets according to the classification technique. Due to the classification technique, the dataset will develop accurately, con- cerning time, and a well matrix will create. Data mining technique is implemented in different smartphone to analyse various activities. An unsupervised algorithm is needed to construct intense real-time work on smartphones. At end of the research IBk classi- fier performed well at 128 and 256 features.

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Identifying Counterfeit Products Using Blockchain

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***Abstract*— With the increase in globalization and technology. There has been an increase in the volume of productions as well as there procuring counterfeit. Be it any Industry food, drug, or luxury, all industry manufacturers and distributors are looking for greater transparency in supply chain management to deter counterfeiting. This paper introduces a decentralized Blockchain-based application system (DApp) intending to identify counterfeit products in the supply chain system. With the increase in the use of Blockchain Technology, it has become clear that data recorded in blockchain is immutable and secure. Hence the proposed project works on the transfer of ownership of the product. A consumer can verify the product distribution and ownership information by scanning a Quick Response (QR) code generated by the DApp for each product linked to the Blockchain.**

Keywords—QRcode, Ethereum, Blockchain, Dapple

I. INTRODUCTION

There is an increasing demand of valuable and original products in the market. As the development of economy and the world is increasing, there is an increasing awareness of the product sense among the consumers. With growing technology and increasing needs, the problems with the supply chain and product is also increasing. Problems like counterfeiting of product, receiving wrong product, and deterioration of quality in the product is also increasing. These problems can create financial losses to the companies and can also disappoint the end consumers. Product counterfeiting occurs when there is re sale of sold products or the product provided is different that of original. As there is an increasing complexity in supply chain and demand, the cases of counterfeiting is also increasing. As per the latest assessment of EU Intellectual Property Office (EUIPO) and the Organization for Economic Cooperation and Development (OECD), the global sales of counterfeit and pirated goods have increased alarmingly to 460 billion euros which is about 3.3% of the global trade [1]. The sales and profits of companies around the world have been affected by this phenomenon. The clothing and pharmaceutical sectors experienced sales losses of about 26.3 billion euros and 10.2 billion euros respectively [2].

With increasing problem of counterfeit, there are also various solution which can reduce the counterfeiting of product in supply chain. Some of the technologies used are QR code, RFID technology, blockchain or any unique feature to identify counterfeit in products. Among this, the most reliable and trusted methodology is blockchain. Blockchain offers various features which helps to reduce the problem. Blockchain is a decentralized system of shared, immutable ledger. It facilitates the process of recording, trading and tracking assets over a business network thus reducing risks and cutting costs for all involved[1]. Blockchain technology has six characteristics, and they are as follows: immutability, decentralized, enhanced security, distributed ledgers, consensus, and faster settlement. The further concept will be explained later.

In this paper, the author have proposed the solution of counterfeiting product using blockchain technology. This will be executed by using various technologies like Ethereum and also with the help of QR code. The information of the product will be stored in QR code and this information will be stored in blockchain. As the product goes from manufacturer to consumer the status of the product gets updated and stored in blockchain. This information can be scanned through QR code.

II. BLOCKCHAIN

Blockchain is collection of blocks that are linked to each other. Every Block stores some kind of information. Blockchain is a decentralized System. Blocks are immutable

i.e the data stored in blockchain cannot be changed. Each block has a timestamp, Actual transactional Data and the hash value of previous block and the hash value of current block so it is difficult to tamper with the data.

A. Working of Blockchain

A new transaction is input, and after that it is sent over a network of peer-to-peer computers that are dispersed throughout the globe. The equations are subsequently solved by the computer network to verify the transaction's legitimacy. They're known as miners. They are grouped together into blocks once their legitimacy has been established. The miner then receives a prize as payment for their efforts. The history of all lasting transactions is then created by chaining together these blocks. The deal has been concluded. The entire process is carried out as indicated in figure 1.

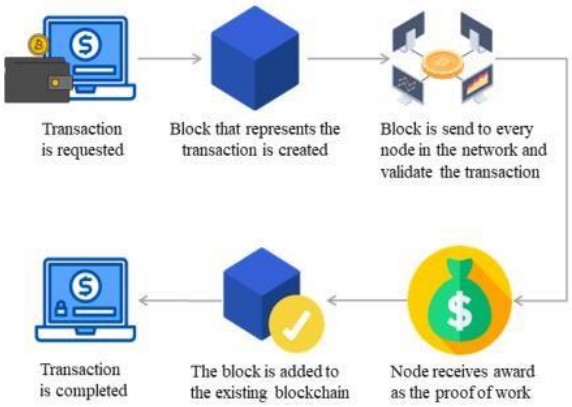


Figure 1: Working of Blockchain [6]

B. Blockchain Features

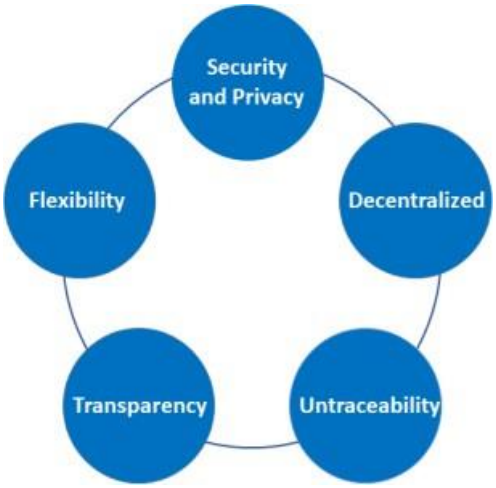


Figure 2: Features of Blockchain [7]

Blockchain is able to add data entries to its database and relies on its own consensus algorithms rather than any centralised body to act as an arbitrator.

Blockchain is a highly trustworthy database that is available to everyone. Below is a detailed description of each characteristic of blockchain technology. Figure 2 displays the Blockchain's attributes.

1. Security and privacy : Blockchain secures its data with encryption. The data is signed using a private key, and using the public key, we can determine if the data has been altered or not and confirm its authenticity. To preserve the security of their data on blockchain, a user should protect their private key by keeping it secret, much like they would their bank's OTP and passwords.
2. Decentralized : None of the participants in a decentralised blockchain network need to know or trust one another. A distributed ledger that contains identical data is shared by every member of the network. The majority of the network's members will reject any altered or distorted data from a member's ledger.
3. Untraceability : The block cannot be altered once it has been added to the blockchain. As a result, if a block is amended in the Blockchain, it is immediately rejected or erased.
4. Transparency : The participants in a blockchain can examine the data, which is entirely public.
5. Flexibility : One of blockchain's greatest advantages is that it is open source. Users have access to a number of public and private blockchains that can be employed depending on the sort of application that has to be constructed.

C. Importance of Blockchain

Blockchain builds trust because it eliminates the need for third parties. The blockchain's smart contracts, which are essentially computer programmes, only run when specific requirements are satisfied. It is challenging to alter the blockchain with false information since every block records its data along with the hash of the previous block. The hash of a block changes if an attacker modifies its information, while the hash of the following block does not. Since much resources and money are needed, it is doubtful that more than half of the participants would agree to change the chain. Additionally, other members would learn of this significant modification.

III. LITERATURE SURVEY

Different strategies have been put forth by various researchers to decrease supply chain product counterfeiting. Utilizing diverse tools, many researchers have generated distinct ideas.

The authors of this research have employed a decentralised blockchain-based DApp to introduce a system. The writers came to understand how well-protected data is on blockchain. They talk about numerous blockchain aspects. They talk about how blockchain works and how it safeguards data. The authors suggest a system whereby a consumer can scan a Quick Response (QR) code created by the DApp for each product linked to the Blockchain to confirm the product distribution and ownership information. They set up an authentication mechanism using Firebase. The solution that is being presented here uses the Ethereum blockchain's Rinkeby Test Network and the MetaMask cryptocurrency wallet for all transactions. The Manufacturer, the Seller, and the Consumer are the three main stakeholders in the DApp. Manufacturers, sellers, and consumers are the three elements that make up their project. [10]

The author's goal in this study is to identify fake goods utilising a supply chain and decentralised blockchain technology strategy. According to the author, traders don't necessarily need to rely solely on blockchain. In order to prove that the end-users in the supply chain do not entirely rely on the trader to determine whether the product is counterfeit or not, this paper implements the combined approach of decentralised Blockchain technology and the supply chain. This can be done by authenticating the product

at every stage in the supply chain using One Time Passwords on the receiver's mobile phone along with a deployed personnel who will be responsible for ensuring the quality of the product. This paper has explained different types of blockchains. The author proposes that everyone in the supply chain will have to follow the OTP verification in their mobile phone and once the product is received the details will be added in the blockchain. The author has implemented the code for working of otp verification using PHP. The author also states that there should be a quality assurance officer who can be deployed in the supply chain that any product is not compromised. [10]

The author has mentioned various ideas to reduce counterfeiting of products. They have expressed that how produc t counterfeiting can lead to various problems in supply chain management. It states that blockchain is one of the best solutions among others. They have explained the working of blockchain and its concept. They have also explained Ethereum and smart contract. Their model consists of three roles, the manufacturer, the supplier, and the consumer. The manufacturer logs onto his account, creates a QR code for the product, and then adds any further information that is needed by using his Ethereum wallet. The supplier logs into their account as a supplier and scans the product's QR code. The manufacturer has entered information about the vendor's goods, which the seller can access. By scanning a QR code that lists the history of transactions, customers can confirm the genuineness of a product and ascertain its integrity. If the last location is not the same as the buy location at the time of customer purchase following the QR scan in supply chain history, the customer will be aware that the product is not authentic. [11]

Using his Ethereum wallet, the manufacturer goes into his manufacturer account, generates a QR code for the product, and adds any further information that is needed. Scan the QR code on the product after logging into the supplier account. The manufacturer's entry of information about the seller's goods is accessible. Customers can scan a QR code to view a history of transactions, which will allow them to confirm the authenticity of the product. The customer will be aware that the product is fake if the final location is not the same as the purchase location at the time of purchase following the QR scan in the supply chain history. [11]

In this paper, the author focuses on reducing the counterfeiting of product and identifying the genuineness of the product. The author emphasizes on blockchain as a solution. The objective of the author is to design anti counterfeit system using blockchain, secure details using QR code, and providing security to the client. They have proposed a system where they can identify the genuineness of product by simply scanning QR code. They have created this system using Android Studio and Firebase cloud. Android Studio is the official integrated development environment (IDE) for Googles Android operating system, built on IntelliJ IDEA software and designed especially for Android development [4]. Firebase is a mobile app platform with integrated, unified client libraries in various mobile programming languages. Firebase's different backend-as-a-service (BaaS) features help you develop high quality apps, grow your user base, and earn more money. [12]

The author suggests that blockchain technology can help to decrease product counterfeiting. It describes how blockchain might lessen counterfeiting and has put the methodology into practise in their paper. The model is divided into three sections: working, customer, and manufacturing ends. They developed a web application that can read QR codes. The product information is contained in this QR code and is kept on the blockchain. The block holding information is added to and updated as the information is updated. By scanning the code, the final user may identify the product and confirm it. If the code is correct, the consumer will be notified that the product is correct; otherwise, if the product is incorrect, a notification of the incorrect product will be generated.

IV. PROPOSED SYSTEM

The effects of counterfeiting on businesses, producers, and customers are enormous. It effects the relationship between the organization's influence and customer welfare. India is not left out. The proposed system is intended for consumer products, and it aids in product tracking by preserving the integrity of the product and the supply chain through the use of Blockchain. Customers now have the ability to use blockchain and QR codes to trace the history of an entire product from maker to customer. [13]

A. System Model

The suggested solution would be a decentralised application (Dapp) that is constructed utilising the Ethereum Network as the primary blockchain for preserving all the records and managing the transactions related the goods of the companies registered on Dapp.

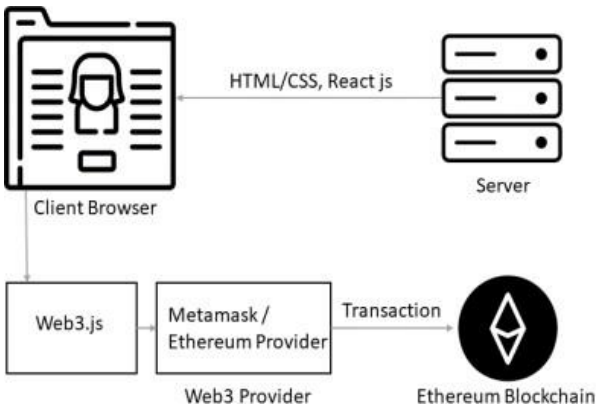


Figure 3:System Architecture

Ethereum

The blockchain is decentralised and employs a proof-of-work consensus process. Blocks are added to the blockchain by proof-of-work by resolving mathematical equations. The completion of the problem "proves" that nodes used computational resources to complete the "job".

It verifies the block's addition to and recording on the blockchain. Mining is the procedure in question. In contrast to the usual method of mining, which involves brute force

trial and error, Ethereum rewards successful block addition (ETH).

Smart Contracts

Programs called smart contracts are kept in blocks. Third-party participants are replaced by smart contracts. These essentially operate as protocols when the prerequisites are met. They remain constant, therefore nobody can alter the contract.

B. Flow of Proposed System

The major goal of this proposed system is to preserve the originality of the product by assisting the customer in following the product's supply chain history. Customers have the ability to follow a product's whole history from manufacturer to customer via the system. This Figure 4 depicts and discusses the three roles that make up the product anti-counterfeiting system based on Blockchain: the Manufacturer role, the Seller role, and the Consumer role.

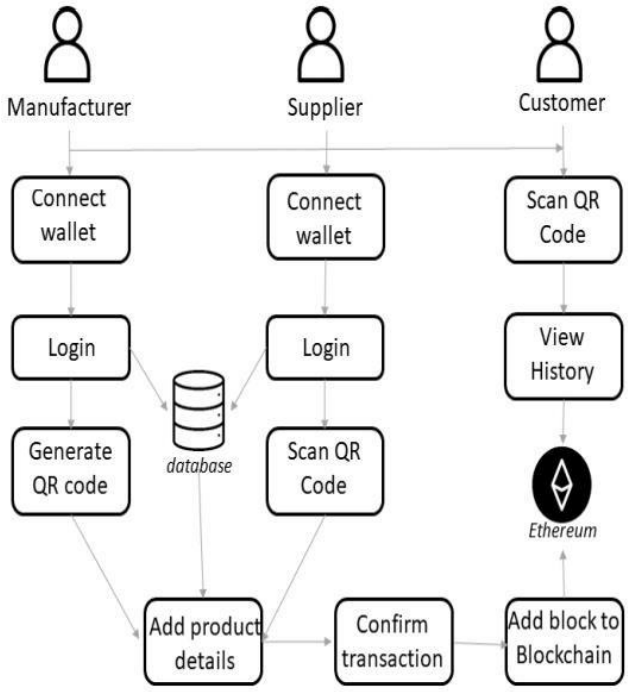


Figure 4:System Flow

Manufacturer :

Manufacturer signs into the manufacturer account, creates a QR code for the product, adds any other information that is needed, and then uses his Ethereum wallet to submit a block to the Ethereum blockchain.

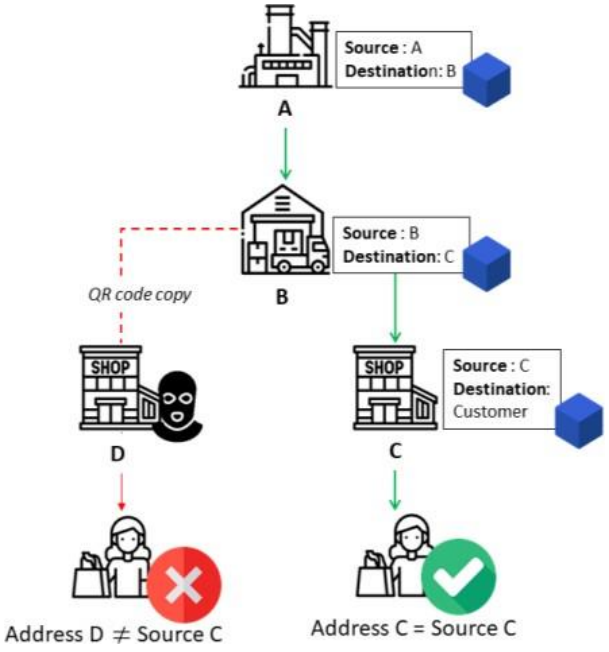
When a manufacturer logs in using his or her own account and uses their own wallet, only that block will be put to the digital ledger. If both the userid of our local database and the wallet address of the entity are present, then both will be mapped together.

Supplier :

The supplier logs into their account as a supplier and scans the product's QR code. The manufacturer has entered information about the vendor's goods, which the seller can access. It pushes the product's additional details, such as the shop's location, into the Blockchain. The buyer can see those specifics.

Customers :

Customers can verify the genuineness of a product by scanning a QR code that lists the history of transactions and allows them to examine its integrity. If the last location is not the same as the buy location at the time of customer purchase following the QR scan in supply chain history, the customer will be aware that the product is not authentic. The buyer learns about counterfeiting and the conclusion is that the QR code was copied.



V. Result and Discussion

With the proposed approach, suppliers and manufacturers can communicate with the system to add their own blocks carrying transaction details to the blockchain without altering the blocks of others. Solidity is used in the writing of the manufacturer and supplier block contracts.

Ganache has been utilised for local testing because the code runs on a local network. The true-config.js file contains the configuration for the host "127.0.0.1" and port 7545. After that, true is used to compile and deploy the contracts. For deployment, migrations files are produced. We can deploy contracts on an Ethereum blockchain network using migrations, which are files.

React is used to design the interface. The Web3.js library is used to handle operations including sending ether, confirming transactions, reading, and writing data from smart contracts in order to enable interaction with the Ethereum blockchain. To access an Ethereum wallet using a browser, Metamask, a wallet that interacts with the Ethereum blockchain, is installed on the browser. The metamask imports accounts from ganache. They must confirm the transactions using their account utilising the Web3.js- connected Metamask wallet in order to add the supplier and

manufacturer blocks. The final user can then scan the QR code to validate the integrity of the supply chain and the product.

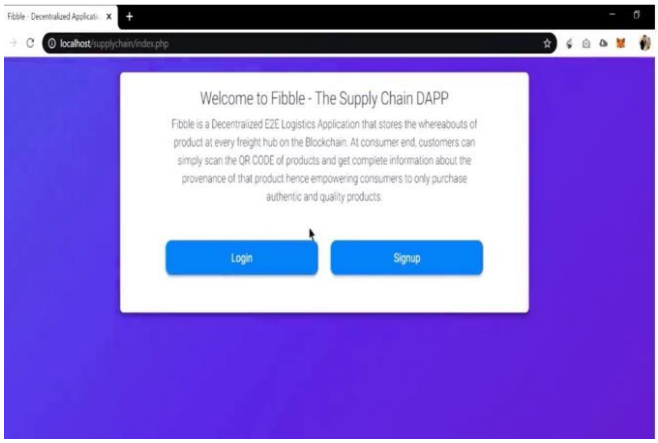


Figure 5:Landing Page

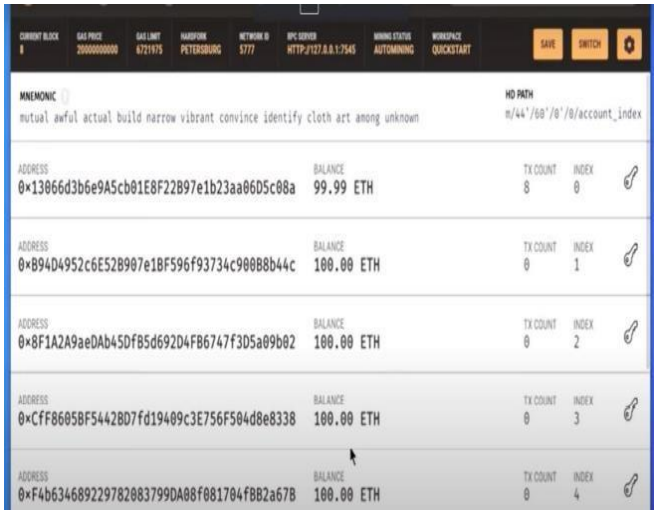
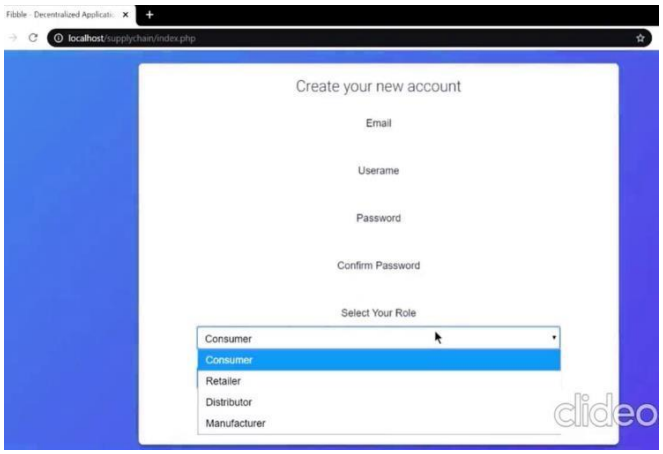


Figure 6:Ganache

The Manufacturer logs into his account using his credentials like username and password as seen in Figure 7.



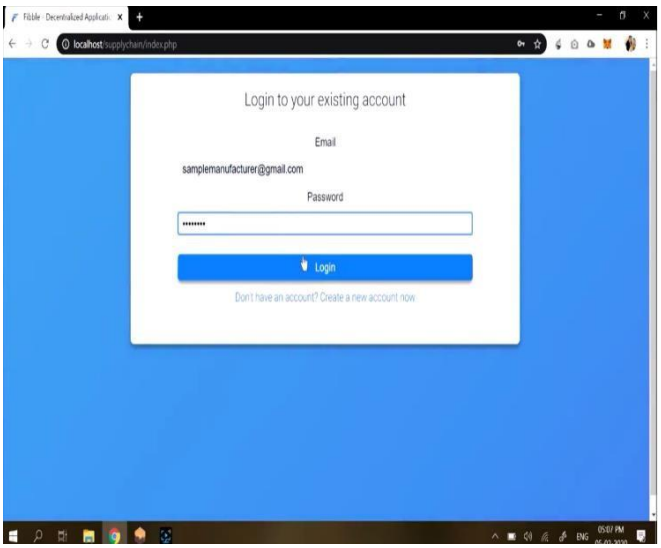


Figure 7: Login

The credentials are stored in SQL server as shown in Figure 8. SQL database is used for storing manufacturer and supplier login details and their address.

As seen in Figure 9, the producer issues a special serial number for the goods and creates its QR Code after the customer logs into his account. When a product is shipped to another location, a QR code is applied to it. Along with this, the maker fills out information on the product's name, current address, which serves as both its source and its final destination. After filling out all the necessary information, the maker clicks the add block button, which adds all the data to the blockchain.

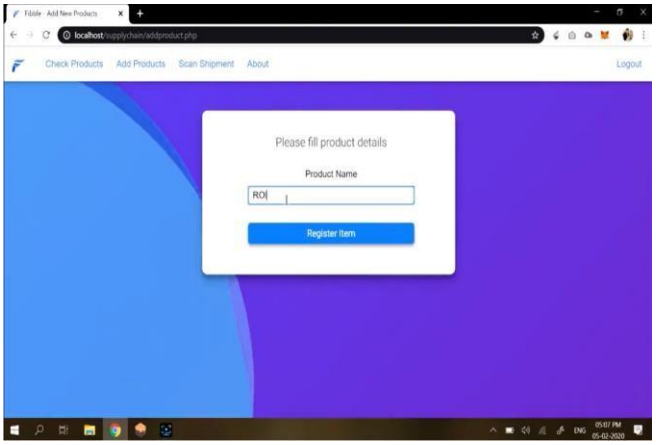


Figure 9:Manufacture adding product Information

A metamask confirmation popup is displayed which asks for the confirmation as in Figure 10.

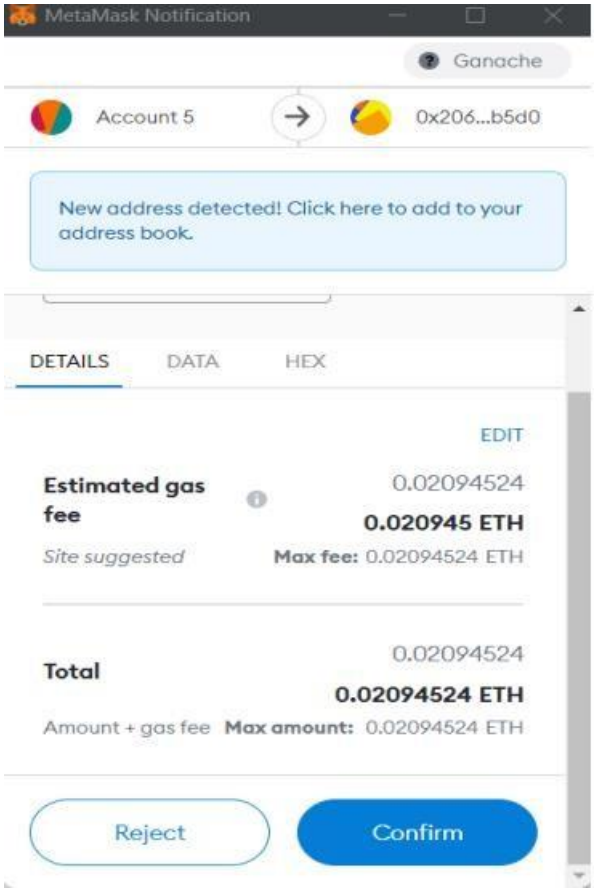


Figure 10: Completing Transaction with metamask

After confirmation, a success page similar to that in Figure 11 is presented, and a block with all the details is uploaded to the blockchain.

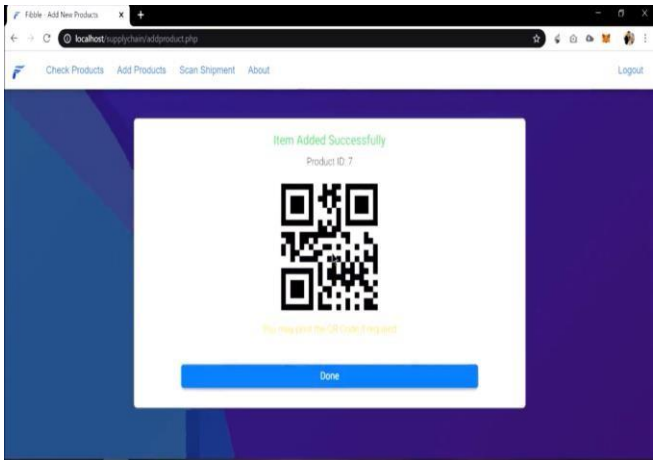


Figure 11:Success Page

Once finished, the supplies are shown a screen where they can enter the necessary product information. This time, the supplier scans the QR code instead of creating one by clicking on the scan QR button. As shown in Figure 12, the supplier inputs the necessary information for the product and clicks on the add block. After the provider confirms his transaction through the Metamask wallet and logs out, the block is appended.

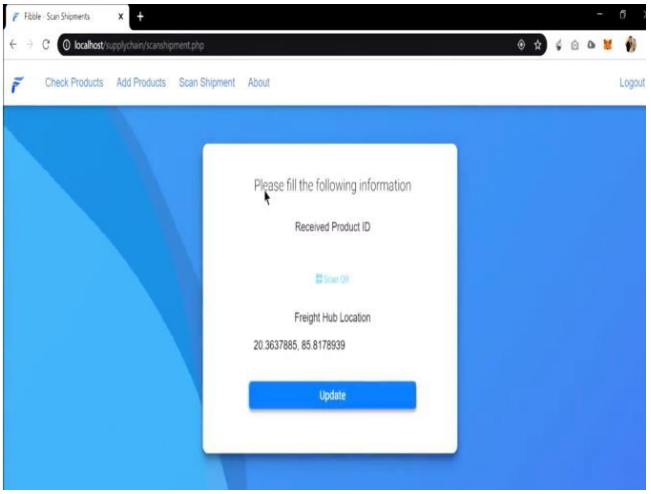


Figure 12: Supplier updating details to the product

The other participating suppliers log into their accounts and submit their individual blocks to the blockchain in a similar manner. Following delivery, the consumer can access the product's customer page, scan the QR code as depicted in Figure 13, and view the product's whole supply chain history.

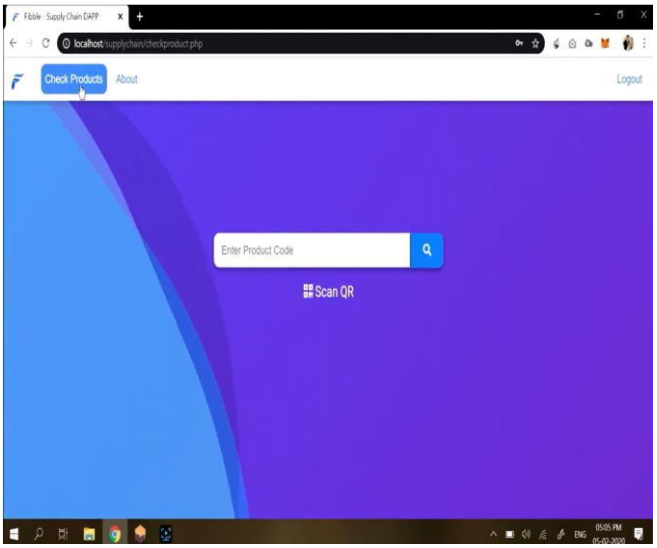
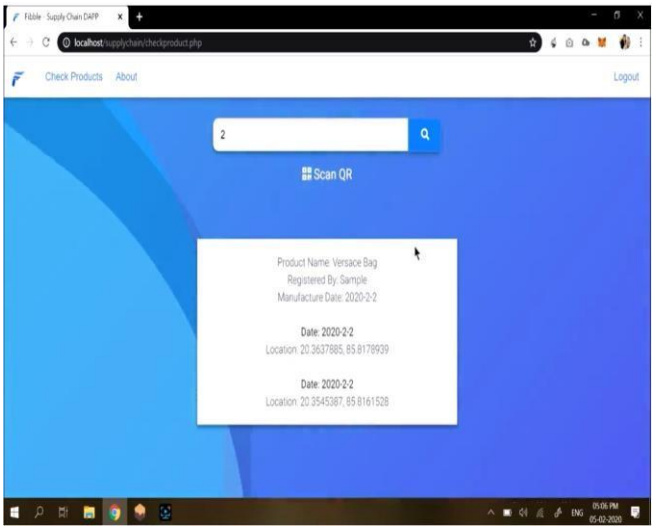


Figure 13: Customer QR Scanning Page

Figures 14 depict the supply chain history. They include information such as the product id, name, source, and destination addresses related to the parties involved, as well as their ethereum account addresses, timestamps of when the block was added, and any additional remarks that may have been added.



If the last location is not the same as the buy location at the time of customer purchase following the QR scan in supply chain history, the customer will be aware that the product is not authentic. The buyer learns about counterfeiting and the conclusion is that the QR code was copied.

VI. CONCLUSION

Since blockchain is a decentralised system, local suppliers cannot affect how the product is checked or if it is being counterfeited in the proposed system. Manufacturers and Suppliers can make use of the system to store product information in Blockchain, which has features like tamper-resistance, data consistency, and confidentiality that guarantee the security and privacy of the data on the network. The customer examines the product's history along the supply chain to confirm its authenticity. Customers may be confident in the quality of the products they buy.

The proposed solution can effectively reduce the rate of branded-items counterfeiting and give businesses a simpler way to give customers confidence that they won't buy fake goods. This technique will help to strengthen the relationship between the company and the client and will actually improve the economy and lower corruption. To prevent fraud in the banking, healthcare, voting, online shopping, and other sectors, additional systems can be implemented.

Text heads organize the topics on a relational, hierarchical basis. For example, the paper title is the primary text head because all subsequent material relates and elaborates on this one topic. If there are two or more sub-topics, the next level head (uppercase Roman numerals) should be used and, conversely, if there are not at least two sub-topics, then no

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IoT based smart medical data security system

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Abstract— **. Health 4.o is an approach to healthcare innovation using IoT and other sensors and devices. The result is an array of intelligent health applications that are more equipped to improve people's health and well-being in practical ways while also being more reliable, scalable, and economical. However, IoT- based healthcare systems may pose problems without proper oversight, espe- cially regarding security concerns like exposed application interfaces. Primary challenge is to learn about the architecture and security needs of IoT-based multi- sensor systems and healthcare infrastructures. In addition, it has to propose light- weight, easily implementable, and efficient designs. This research introduces the Internet of Things (IoT) in healthcare and a thorough analysis of practical, novel health frameworks that use a wide range of resources and limited-power sensors and devices. Additionally, this paper also focuses on the safety of these vital In- ternet of Things components and their wireless connections. The result is intro- duction of a lightweight-based security system that uses the Lightweight Encryp- tion Algorithm by IoT(LEAIoT). Essential creation with the proposed hardware- based method is 97% faster than with a software-based approach, and encryp- tion/decryption is faster by 96.2%. Finally, it is competitive with other typical hardware-based cryptography designs, achieving reduced hardware usage of up to 77% with the lowest frequency with its lightweight, flexible implementation and configuration of high-speed keys.**

Keyword- IoT, Health 4.o, Multi sensors, Security, frame work,

I.INTRODUCTION

Medical gadgets changed healthcare. Now we can track our health without going to the hospital. We need to examine the security of such devices not withstanding this drastic development.

These technologies compromise privacy and security. Medical device security is criti- cal since many patients' lives rely on it. Healthcare security is crucial.

Wearable Internet of Medical Things devices diagnosis patient health. These gadgets monitor physical activity, temperature, diabetes, sleep, heart rate, and more. Smart wristbands, watches, glasses, belts, necklaces, and patches are available from head to toe.

Wearable systems include sensors, memory, solar cells, and batteries. They gather, dis- play, and wirelessly transmit data. Gadgets may communicate patients' health data di- rectly to doctors to reduce office visits.

Modern information technologies like the Internet of Things (IoT), big data, cloud computing, and artificial intelligence have made healthcare smarter. Care of this kind is more effective, convenient, and individualized than the alternative. Electronic healthcare systems (eHealth) based on the Internet of Things (IoT), mobile healthcare (mHealth), and ambient assisted living (AltHealth) are all part of "smart healthcare" (sHealth). Smart Healthcare Systems (SHS) are widely used presently because of their practical data storage and sharing system, fast reaction times, and reduced treatment costs. With the aid of IoT devices, patients' private medical records may be securely saved in the cloud and shared with doctors and other patients. As a result, the telecare e-medical service model may provide care recommendations based on data gathered from the patient's medical monitors. Care for patients with long-term conditions, in- cluding critical care emergency services, heart patient symptom records, and more are part of this process. These IoT-based monitoring devices may collect vital signs and transmit them to a cloud server using implanted sensors. In the future, members of the savvy community may share this information. Network assaults, such as denial of ser- vice (DoS) attacks, router attacks, replay attacks, etc., threaten the privacy of transmit- ted data. Additionally, at any one time, a vast quantity of patient data is being saved in the cloud platform to make diagnoses or provide recommendations, might be challeng- ing to keep sensitive data safe in a third-party cloud [1].

These days, medical computing equipment may connect to the IoT and send patient data and photos via the internet without any intervention from a person. User-level components of the echo system include the patient, doctor, pharmacist, etc., while stor- age-level features include a cloud data centre housing real-time and asynchronous ap- plication. Data sharing and communication are hampered by the complexity and vol-ume of available data. The delays in responses and communications are also an issue. Most standard cloud computing solutions fall short of the service needs of real-time applications like remote medical care during emergency scenarios. An edge-based com- puting facility that speeds up responses while decreasing network latency may resolve this problem. Therefore, IoT solutions need an edge and fog computing to protect pa-tient confidentiality. Mediation at the sensor network's periphery may enable data to be processed closer to its origins (the healthcare network), strengthening user privacy and data security. This mediation layer can manage enormous volumes of data, expedite computing, improve mobility, and increase privacy with low latency and bandwidth, addressing these obstacles. Edge computing may process healthcare data twice. For a timely decision, edge nodes collect and analyse sensor data. Second, distant health cloud data centres handle vast volumes of data (clinical test results, scan images/reports, etc.). Sensor data are used for essential choices like

monitoring oxygen, glucose, car- diac pumps, etc.

In 2019, we saw the emergence of a new virus that causes a disease called Coro- navirus. Also known as COVID-19, it was formally reported on December 31, 2019. Infections with this virus cause both SARS and MERS, which might result from prob- lems in breathing, headaches, fever, and even respiratory collapse. It's contagious. Therefore it's not safe for otherwise healthy people to become involved. This needs a system that can track changes as they occur in real-time. Strong authentication is es- sential whenever sensitive patient data is accessed in such a system. Literature [2, 3],

[4] provides a variety of authentication frameworks. However, the authentication pro- cess takes longer because of most three-factor-based authentication frameworks' high False Rejection Rate (FRR). However, although IoT with edge computing may help, the currently suggested solutions are not flexible enough to deal with both scenarios without compromising privacy or security.

It is widely believed that IoT will become standard in all technologies of the next generation [1]. In this context, "interconnection" refers to the linking together of inno- vative items and gadgets via which they may be detected solely. Invisible sensors con- nected to many things around us provide IoT with a wealth of tracking data [2]. Re- search indicates that health monitoring is the most promising field for future wearable electronics (HM). Smart HM [3] combines innovative computing, remote HM, and the Internet of Things.

HM expands clinical monitoring and care limits (i.e., house, for instance). An HM system consists of a smartphone with internet access and an HM app, a monitoring device for submitting health data to smart contracts [4]. Wearables and IoT are im- portant for HM and intelligent cities [5]. Wearable devices capture patient health data for healthcare administration, diagnosis, and patient care. A Big Data scenario [6] arises as medical records are analysed and shared. A secure data interchange between organ- isations is also required [7].

Security is a significant consideration for any setup. There are several security definitions since individuals have different perspectives [8,9]. In a broad sense, security may be thought of as a concept analogous to the system's overall stability. Most modern IoT-centric HM relies on wireless connectivity, posing several potential security risks [10,11]. These security concerns might cause significant difficulties for wireless sensor equipment [12,13]. Thus, medical and health data management needs lightweight block encryption techniques for medical IoT resources [14].

Predicting abnormal health changes from the Internet of Things data [17,18] is accom- plished via the use of data mining techniques, including classification and clustering [15], neural networks [16], and other machine learning approaches. The study that utilises clouds and IoT technologies forms the foundation for a secure patient HM sys- tem using BC-XORECC and a patient monitoring system utilising LSK-RNN, which together permit the safe transfer of data and offer accurate patient healthcare staff and materials. Finally, information exchange and cooperation between healthcare monitoring. As a result, doctors could keep tabs on the patient from afar and catch potentially fatal con- ditions in their earliest stages.

Several dangers and vulnerabilities are associated with utilising the IoT for intel- ligent health, and they may be categorized into two broad categories: embedded and network problems [2]. Dealing with the hardware and software of IoT-based devices might lead to embedded difficulties. The number of IoT nodes has limited resources, such as battery life or data storage space.

Robotic or remotely controlled gadgets. They are not designed to run resource- and computation-intensive security techniques. Lightweight cryptography's ability to sufficiently protect the design while making more minor hardware demands is the key to solving this issue. However, many substitute methods are less secure than the widely- known heavy cryptographic primitives [7]. Further, most digitally savvy healthcare pro- viders must allocate more resources to ensure the three pillars of security [8].

They are only concerned with the healthcare features of the app and the savings on deployment. The outcome is a system readily exploited due to poor security measures and inadequate upgrades. The scalability creates another potential weakness.

In particular, new devices are being added to the system without any assurance that they will maintain its security. An attacker may access the more extensive system by compromising a tiny, unsecured device. Thus, even the smallest devices interacting with the centralised services need some lightweight security strategy that keeps them safe from harm.

II.IOT BASED HEALTH CARE SECURITY SYSTEM:

IoT technology can develop several smart health apps, accomplishing Health 4.o goals [4]. Figure 1 shows the integrated technology and healthcare architecture compo- nents of Health 4.o. High-quality services for persons with diverse healthcare require- ments are a crucial goal that involves optimizing tools, resources, and system perfor- mance. Automation and intelligence may improve outcomes and speed up monotonous activities. Remote access and real-time answers aid medical care and monitoring. Fi- nally, designing databases with complete and easy-to-access medical information helps improve diagnostics and tailored therapy.

Another important goal is to improve operations while reducing expenses, resource use, and energy usage. Thus, energy-constrained IoT devices may run healthcare applica- tions. In the end, resources will balance the critical and actual requirements of the sys- tem. The best strategy maximises performance throughput with few resources. IoT may help monitor, diagnose, and forecast illness through health sensor data.

Cloud services quickly transmit, evaluate, and store this data, making diagnosis more straightforward and accurate. Cost-effective, user-friendly, and promptly responsive health assessment procedures will relieve institutions and providers will be easy and timely.

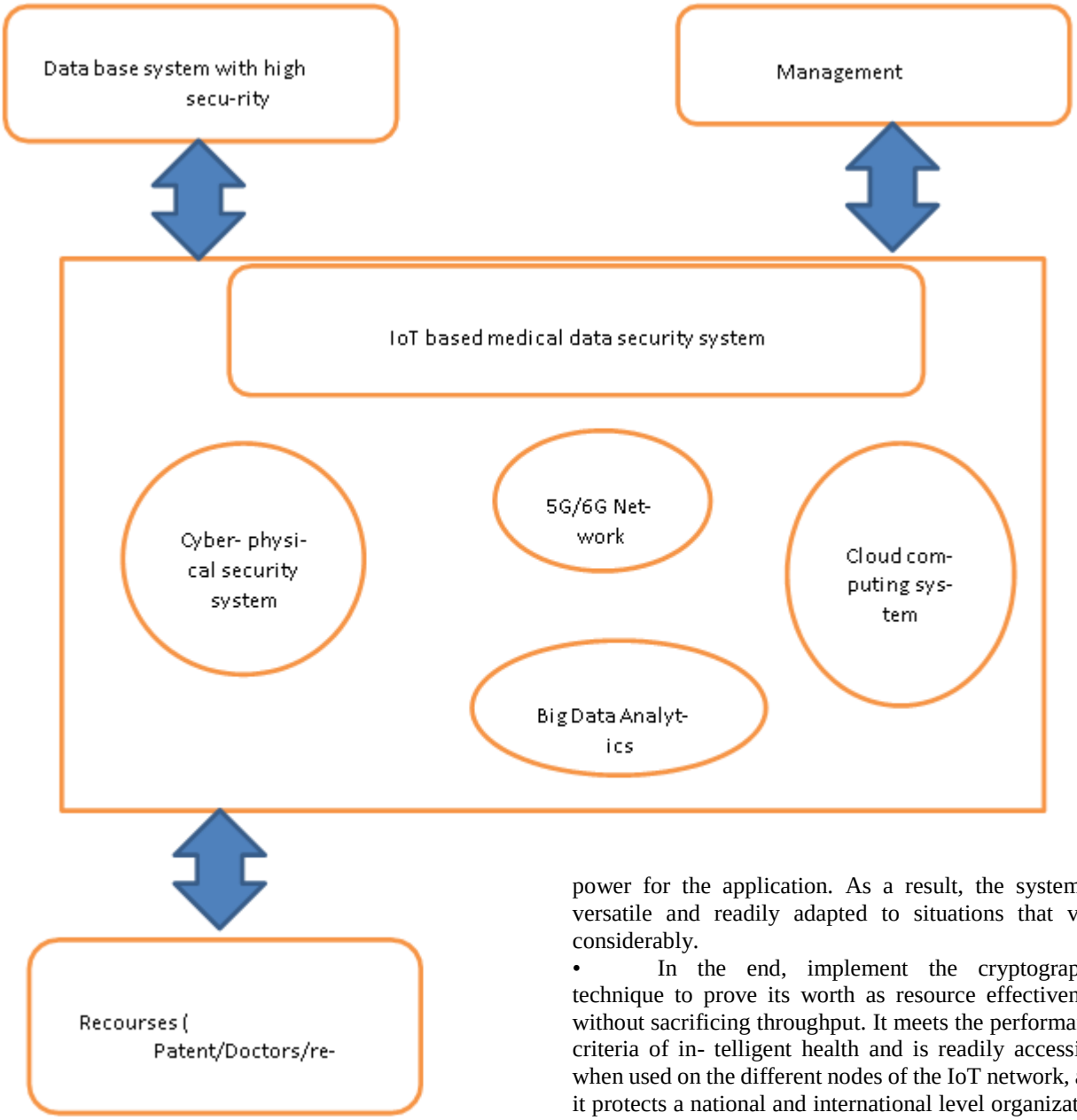

Figure 1: Framework of the IoT based medical data security system

II.1 Proposed work:

• First, the utilized cryptographic primitive guarantees the maintenance of the funda- mental security principles while being lightweight and able to use keys ranging in size from 64 to 520 bits. The width of the key is a generalisation of the measure of symmetric encryption's security; 520 bits is the minimum acceptable for most appli- cations, as practical and crucial to the suggested setting.

• Assures efficient handling of the large amount of data sent between devices in the Internet of Things. Cryptographic primitive ran on a computer's processor (Central Processing Unit), boosting essential creation speed by up to 99.9%, and the rate of encryption and decryption is as high as 96.2%.

• Third, four distinct key sizes are included in a single architecture, Applications may achieve four different performance rates and levels of security efficiency. Instanta- neously choose based on the state of power for the application. As a result, the system is versatile and readily adapted to situations that vary considerably.

• In the end, implement the cryptographic technique to prove its worth as resource effectiveness without sacrificing throughput. It meets the performance criteria of in- telligent health and is readily accessible when used on the different nodes of the IoT network, and it protects a national and international level organization of healthcare while keeping resources in a state of optimal performance, efficiency and safety

III.IMPLEMENTATION PROCESS:

The IoT architecture comprises applications, networks, and physical/perception layers [11]. The application layer connects IoT devices [11]. E-health applications are in-cluded. Network layer protocols allow IoT components to communicate physical layer data. Popular networks include ZigBee, 5G, Wi-Fi, RFID, 6LoWPAN, and LoRaWAN. IoT-integrated WSN is another node network [18]. The physical/perception layer ter- minates architecture. It encompasses sensors, wearables, actuators, cellphones, anten- nas, and CPUs. This layer translates health signals to network data.

III. 1 Infrastructure of IoT based medical data security system:

Figure 2 depicts an IoT-based Health infrastructure. This arrangement shows IoT- healthcare linkages. This article

compares smart hospitals with near-patient/personal- ized systems. Individualized revolutionary health architecture comprises heterogeneous IoT devices, a wireless interface, and a cloud-based database. [2, 3]. Medical equipment gets sensors first.

They use batteries, therefore maximizing efficiency is essential. To send "sensed" data, they must connect to the system's wireless network. Multiple sensors and gadgets are used simultaneously, where their connectivity is crucial. Wearable equipment must also be lightweight and pleasant. Some implanted and wearable devices may wirelessly receive orders to modify medicine doses or gadget settings. The wireless interface must connect to the Internet to provide health data to physicians and nurses. The hospital or private clinic's main computer or near-patient IoT system may process this data. Some wearables can analyze and wirelessly communicate data to the Internet. Fixed or mobile devices may replace small, wearable, and implantable devices without processing ca- pability. These intermediary devices evaluate sensor data from various IoT networks and transfer it to back-end systems and databases. They can also interface with sensors and process back-end data. These gadgets gain intelligence and real-time capability by making decisions and acting without back-end infrastructure. IoT devices lack storage. Thus, medical history is stored in databases.

IoT may improve hospital relationships and functionality. Hospitals may use all implanted and wearable IoT devices. These sensors and gadgets must also be connected to wired and wireless networks and accept orders and sensitive data from authorized sources. Two things distinguish this hospital building:

With the help of the Internet of Things, hospital beds and other medical devices may now connect to the network and share confidential patient information for diagnostic purposes.

The hospital's medical records and healthcare database are to the IoT network. Thus, hospital staff may obtain real-time data and react to situations. All hospital devices can quickly retrieve the patient's medical history from the recorded data.

The hospital's Internet of Things (IoT) network communicates with other healthcare facilities and Internet-connected devices close to the patient.

More tailored and sophisticated health services will help healthcare professionals re- duce hospital resource strain.

III.2 Security system and scheme:

High security is essential for IoT-based healthcare applications. When it comes to at- tacks on the intelligent health infrastructure, the Internet of Things (IoT) network (Fig- ure 2) is the weakest link [2]. IoT network attackers may readily access devices' per- sonal data. Eavesdropping and data transmission/traffic tracking are major data privacy breaches [11]. Data protection also affects user authentication. Unauthorized devices may access and manipulate this data. They may potentially send false health data to the IoT network. This causes misdiagnosis and inconsistent health-provider communica- tion.

Researchers prioritise safe communication network development. Cryptography protects data, authenticates users, and uses cyphers to encrypt and decode messages. Due to resource limits, the IoT system cannot employ cryptographic primitives. The cypher must not divert resources from other vital healthcare functions. Thus, IoT hard- ware restrictions need a lighter version. In crucial situations, low-speed algorithm im- plementation might delay real-time applications, which can be disastrous. Therefore, must consider quickness and responsiveness. Finally, each capability must have numer- ous alternatives to meet the application's network and security demands. The system needs flexibility and scalability.

A lightweight cryptographic primitive and security method is needed to secure smart health application health data. Before IoT devices communicate data, the encryption method must encrypt it. Thus, patient data is safe from hackers. For healthcare applica- tions, the decryption algorithm must decode this received data. The outcome is com- plete data content security in communication networks, particularly IoT networks and cloud-connected Internet.

IV IMPLEMENTATION PROCESS OF SECURITY SYSTEM AND SCHEME:

The current system's lightweight-based security method leverages the LEAIoT crypto- graphic primitive to encrypt and decode data while offering variable key size and im- plementation speed. This approach is embedded into every Internet of Things (IoT) device in a healthcare system, securing sensitive patient information over public net- works like the Internet and within private ones like smart hospitals and near-patient infrastructures. LEAIoT beats traditional encryption primitives in key generation and encryption/decryption speed. The IoT-based healthcare system's complicated connec- tion demands benefit from a lightweight design, and It enables fast end-to-end commu- nication with little hardware. LEAIoT mixes symmetric and asymmetric encryption methods. Symmetric cryptography improves performance with fewer resources; Asym- metric primitives increase key distribution, scalability, secrecy, and authentication. LEAIoT encrypts a made-up plaintext with an n-bit private key; the sender and recipient are well-informed. NLBC employs ciphertext with two legends: n1 and k. They are protecting encrypted content. Decryption uses the modular inverse of the three encryption keys, SSK, n1 (1), and k0. Delivered ciphertext and keys n1 (1) and k (0) are needed for asymmetric NLBC decryption. These keys are made using n1 and k's modular inverse modulo 27. Using symmetric decryption, you can acquire the plaintext if you know the modular inverse of the n SSK key. This technique continuously calcu- lates the modular inverse modulo 27. The following material analyses ciphering and decoding.

1. The key n multiplies the synthetic plaintext values. Modulo 27 follows;
2. The secret code k is a 3x3 matrix that keeps secret. Aside from that, the length of the key n is computed and used as the key n1;
3. In the first stage, the created text is split into sections using the critical k to identify each section. You are multiplying by k and n1 for each block bi. Here comes

Module 27.;
4. The secure ciphertext is the original plaintext;
Decryption sequence:
1. Use the modular inverse of the keys n1 and k modulo 27;
2. Divide the received ciphertext into blocks bi, as in step 3 of the encryption process.
3. Multiply each block with the two keys k 0 and n1 (−1). Modulo 27 follows;
4. The text is multiplied with SSK and modulo 37 again;
5. The result displayed in plaintext.
The suggested lightweight-based security system. The Lightweight Encryption and De- cryption for the Internet of Things (LEAIoT) use Symmetric and staged asymmetric encryption and decryption. Users may customize the playback duration of the key pairs with a symmetric key length of 64, 128, 256, or 520 bits.

IV.RESULTS:

Simulate symmetric and asymmetric key insertion and modular inverse computa- tion. Figures 3 demonstrate the two processes for different key sizes

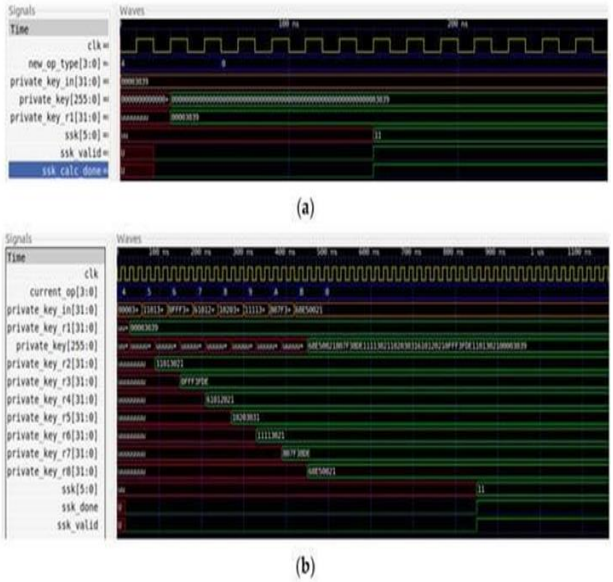

Figure 3: the two processes for different key sizes

Each encryption/decryption cycle processes three 7-bit characters. Each function takes nine clock cycles. The first cycle starts with the encryption or decryption procedure, which complete in eight cycles. Table 1 represents the cycles needed in symmetric and asymmetric to generate both keys. These clock cycles provide the start signal

Table 1: cycles needed in symmetric and asymmetric to generate both key.

Symmetric key size of the bit	**Insertion of symmet-ric key**	**Inverse of the modu-lar sym-metric key**	**Insertion of asymmetric key**	**Inverse of the modu-lar asym-metric key**	**Total**
64	4	7	7	66	74
128	12	10	7	66	81
256	18	14	7	66	97
520	36	21	7	66	116

Finally, the security and performance criteria will assess the design. Simulation vali- dated the cryptographic primitive's security. It has four different vital sizes, so users may adjust it to meet their needs regarding network speed and security. A minor key size might speed up the encryption process when traffic is heavy on the network. A more considerable key length may be a good option when protecting sensitive infor- mation. Transmission rates and system availability have both seen boosts thanks to faster key generation and encryption/decryption. So, it's fast enough for the Internet of Things. Finally, the synthesis results and comparisons with other hardware-based re- search demonstrated that the recommended design for IoT-based healthcare systems is lightweight and efficient. New approaches to security are being developed to strike a good balance between availability, efficiency, and safety in an IoT-based healthcare architecture.

VI CONCLUSION:

This article presents an overview of IoT-based multi-sensor architecture, the Health 4.o design framework, and cutting-edge health infrastructure. This detailed environment overview guides IoT use in healthcare, whether for intelligent hospitals or tailored in- novative health systems. The representative study helped me understand the domain's current situation.
General smart health infrastructure's top priority is data protection, and user authenti- cation suggests a new hardware-based IoT security approach. The LEAIoT encryp- tion/decryption algorithm gives the lightweight-based security strategy additional key selection options than existing systems. Thus, it may boost speed under network con- gestion. Compared to a CPU-based version, the hardware-based LEAIoT implementa- tion is 99.9 per cent quicker at key generation and 96.2 per cent faster at encryption/de- cryption for 1000 kilobits. Compared to the lightweight cyphers AES, SNOW 3G, and ZUC, it utilises 89.2%, 64.2%, and 13.4% less hardware in identical hardware devices. Even the tiniest devices can implement this architecture and be protected, making it useful in an IoT-based multi-sensor ecosystem. Finally, its limited throughput and fre- quency reflect IoT devices' resource constraints. It is suitable for resource-efficient and fast critical generation applications. It also meets the IoT-based innovative health framework's primary security and performance criteria, yielding novel outcomes and improvements.

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Monitoring of education environment by cyber physical system

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Abstract— **The notion of Industry 4.o users in a new era of digitization in man- ufacturing. Industry 4.o technologies like the Internet of Things, Cloud compu- ting, and AR/VR will boost industrial education and lifetime training of skilled personnel. To enhance industrial skills, networked ecosystems and Education 4.o are the helping tools. This research will represent the pedagogical teaching tech- niques with new technologies, i.e., IoT (Industrial 4. o technological) and cyber- physical systems. These technologies may transform manufacturing education and fulfil the industry's rising demand for highly skilled personnel. Using the example of assembling a radio-controlled automobile, we will provide a new model for educational factories enabled by the tools of Industry 4.o.**
Keyword- : Industry 4.o, IoT, pedagogical teaching techniques, cyber-physical systems,

I. INTRODUCTION

Information technology's development has altered how people and things function in the world. This has occurred because of the recent proliferation of IoT and IoE technol- ogies. There were already three waves before this one, as indicated in [1]. The intro- duction of computers in the late 1960s allowed for the first classification, in which sev- eral users shared a single machine. Another wave emerged after a decade, referring to the 1:1 ratio of personal computers. A third wave followed the introduction of embed- ded and ubiquitous computing, allocating several computers to a single user.

The Internet of Everything has allowed various revolutions to occur in multiple areas, making it possible to bring up the fourth generation. Standardization efforts have been brought to the issue of Industry 4.o via various research endeavours, hoping to produce mature contributions to the field. We propose a new breed of schools focusing on a different kind of education in response to the Cyber-Physical Systems (CPS) and Au- tonomic Computing (AC) ideas that define Industry 4.o.

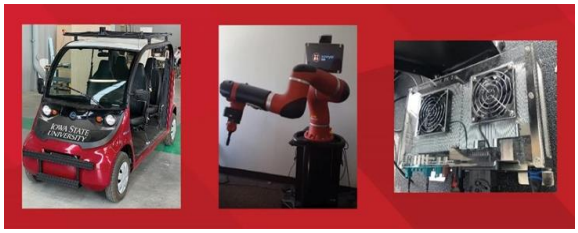

Figure 1: Cyber physical minor process

The manufacturing industry continues to expand as a part of our economy. More than 3 million additional industrial jobs will be required owing to retirements and eco- nomic expansion [1]. It is crucial to reshape manufacturing education methods, linking the industry with engineering educational organisations. To avoid a crisis caused by an inability to find qualified workers at all levels of production who are up to date on the latest developments in a field that is constantly adapting to include new technologies.

One of the emerging fields for keeping tabs on all kinds of situations and pro- grammes is the cyber-physical system. Existing wireless infrastructure based on stand- ards [1] is used for component-to-component communication inside the system. Data from any Internet-enabled device may be analysed and visualised to provide a wealth of information about the surrounding environment.

From the physical level, with its sensors and communication protocol, to the cyber level, with its data management and storage, this work comprises the whole solution, a cyber-physical system. The experimental results demonstrate the practicability and simplicity of the proposed method for environmental and ambient monitoring [2].

Monitoring is really important. Since their inception, wireless sensor networks (WSNs) have been put to use in this sector, with the main goal of monitoring and quan- tifying the real world. CPSs are made up of large-scale wired and wireless networks of sensors and actuators that collect data from and make changes to the environment via linked clusters of processing units. The Internet of Things (IoT), which enables ubiqui- tous sensing and foresees a future in which billions of Internet-connected items or things with sensing, communication, computation, and possibly actuation capabilities coexist,

has many characteristics with these newly emerged systems.

II IOT IMPLEMENTATION IN EDUCATION SYSTEM:

More and more businesses are making strides in implementing Industry 4.o technolo- gies as the positive impacts of digitalization on contemporary production become more apparent and widespread. The apps aim for the whole design and production process, capitalizing on the rising popularity of mobile apps and the Internet of Things and the superior connection features of today's networks [3]. Clients may be digitally involved in the design [4] and personalization [5] through mobile devices. At the same time, production line personnel can keep tabs on production progress and access relevant data and expertise [6]. By transmitting service-supporting data throughout the product life cycle, the Internet of Things enhances the quality of goods for consumers [7]. The de- velopment of monitoring and communication apps for the factory floor is facilitated [8]. Wireless networks like 5G provide more data capacity and connected device den- sity [9], connecting people, brilliant Things, and production-related applications.

Incorporating sensors, actuators, and high-quality communication into manufacturing equipment transforms it into a Cyber-Physical System (CPS). Connected and intelligent systems (CPS) include sensing their status, It is then monitored and acted upon in real time through the network [10] based on the results of the data analysis. CPS systems on the shop floor may communicate with other systems and people via this medium, potentially forming an intelligent factory [11] in the spirit of the Industry 4.o ecosystem. Big Data analytics technologies are being utilized to manage, store, and evaluate the ever-increasing volumes of data [12]. Young, bright minds may be put off by the in-timidating complexity of today's technological landscape, with many interdependent systems. To bridge the gap between industry and educational institutions and the avail- able information, teaching factories have emerged [13] to engage practitioners in task- specific industrial challenges in groups to acquaint them with the technologies and im- prove personal capabilities. Participants learn about industry standards and use their knowledge in practical situations [14].

The developing notion of Education 4.0 includes technological expertise, and teaching factories is an integrated approach to practise this knowledge on the one hand, Educa- tion 4.0 accounts for using existing technology (such sophisticated visualisation meth- ods that use virtual reality) to improve classroom efficiency. However, the strategies and workshops that introduce future engineers to these tools will function in Industry 4.0 settings [15]. This educational concept has taken on more significance due to the fast advancement of technology, leading to talks about its prospective integration by international organisations [16]. More precisely, educational institutions seek innova- tive approaches to bridging the gap between the theoretical understanding gained in their classrooms and the practical application of CPS in the business world.

III CURRENT EDUCATION SCENARIO WITH CYBER PHYSICAL MODEL:

Figure 2 depicts the several subsystems that make up a education 4.o. These include academics, administration, research, and more. Our studies centre on improving learning and teaching in a linked environment that provides for everything (individuals, information, procedures, physical objects, and the educational setting). Yet, we offer a central idea with several possible definitions depending on context—the Cyber-Physi- cal Learning System for Education (ECPS). Few research has, to our knowledge, at- tempted to define ECPS, whereby instruction and assessment may take place in both online and offline environments. While [4] makes an effort in this direction, it does so without clearly depicting the various structural components and their corresponding interactions or behaviors. In reality, ECPS represents a convergence of the abovemen- tioned educational and CPS perspectives.

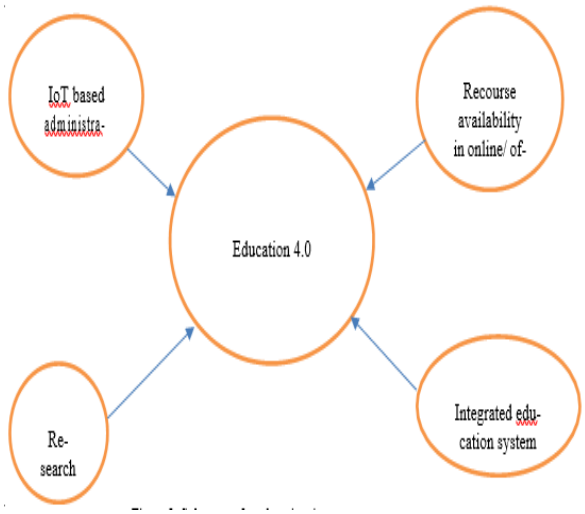

Figure 2: Subsystem for education 4.o

Systematizations with CPS capabilities enable the merging of the natural and virtual worlds. There are two primary functional components, as stated [11]:

The high-tech network permits instantaneous data collection from the actual world and information feedback from the virtual world—construction of cyberspace based on in- telligent data management, analytics, and computing power.

Thus, we define an ECPS based on these aspects and the

IoE ecosystem components as the contextualization of the various physical elements of the IoE educational ecosystem (people, things) to create the necessary procedures that should be executed. The cyber level is responsible for data gathering and analysis to keep an eye on the physical world, and make adjustments to the processes as required. From the viewpoint of Autonomic Computing, these checks are based on iterating through control loops (monitor, analyze, plan, and execute).

We believe that process configuration and the interactions between and within the var- ious pedagogical aspects are influenced by the many factors of the learning/teaching environment. According to our understanding, there are primarily three processes to describe the learning outcomes (knowledge, competence, expertise [8]) attained at the end of the learning process:

- By "classroom processes," we mean the corresponding sequences of actions in a tra- ditional or online classroom. Knowledge is the product of such a learning process. Acquisition, generation, storage, redistribution, and application are all aspects of knowledge that need to be managed, as outlined in [8]. This management strategy's success depends on the pedagogy chosen for the classroom's primary players: the students and their instructors.
- Processes in the course include the approach to learning and teaching dependent on the subject matter being taught. In this way of teaching and learning, competences are the results. They suggest a capacity to maintain a high standard of performance throughout time.
- In this course, procedures include a method of instruction and study tailored to the course material's specifics. Competences are the end product of this kind of instruc- tion. These qualities imply that you can keep performing at a high level throughout time.

For instance, we may identify the process type (classroom, course, or curriculum) based on the defined temporal parameters (short, medium, or long term) and the duties of the educational personnel (teacher, course manager, or studies director). One or more pro- cesses may have their flow disrupted by a context parameter. Parameters of context and the processes they affect are shown in Table.1. Subsequent sections give such details.

Table 1: Parameters of context and process

	In class-room	In Overall Course	In curricu-lum develop-ment scheme
Process Ad-min	Lecture/ Professor of the subject	Head of the department/ Chair person of the depart-ment	Academic advisor/ cur-riculum devel-opment team
Pre require-ment	-	-	X
Pedagogical system	X	X	-
Course devel-opment/ Structure	X	X	-
Knowledge needed to thought	-	X	-
Presentation of the things	X	-	-

IV FRAME WORK OF THE PROPOSED SYSTEM:

To better acquaint aspiring engineers with the demands of the industry and to strengthen cooperation amongst concerned parties with varying levels of expertise, teaching fac- tory paradigms attempt to place students in an environment where they may work closely with professionals in the area. In addition, it is crucial to modernize established educational establishments and increase their impact by integrating new digital tech-nology. The transition from the current educational model to the Education 4.o frame- work necessitates integrating both the tried-and-true methods of mass production and the cutting-edge tools made possible by Industry 4.o. The graphic below depicts the framework of upgrading a school to the modern Teaching Factory 4.o standard.

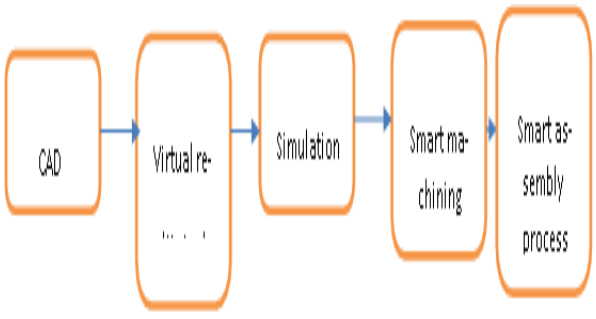

Figure 3: Proposed system with frame work

The R/C electric car's creation results from the teaching factory 4.0's efforts. Partici- pants are divided into smaller teams and given the problem statement, requirements, specifications, standard components, and production resources. Several Internet of Things (IoT)

technologies, such as near-field communication (NFC), augmented reality (AR), virtual reality (VR), human-robot cooperation (HRC), process data gathering (PDG), and big data analytics (BDA) are used in this process. Each team is equipped with a near-field communication (NFC) card that will be used to track and assess their performance at several checkpoints during the LF. At each checkpoint, the team will record the LF's start and finish times and save relevant data about the job to a cloud- based repository. Aspiring engineers may look at their stage-by-stage performance evaluations thanks to the cloud database that stores all of their data.

The product's initial step is its design. A CAD programme is used at this point to sketch out the basic layout of the final product that the aspiring engineers have been tasked with creating. Each group's designs are collected and filed away in one convenient lo- cation. After that, the product designs are tested in a VR/AR review session. The method includes validation by engineers with expertise in product design, who may provide comments and ideas, as well as a call for participants to test their strategies in actual size using Augmented Reality, followed by a simulation of the assembly process using Virtual Reality. In the first step of the teaching factory process, students get to handle and analyse their design to spot any defects that might significantly impact the final assembly's success and the solution's efficacy. Participants may benefit from this digital prototype and the actual engagement with it since they can catch their mistakes early and correct them before they go into production. Further, the assembly may be tested by putting the planned components through a virtual reality simulation. Any de- lays found at this point should be recorded as they may suggest possible flaws in the original design.

The assembly of the RC car's components is the focus of the second section of the educational factory. The participants will be asked to model and arrange a produc-tion line to manufacture the suggested product. To fulfil varying demand profiles, pro- spective engineers must utilise cutting-edge technologies to simulate production lines and plan work. The supplied instances simulate actual situations that engineers-to-be may confront in the manufacturing industry. To further facilitate participants' evalua- tion of their proposals, the proposed framework maintains data from each group directly in the TF database, allowing them to compare their recommended shop floor layout and the resulting performance to that of other groups. During this process, participants will get acquainted with a simulation programme and, ultimately, the needs of a production line to facilitate self-evaluation and growth within the group. Participants are tasked with making the components of their product after first modelling the manufacturing and learning the theoretical underpinnings of each necessary procedure. Milling, drill- ing, and turning are available at the learning factory. Cyber-physical system (CPS) up- grades at each also the technologies mandated by Industry 4.o that will station/machinery include process monitoring sensors and a wireless network to gather and store the data for further use by the TF. Under the watchful eye of a seasoned machine operator, each team uses the NFC card to report their team num- ber and the procedure's scheduled start time. With a smartphone app, the participant may check on the machine's condition and spot any anomalies in real-time by reading the data captured by the sensors that have been placed. This section of the training factory 4.o introduces the participants to the Industry 4.o technologies that are reshap- ing manufacturing and are being progressively implemented in production lines.

The last phase in the instructional factory's procedure is completing the product's two-part assembly. As with other examples of human-robot collaboration, the first stage is performed with the help of a robotic arm. Because most modern industrial assembly processes are handled by automation, these techniques must be included in Education 4.o curricula. Aspiring engineers must coordinate their efforts with the robot during an assembly process, with the latter's motion path shown in their augmented reality gog- gles. At the same time, they control it with a wristwatch [17]. The operator may validate the robot's actions, get helpful messages, and verify the task's completion wirelessly via the smartwatch. Each team gathers information throughout the work, such as how long it takes to complete the job and data from the robot's PLC, to compile a meaningful dataset on the task from which they may make conclusions [19].

Additionally, the aspiring engineers, with the help of a seasoned technician, are re- quired to complete the final assembly of the radio-controlled electric automobile by hand. Wearing an intelligent glove during assembly is mandatory, per Industry 4.o's guidelines for further digitization. The operator's grasps, manipulations, and assembly patterns may all be mapped thanks to the intelligent glove's built-in sensors. Each team uses the NFC card to mark each construction process's starting and ending times. Also, the operator may use augmented reality software on their mobile device to see how to put together the standard components of the planned automobile. Using the collected data and working closely with a seasoned operator, each team may assess its assembly performance by keeping track of the time it takes to complete a task and looking for unnecessary steps that might lead to a design or production flaw.

After the final assembly is complete, each team puts its radio-controlled electric vehicle through its paces in a series of trials to ensure it is ready for use. Participants who complete the teaching factory 4.o programme get a set of highly marketable abili- ties to facilitate their incorporation into the manufacturing sector. Engineers-to-be learn not only the standard procedures for product design and manufacturing methods and equipment but

influence future production direction. In response to

recent technological advancements, the concept of "teaching factories" has emerged under the umbrella of "Education 4.o," intending to provide a setting that will aid businesses in integrating cutting-edge technologies into their operations by drawing on the expertise of academic research institutions. In addi- tion, it prepares future engineers for the demands of the industry by allowing them to practice their craft in a setting that mimics the real world, complete with the challenges of working within the constraints of a realistic design that they helped create with the help of seasoned professionals.

V CASE STUDY ACCORDING TO THE COURSE WORK:

An example course from a manufacturing training center is used to evaluate the strat- egy. A radio-controlled automobile is designed, built, and assembled in seven stages during the procedure, with students working in small groups. Industry 4.o technologies have been considered throughout, making for a more cohesive experience for everyone involved and giving insight to the engineers working together on the project about the difficulties and opportunities presented by cutting-edge innovations.

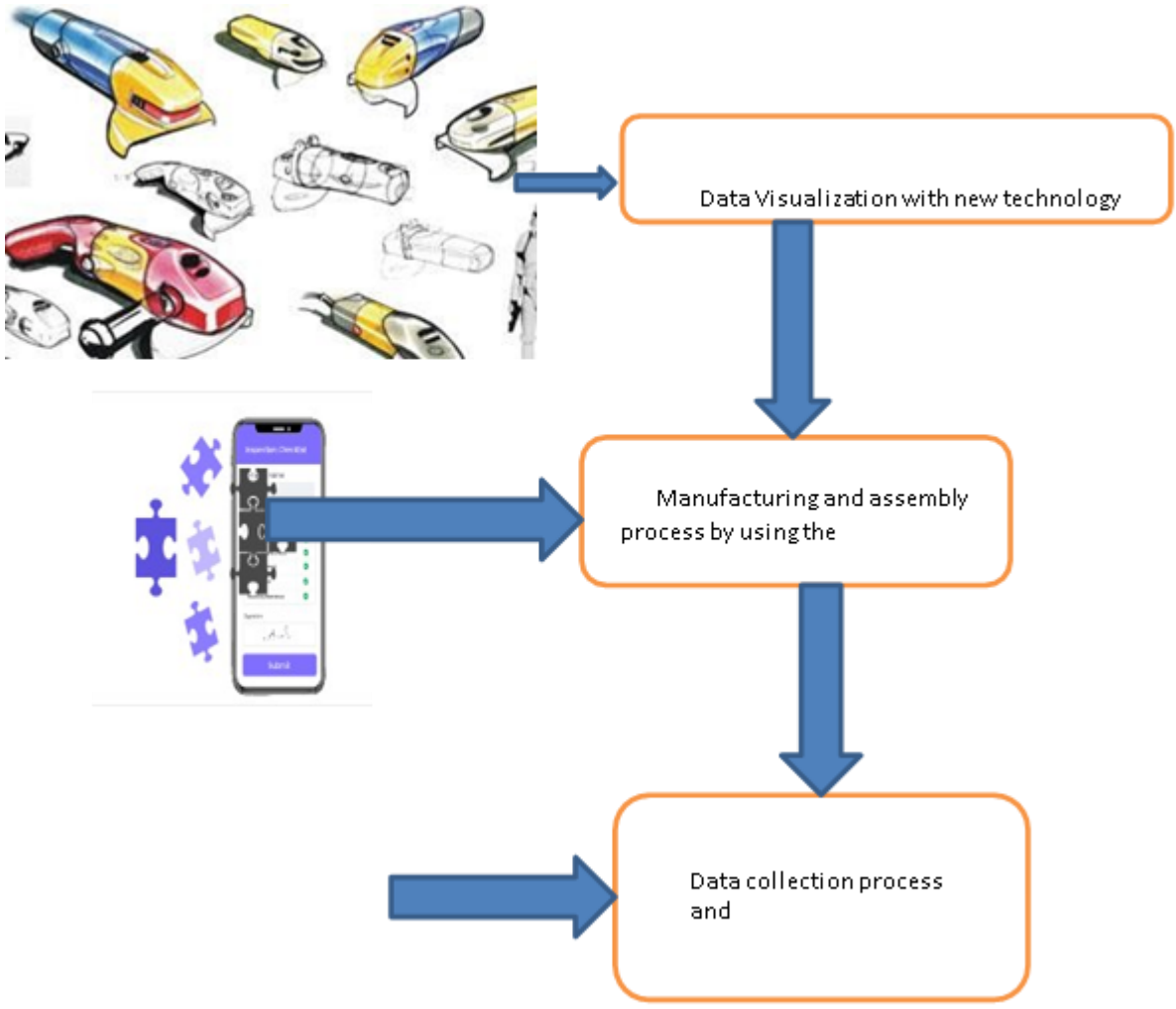

Figure 4: paradigm- Education 4.o

Participants are tasked with coming up with an initial design for the vehicle utilising a predetermined set of electrical components, visualising that design in virtual reality, and finally simulating the scheduling of mass manufacturing of the car to fulfil specific output targets. After deciding on a plan, they use material removal techniques like drill- ing, milling, and turning to create the necessary components before assembling them with an industrial robot and subsequently by hand. Participants gained knowledge about and hands-on experience with manufacturing processes at this teaching factory, which covered all the stages of product development. The development of the current ap- proach was with Education 4.o principles in mind to introduce pupils to cutting-edgedigital tools. Each team has an NFC card to monitor their progress as they go through the process, and the team may also collect relevant information from sensors built into the equipment they use. The whole procedure was digitised so that participants could access data on the related task for self-evaluation. During the research, the amount of information accessible was expanded thanks to mobile devices such as smartwatches and tablets to facilitate collaboration between operators and robots in assembly activi- ties. Virtual and augmented reality were used in conjunction with the design for digital prototyping. As part of the teaching factory 4.o paradigm, these instruments introduce future engineers to state-of-the-art visualisation and simulation approaches to product creation. It introduces students to the hybrid cyber-physical systems characterising manufacturing in the twenty-first century.

To better educate future engineers for the manufacturing settings in which they will operate, they must get acquainted with the elements shaping the cyber-physical systems of future production lines. Students may get a deeper understanding of the product design and production processes by integrating and analysing data from the simulation, the manufacturing processes, and the assembly of the final pieces collected during the teaching factory experience. 4.o. Participants get experience with machine monitoring, data comprehension, and data prediction via analysis of collected data. They gain awareness of faults made in earlier design processes to minimize errors that may be crucial in later steps.

VI CONCLUSION:

This paper includes the new technologies in the education system to develop according to the current industrial need. Physical cyber security systems and IoT technologies use to update the current education system. The final framework will enhance the education concept according to Industry 4. o. Teaching factories 4.0 also introduces future engi- neers to cutting-edge tech through hands-on workshops that encourage participants to see these tools as a way to boost the efficiency and precision with which they perform existing duties, thus opening the door to previously unrealized possibilities. These tech- nologies' incorporation into manufacturing will be furthered by their use in educational factories, as aspiring engineers exposed to the full potential and capabilities of Industry

4.0 will look for ways to incorporate it into their projects.

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CAMERICA – Criminal Identification and Real-time Monitoring of valuables using Facial Recognition

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Abstract— **The human face is a dynamic object with a great degree of diversity in its appearance, and it plays a significant role in social interaction through communicating people's identities. Face detection and face recognition techniques have been devised to combat this unpredictability. The initial stage of face recognition is face detection. We provide a thorough and insightful analysis of face detection and face recognition methods in this study. We describe a neural network method that identifies a face picture using the specific properties of the face. The fundamental concept is to locate certain distinctive traits in a person's facial picture, extract those elements, and then compare them. Approaches and different techniques that use aligned text**
with composite backgrounds and text detection in natural images. We suggest the use of neural networks and PCA, LDA, and MPCALDA in facial recognition, where we identify an unknown test image by comparing it to previously identified training photos that have been recorded in a database and provide details about the individual identified. Experimental results show that backpropagation algorithms provide varying rates of accuracy under various circumstances. We have created a face identification system that can identify human faces in a picture. This report outlines the development of our study into a new strategy for recognition approaches.

Keyword- Face detection, Face recognition, Neural Networks, SVM, RBF, PCA, LDA, MPCALDA, Back Propagation.

I. INTRODUCTION

Separating picture windows into two classes—one having faces (targets) and one including the background—is neces- sary for face detection (clutter). It is challenging because, de- spite the similarities across faces, they might differ greatly in terms of age, skin tone, and facial expression. Different light- ing situations, picture quality, and geometries, as well as the potential for partial occlusion and disguise, make the issue much more challenging. Therefore, the perfect face detector would be able to identify any face against any background, in any lighting situation.

There are two steps to the face detection process.

In the first stage, a classification job is used to determine whether there are any faces in an input image. This task ac- cepts any image as input and produces a binary result of yes or no.

The face localization job, which is the next phase, outputs the position of each face or faces inside an image as a bound- ing box with some (x, y, width, height).

A. FACE DETECTION

1. Pre-Processing: Before the photos are sent into the network, they are treated to lessen the variability in the faces. Cropping frontal face photographs to just include the front view yields all of the favorable in- stances, which are the face images. The clipped pho- tos are all then light-adjusted using industry-standard methods. [4]
2. Classification: Using these samples as training data, neural networks are used to categorize the pic- tures as either having faces or not. For this challenge, we employ the Matlab Neural Network Toolbox as well as our own neural network implementation. To improve the outcomes, several network configura- tions are tested.
3. Localization: Next, faces are sought out and, if any are found, they are localized in a bounding box using the trained neural network.

VARIOUS CHARACTERISTICS CONSIDERED IN A FACE DETECTION:

- Position
- Scale
- Orientation
- Illumination

FACE DETECTION TECHNOLOGIES:

- Knowledge-based approaches are rule-based tech- niques that characterize a face using those rules. The method is hampered by the difficulty in developing clear guidelines.
- The feature invariant approaches extract facial charac- teristics, such as the eyes, nose, and mouth, and then employ them to identify faces. These algorithms have a flaw in that noise, occlusion, and lighting can distort the features. The face region is segmented using collab- orative evolutionary agents that look for skin-like pix- els. The region's shape is then parameterized by height, aspect ratio, and orientation, and based on color and shape, it is categorized as a face. [8]
- The template matching methods, typical patterns of a face or characteristics are saved, and the input photos are connected with these patterns to recognize a face. These techniques can't handle changes in position, scale, or form. [9]
- The appearance-based approaches, on the other hand, learn the properties of face and non-facial pictures from examples using statistical and machine learning tech- niques. The learnt attributes are then used to face de- tection in the form of distribution models or discrimi- nant functions. Dimensionality reduction is another crucial step used in these techniques to lessen comput- ing complexity and boost detection effectiveness. Giv- en that one of the appearance-based approaches is the neural network technique.

APPEARANCE-BASED APPROACHES:

• Eigen faces: The goal is to find basis vectors spanning
the best subspace such that the mean square error between the training pictures projected into this sub- space and the original images is as little as possible given a set of n x m pixel training images expressed as vectors. Principal component analysis has been used to extend this method for face detection and identifi- cation [4].

• Support vector machines (SVMs) are a novel para- digm that may be used to train classifiers that use neural networks, radial basis functions, or polynomial functions. The separation hyperplane for the SVM classifier's linear classifier is chosen to reduce the predicted classification error of the test patterns that haven't yet been observed and those that have. A weighted combination of a small subset of the train- ing vectors known as the support vectors is described as this ideal hyperplane. An effective strategy for training an SVM for complex tasks was created by Osuna et al. [5] and used to face identification.

• Radial Basis Functions: The fundamental goal of an RBF neural network is to divide the input space into many hypersphere-shaped subspaces. So, clustering techniques like fuzzy k-means clustering, hierarchical clustering, and k-means clustering are frequently uti- lized in RBF neural networks.

REF ARCHITECTURE:

Input, a hidden layer with a nonlinear RBF activation function, and a linear output layer are the three layers that make up most radial basis function (RBF) networks. The hidden layer node responses are combined in linear combinations at the output layer to create the output. The basis functions in the hidden layer nodes are radically symmetric, thus the acronym RBF. The Gaussian function, which has a mean and a standard deviation, is the basic function that is most frequently used. The connections between the input and the hidden layers are not weighted in RBF networks. Consequently, the network's output is

Yk = L Wkj exp(-llx -cJ II /2(YJ)]=1

where N is the total number of neurons in the hidden layer, Cj is each neuron's center vector, crj is the distribution of basis functions at each node in the hidden layer, and Wkj are each linear output neuron's weights. The Ilx -cj II is the distance, as determined by some norm, between the center of the th hid- den node and the point representing the input X. This research use the Euclidean norm.

HIDDEN MARKOV MODELS (HMM):

When training an HMM for a pattern recognition issue, the objective is to increase the likelihood that the training data will be observed. To do this, the HMM model's parameters are adjusted using the common Viterbi segmentation technique and Baum-Welch methods. The output probability of an ob- servation indicates the class to which it belongs after an HMM has been trained. A face pattern can be broken down into sev- eral areas, such as the eyes, nose, mouth, and so on, in a face detection job. By paying attention to these areas in the proper sequence, a facial pattern may then be identified. Here, as op- posed to the template matching method, the goal is to link face areas to continuous density Hidden Markov Model states.

NEURAL NETWORKS:

Numerous pattern recognition issues, including character identification, object recognition, and autonomous robot driv- ing, have seen widespread use of neural networks. As a two class pattern recognition issue, the face detection job has seen a number of networks suggested throughout the years. The use of neural networks has the benefit of being able to capture the intricacy of facial pattern complexity. The drawback is that in order to get decent results, the network design must be carefully modified (number of layers, number of nodes, learn- ing rates, etc.). [10]

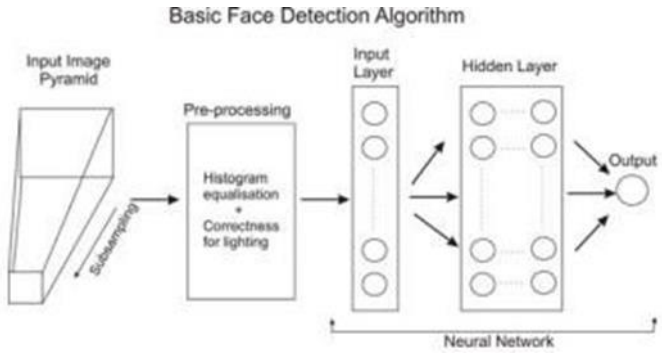


Figure 1: Face Detection Algorithm

B. FACE RECOGNITION SYSTEM:

An intriguing and effective use of pattern recognition and image analysis is face recognition. For intelligent vision-based human computer interaction, facial pictures are crucial. Face processing is based on the idea that computers can operate in accordance with the information about a user's identity that can be retrieved from the photos. Face detection has a wide range of uses, including biometrics, information security, and entertainment [1]. There are several methods that have been suggested to find faces in a single picture.

An active field of study is the face recognition system, a computer-based digital technology. The Face Recognition Sys- tem may be used for a number of purposes, including person searches, security systems, and numerous authentication methods. [6]

Even the feature qualities of the face change throughout time as humans' brains develop the learning ability to distin- guish people by their faces. The neurons in the human brain are taught by reading or memorizing a person's face, and even after many years, they can immediately recognize that face. With the use of artificial neural networks, this capacity for identification and training is transferred into machine systems. The fundamental job of a face recognition system is to com- pare a subject's face to those already learned in artificial neural networks. It then outputs the face that matches the subject's face the best, regardless of lighting, viewing angle, or facial expression.

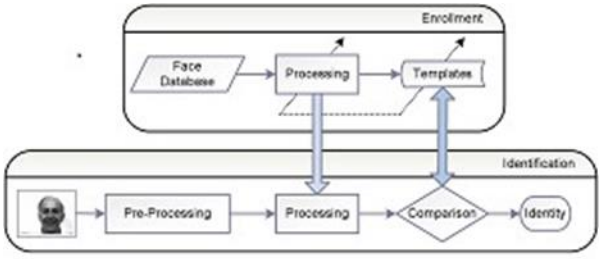


Figure 2: Basic Face Recognition System

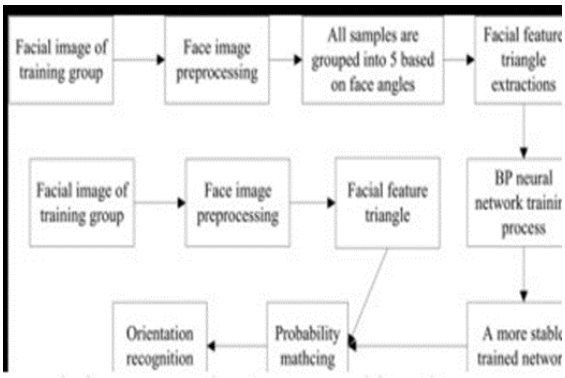


Figure 3: Face Detection And Recognition Diagram

Facial Recognition can be done using two ways:

a. Still Image
b. Video

Principal Component Analysis (PCA), Multilinear Principal Component Analysis (MPCA), and Linear Discriminant Anal- ysis are the face recognition techniques utilized in this article (LDA).

Each algorithm has a distinct benefit. While PCA is the most straightforward and quick technique, MPCA and LDA, when used as a single algorithm called MPCALDA, perform better under challenging conditions like face position, bright- ness fluctuation, etc.

II LITERATURE REVIEW

2.1 PRINCIPAL COMPONENT ANALYSIS (PCA)

Karl Pearson developed principal component analysis (PCA) in 1901. PCA is a mathematical technique that converts a number of potentially linked variables into a number of main components, which are orthogonally connected to the original variables. The data from PCA is projected in the directions with the largest variations[11].

By transforming data from a high-dimensional image space to a low-dimensional image space, the PCA approach calculates the largest variances in the data. For training and testing purposes, these derived facial image projections are further processed to Artificial Neural Networks. The main benefit of PCA is that the eigenface method aids in lowering the size of the database needed for test picture identification. The learned pictures are not kept.

2.2 MPCALDA

A. MPCA

The multilinear algebra-based version of principal component analysis (PCA) known as multilinear principal compo- nent analysis (MPCA)[3] is capable of understanding the in- teractions of many elements such as different views, different lighting conditions, different expressions, etc.

The method is comparable to PCA in that the eigenface technique is used to condense the characteristics that make up a face. In contrast to PCA, which only applied one transfor- mation vector, MPCA applies N separate transformation vec- tors, each of which represents a different dimension of the face pictures.

B. LDA

A computer method for assessing the relevance of various face characteristics in terms of their discriminating power is known as LDA, sometimes known as Linear Discriminant Analysis[2].

The database is segmented into many classes. Each class has a collection of pictures of the same individual taken under various lighting and backdrop settings, different frontal view- points, and with or without spectacles, among other things. Additionally, it is believed that all photos are the same size and only contain facial parts.

We may create a model for doing cluster separation analy- sis by classifying all the face photos of the same person into one class and faces of other individuals into other groups.

2.3 NEURAL NETWORK APPROACH

An artificial neural network (ANN) is a paradigm for in- formation processing that takes its cues from how organic nervous systems, like the brain, function. The innovative structure of the information processing system is the funda- mental component of this paradigm. It is made up of several, intricately linked processing units called neurons that collabo- rate to address certain issues. ANNs learn via imitation much like people do. Through a learning process, an ANN is tai- lored for a particular purpose, such as pattern recognition or data categorization. Adjustments to the synaptic connections that exist between the neurones are a result of learning in bio- logical systems.

2.4 FEATURES OF NEURAL NETWORKS

A. FEED-FORWARD NEURAL NETWORKS

Feed-forward Signals can only go in one direction, from input to output, using ANNs. There are no feedback loops, meaning that the output of each layer has no bearing on that layer itself. Feedforward ANNs are frequently simple net- works that link inputs and outputs. They play a significant role in pattern identification. This kind of organization is sometimes known as top-down or bottom-up.

B.FEEDBACK NETWORKS

By adding loops to the network, feedback networks (fig- ure 1) can have signals traveling in both ways. Feedback net- works have tremendous power and may become very com- plex. Feedback networks are dynamic; until they find an equi- librium point, their "state" is always changing. They stay there until the input changes and a new balance needs to be estab- lished. The terms interactive and recurrent can also be used to describe

feedback topologies, albeit the latter is frequently used to describe feedback links in single-layer organizations

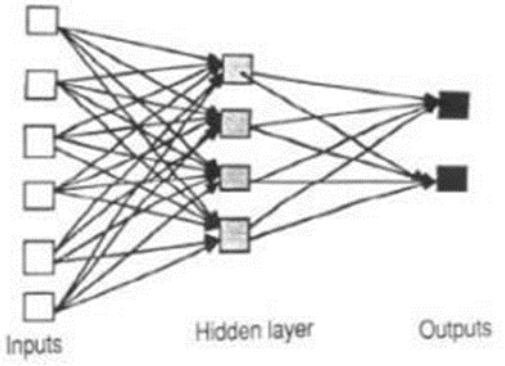


Fig- ure 4: An Example of a Simple FeedForward Network

III ARCHITECTURE OF NEURAL NETWORK

A) NETWORK LAYER:

A layer of "input" units is connected to a layer of "hidden" units, which is connected to a layer of "output" units in the most popular kind of artificial neural network. In Figure 4.

- The network is fed with raw data, which is represented by the activity of the input units.
- The activities of the input units and the weights on the links between the input and hidden units influence each hidden unit's activity.
- The activity of the hidden units and the weights be- tween the hidden and output units affect how the output units behave.

The hidden units in this straightforward sort of network are allowed to create any representation they like for the input. When a hidden unit is active depends on the weights between the input and hidden units; by changing these weights, a hid- den unit can select what it represents.

Additionally, we differentiate between single-layer and multi-layer systems. The most typical organization type is a single-layer organization with interconnected units since it has a higher potential for computational power than multi-layer hierarchically organized organizations. Units in multi-layer networks are frequently numbered per layer rather than uni- formly.

B) PERCEPTRONS:

The most important research on neural networks in the 1960s was classified as "perceptrons," a word that Frank Ros- enblatt invented. An MCP model (neuron with weighted in- puts) plus some additional, fixed pre-processing turns out to be what the perceptron is. The association units with the labels A1, A2, Aj, and Ap are responsible for extracting certain, local- ized features from the input pictures. The fundamental princi- ple of the mammalian vision system is mimicked by perceptrons. Despite the fact that they had far greater capabilities, they were mostly utilized for pattern recognition.

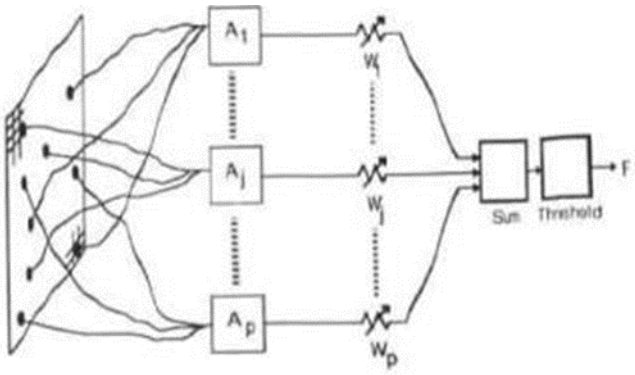


Figure 5: Working of Perceptron

C) MULTILAYER PERCEPTRON:

The well-known and popular learning algorithm for multi- layer perceptrons is back-propagation (MLP). The neurons in an MLP feedforward network are arranged in layers. The in- put layer of the MLP network is made up of a number of sen- sory units (source nodes), one or more hidden layers of com- putation nodes, and an output layer of computation nodes. The input signal travels through the network in a forward manner, layer by layer, and from left to right. Back propaga- tion is a gradient descent-based supervised learning network. With differentiable activation function units, the BPNN offers a computationally efficient approach for adjusting the weights in a feedforward network in order to learn a training set of input-output data. [12]

It minimizes the total squared error of the output generated by the net since it is a gradient descent approach. The goal of training the network is to strike a balance between its capac- ity for accurate response to the input patterns utilized for training and its capacity for good response to inputs that are similar.

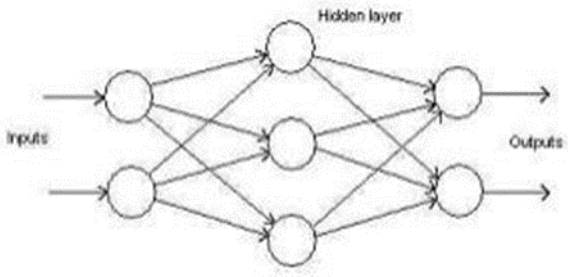
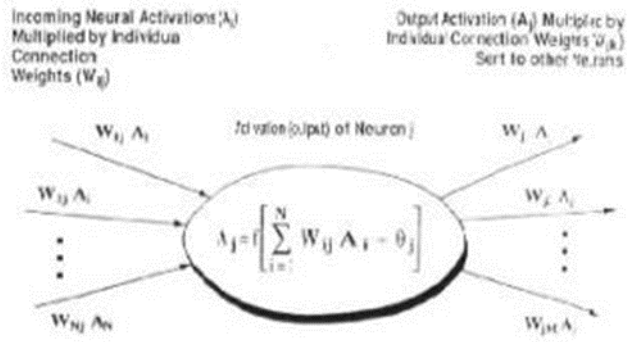


Fig.6 Layers of Neural Network

D) THE LEARNING PROCESS:

Each neural network has information that is encoded in the weights of the connections. A learning rule for altering the values of the weights is implied when the information stored in the network is modified as a function of experience.



Since it uses a gradient descent technique, the total squared error of the net's output is minimized. The aim of network training is to find a compromise between the network's ability to respond accurately to the input patterns used for training and its ability to respond well to inputs that are similar.

3.1 Supervised learning is learning that is guided by a third party instructor, who explains to each output unit what it should do in response to input signals. It may be necessary to have access to global knowledge when studying. Error- correction learning, reinforcement learning, and stochastic learning are supervised learning paradigms. The problem of error convergence, or the minimizing of error between the intended and computed unit values, is a significant challenge with supervised learning. Finding a set of weights that mini- mizes mistake is the goal. The least mean square (LMS) con- vergence is a well-known technique that is included in many learning paradigms.

3.2 Unsupervised learning relies only on local knowledge

and employs no outside teachers. In the sense that it self- organizes data provided to the network and recognizes their emerging collective qualities, it is also known as self- organization. Hebbian learning and competitive learning are unsupervised learning paradigms [13]. Whether there is a dis- crete phase during which the network is trained and a subse- quent operating phase depends on whether or not human neurons or artificial neurons are used. When the learning phase and the operating phase are separate, we say that a neu- ral network learns off-line. If a neural network learns and runs at the same time, it learns online. Unsupervised learning often takes place online, whereas supervised learning typically takes place offline.

E) TRANSFER FUNCTION:

Both the weights and the input-output function (transfer func- tion) that is set for the units affect how an ANN (Artificial Neural Network) behaves. Usually, this function belongs to one of three categories:

- linear (or ramp)
- threshold
- sigmoid

The output activity is proportional to the overall weighted output for linear units.

The output of threshold units is adjusted to one of two lev- els based on whether the total input is higher than or less than some threshold value.

For sigmoid units, when the input fluctuates, the output var-ies continuously but not linearly. Sigmoid units resemble gen- uine neurones more closely than threshold or linear units, alt- hough all three must be seen as approximations.

F) BACK PROPAATION:

One of the most often used neural network models is the back propagation (BP) neural network method, which is a multi-layer feedforward network trained using the error back propagation technique. There is no need to reveal in advance the mathematical equation that explains these mapping rela- tions since BP networks can learn and retain a large number of input-output model mapping relations. Its learning rule is to employ the steepest descent approach, in which the network's weight value and threshold value are controlled via back propagation to produce the lowest possible error sum of squares. The investigation of the BP neural network's proper- ties and mathematical theory is the primary emphasis of this research, which also identifies the flaws in the BP algorithm and suggests many solutions.

An artificial neural network (ANN) is a paradigm for in- formation processing that takes its cues from how biological nerve systems function. It goes through a specialized learning process to be set up for a certain application. The feed-forward network, which comprises multilayer perceptron and other neural networks, is the family of neural networks that is most frequently employed for pattern categorization tasks. The feed- forward network family, which includes multilayer per- ceptron and Radial-Basis Function (RBF) networks, is the one most frequently employed for pattern categorization tasks. A feed-forward supervised learning network is back propaga- tion. The main idea behind the back propagation technique is to reduce the squared error between the goal output values and the network output values by updating the weights using gradient descent. To calculate the contribution of each weight to the error, the update rules are generated by calculating the partial derivative of the error function with respect to the weights. Each weight is then modified. The term "backpropa- gation" refers to the iterative process that happens for each layer of the network, beginning with the most recent set of weights and moving backwards toward the input layer. The network is trained to perform well in terms of its capacity to react appropriately to the input patterns used for training and to deliver a suitable response to input that is comparable.

IV NEURAL NETWORKS IN FACE RECOGNITION:

By using a PCA-based eigenface technique, human face fea- tures are extracted, turning a high-dimensional space into one with very few dimensions. Various effective approaches have been used for decades. The facial pictures may be expressed in terms of a best coordinate system called "eigenfaces," as demonstrated by Kirby and Sirovich in 1990 [5].

These are the eigenfunctions of the ensemble of faces' aver- age covariance. They also intended for the limited number of eigenfaces to be required even for a high number of faces. Us- ing the eigenfaces representation of faces as a foundation,

M.A. Turk and A.P. Pentland [14] presented a face

recognition algorithm in 1991. Several feature extraction techniques, in- cluding Linear Discriminant Analysis (LDA), Kernel ap- proaches, Evolutionary Pursuit (EP), Support Vector Machine(SVM), and Artificial Neural Networks, were developed in the past several years for use with face photos (ANN). A super- vised learning algorithm is LDA. By calculating the edge re- sponse values in each of the eight directions at each pixel spot, LDP features are acquired.

In the projective feature space, all projected samples will simultaneously form the greatest between-class scatter and the lowest within-class scatter. For the purposes of face recogni- tion, each face is represented as a set of LDP codes [11].

A genetic method called Evolutionary Pursuit (EP) over- comes the issue of the size of the solution space. It is an eigen- space-based adaptive technique that looks for the optimal col- lection of projection axes to maximize a fitness function while also assessing the system's generalization capability and clas- sification accuracy [9]. A extension of linear techniques is of- fered by kernel methods. To learn this non-linear manifold, direct non-linear manifold techniques are investigated.

The Support Vector Machine (SVM) determines the hyper- plane that minimizes the distance from either class to the hy- perplane while separating the greatest percentage of points from the same class on the same side.

Face image characteristics are initially extracted using PCA, and SVM is utilized to train the discriminating functions between each pair of photos.

Real-valued, discrete-valued, and vector-valued functions have been approximated from a variety of instances using Artificial Neural Networks (ANN), a very reliable and effec- tive classification approach.

Fleming and Cottrell [15] trained the system in 1990 using nonlinear units and back propagation. By training the net- work, the learning capacity of neurons is employed to exam- ine the various facial distances and backdrop components.

In order to increase the success rate and define the rejection rate, this study discusses a whole face recognition system by merging a feature extraction method based on Principal Components Analysis (PCA) with a detection method based on Artificial Neural Networks (ANN). The project is demon- strated using a database of 49 colored face photos and MATLAB simulation.

V IMPLEMENTATION RESULT:

The back propagation technique is used in conjunction with the ANN learning process for face recognition. A feed-forward supervised learning network is back propagation.

There are several ANN types, including Radial Basis Func- tion, Multilayered Perceptron, and Kohonen networks.

As illustrated in Fig. 7, the multilayered feed forward neu- ral networks include three layers: an input layer, a hidden layer, and an output layer. These levels of processing compo- nents independently compute data before passing it to a high- er layer.

On the basis of the inputs' weighted total, the computation of the processing elements is finished. In order to change the weights of the hidden layer, the output is compared to the goal value, and the mean square error is determined. By con- tinually altering the weight of each layer, this procedure iter- ates for each layer to reduce error. As a result, it is known as the back propagation. The process of iteration continued until the error was below the acceptable level.

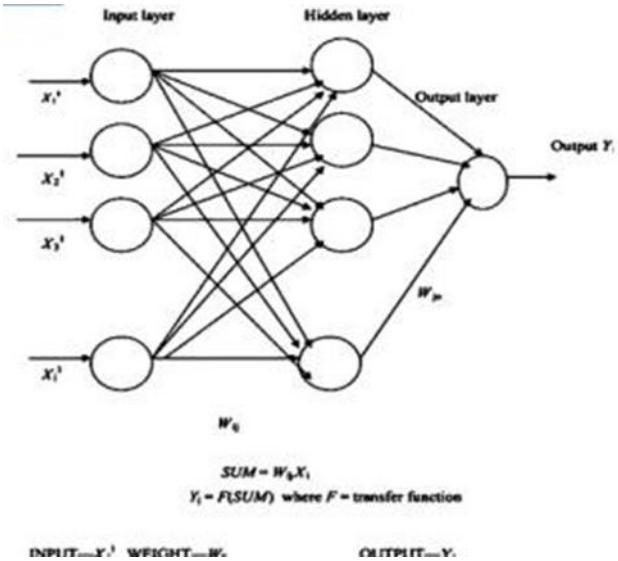


Figure 7: Basic diagram of neural network

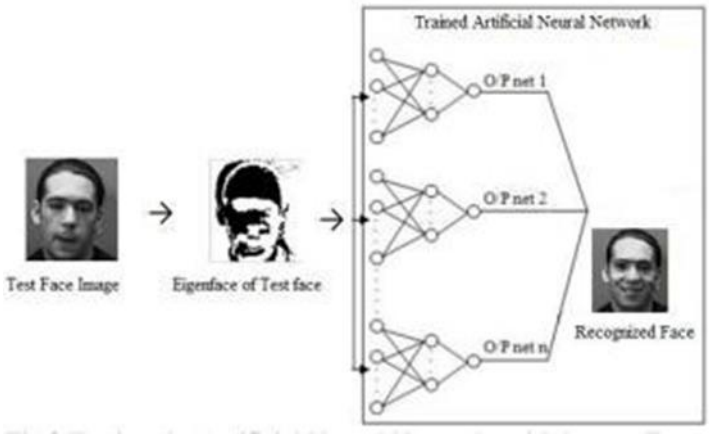


Figure 8: Testing the Artificial Neural Networks with known Face Image with different expressions.

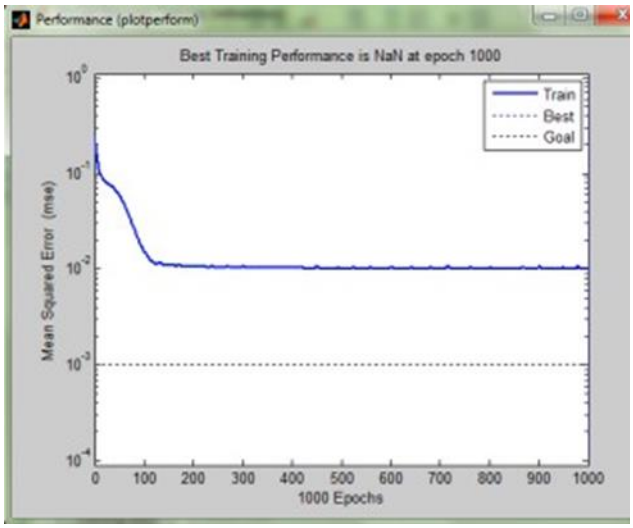


Figure 9: Performance plot between Mean Square Error and number of Iterations of Artificial Neural Networks

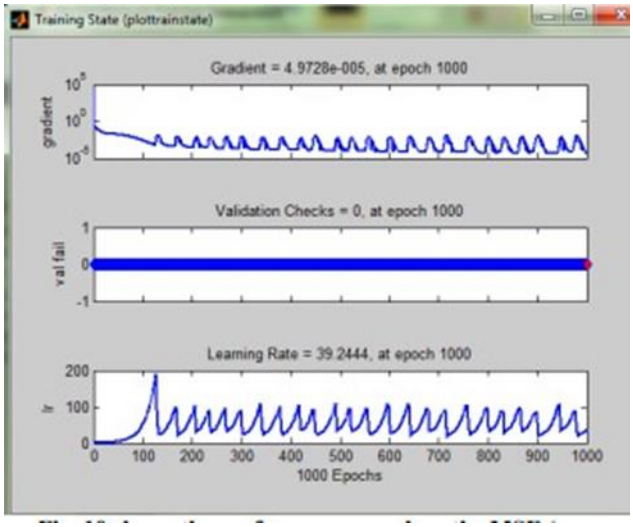


Figure 10: Performance graph as the MSE (mean square er- ror) is reduced to 0.001 by updating the weights of hidden layer using the back propagation algorithm.

VI CONCLUSION

Human face detection is frequently the initial stage in the recognition process since it may direct computing resources to the face region of the image before recognition is even at- tempted.

Here, one of the eigenface face recognition approaches and one of the neural network-based face detection strategies have been demonstrated.

A trustworthy MSNN model has been designed for neural networks.

For face recognition, back propagation feed-forward artifi- cial neural networks with PCA-based feature extraction are used.

Even with noisy face photos, the targeted face recognition system operates with high accuracy and offers superior suc- cess rates. By increasing the number of iterations and employ- ing the Log-sigmoid and Tangsigmoid functions, the mean square error may be further decreased until it is below the tolerance limit of 0.001, which has been established. The find- ings demonstrate that owing to added errors in distance esti- mates, counting the picture distance becomes challenging when lightening changes are substantial.

Even with differences in lighting and backdrop, the intend- ed method outperforms individual PCA-based face recogni- tion systems. The rejection rate for photos of unfamiliar or non-human faces has increased as a result of our work. We will use artificial neural networks and local feature extraction techniques in the future to advance our understanding of the face recognition system. For the used database, this approach offers a maximum accuracy of roughly 95.45%.

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Cyber Intrusion Detection Using a Boosting Ensemble of Neural Networks

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Abstract— **With the world increasingly becoming more and more virtually connected, the threat of intrusion in systems and networks is a rapidly increasing threat as well. A lot of different ways to detect this intrusion and ultimately prevent it are being developed. The best way is the implementation of deep learning algorithms and neural networks to detect the anomalies in a given system/network. The use of LSTMs (Long Short Term Memory) has been quite popular but they have their limitations as well. The proposed system develops an ensemble with 3 different LSTM-hybrids to develop a robust and better model that detects a large number of cyber attacks and provides better accuracy compared to a single LSTM model. Out of the three LSTM- hybrids used CNN-LSTM provided high accuracy with low FAR (false alarm rate) while RNN-LSTM was able to classify 3 major attacks more accurately but it was not much robust with R2L attacks and was giving high FAR. While the MLSTM is able to classify R2L attacks in a proper manner. The proposed ensemble model of LSTM and neural networks for intrusion detection have achieved an accuracy score of 98.7% for NSL KDD dataset and 99.3% for KDD99 dataset.**

Keyword- Cyber security, Neural networks, Ensemble learning, LSTM, Deep learning,

I. INTRODUCTION

The modern world is a completely virtual world as of now and the progress of technologies and advancements in this field are still rapidly increasing. With the revolution that computers have brought around, us humans have developed so many different things with said computers and related to said computers as well. As it stands now, humans are completely dependent on computers and the internet in day to day lives.Especially in the past few years, since the increased use of cloud computing, IoT services, any and all sort of communication or entertainment service is most certainly over the internet today. This increased reliance can also have negative repercussions if it is not thought about in a well rounded way. Any sort of new rise brings its threats along with the opportunities as well. It would not be prudent to only focus on the endless opportunities that the past few years have brought.

One of the biggest threats with the extreme reliance on networks and the internet is obviously security. Network security is a very vast and constantly evolving topic. Cyber attacks have also developed quite a bit throughout the years and hence there is a constant need for the cyber security measures to evolve as well.

With complex networks and setups, it is crucial to note the fact that any threat to the network or vulnerability will affect the entire network and can lead to huge losses and setbacks [1]. With the constant evolution of various types of cyber attacks and increasing threats to security, it is felt that just the traditional methods of security can no longer keep up. Hence the need to develop efficient network intrusion detection systems is felt quite strongly. These systems should be able to provide the integrity and privacy of the data by accurately detecting the attacks and threats with a high accuracy and a low false alarm rate.

Signature based detection or misuse detection is the model where detection is based on known attacks and threats. This model has high accuracy and low false alarm rates but the major drawback with it is that it doesn't change or evolve over time. Stagnant detection systems are easily overcome within a matter of a few years or months even with the rate at which all systems are advancing. To prove effective, an intrusion detection system will have to be able to perform well against known and unknown attacks.

Machine learning and Deep learning are both fields that have been used for a wide variety of applications, so it should be no surprise that they have also been employed in the field of intrusion detection. Machine learning systems are based on manually extracted features and deep learning systems extract features from the available data themselves.

A lot of work has been done regarding the use of ML/DL techniques in intrusion detection over the last couple years. The use of LSTMs as well as various other neural network architectures has been seen and has proved quite effective. LSTMs are especially useful in this field as they are designed for time series predictions which can be very useful here, to predict or classify the cyber attacks over time. LSTM hybrids will be the focus in this paper. Deep learning in intrusion detection is preferred because of the feature extraction ease as well as the fact that the neural network can learn from the unstructured or unlabelled data [2]. DL algorithms are also robust and scalable with the data availability. The deep learning models are developed for complex problems like pattern recognition, natural language processing(NLP), etc so intrusion detection systems are also efficiently developed using the deep learning algorithms.

II. LITERATURE SURVEY

Intrusion over networks is a big problem now with the increase in network systems as well as the developing

types of various attacks. One widely used deep learning method for this is the CNN- LSTM model. It is felt that the machine learning alternatives for intrusion detection are not sufficient and there is a need to develop deep learning models [3]. The use of datasets other than the one discussed is also a factor to be considered. Even though they are out of date, the KDD datasets are the most complete datasets for the problem of intrusion detection. It is found that CNN-LSTM models are extremely efficient and accurate for binary classification of cyber intrusion detection ie. just detecting whether a system is clean or has been attacked. But it fails for multiclass classification and cannot accurately distinguish between certain attacks The false alarm rate for CNN-LSTM is also extremely low and hence it is good for the intrusion detection system.

The use of LSTMs as stated above are the focus of this paper as all the models used in the ensemble are going to be LSTM based hybrids. The use of LSTMs of temporal feature extraction in intrusion detection systems has already been carried out [4]. In a referred paper, three LSTM approaches are described. One is a plain LSTM, one is with dimensionality reduction using principal component analysis (PCA), and one with mutual information. On the KDD99 dataset using LSTM with PCA, the model was able to get above 99% accuracy in classification.

Recurrent neural networks are also quite helpful in this field, they can be used to produce new attack types so that the model can be trained faster and in an efficient manner. To make RNN more powerful for modeling purposes cyclic connections are made. A proposed model contributed for generating the malware mutants, the attack signature and the synthetic data gathering [5].

Another referred paper used the RNN- LSTM model on the KDD dataset. A multiclass classifier was designed using that algorithm and it gave a decent overall accuracy of around 95%. The false alarm rate of this model was also high but it gave better results when compared to similar RNN- LSTM models [6]. Intrusion over network system is a big problem to handle. Now with the increase of network systems the type of attacks are also increasing and thus the paper titled, CNN-LSTM: Hybrid Deep Neural Network for Network Intrusion Detection System elaborates the use of ML models is not sufficient to counter the problem [7]. But with the technological advancement in deep learning and also ANN the researchers have proposed a system which uses CNN and LSTM. The ability of CNN is that it can extract important features and the LSTM has ability to extract time based features. Thus by using CNN and LSTM they have proposed a hybrid IDS. The dataset used was CIC-IDS -2017. Efficiency was determine by confusion matrix and performance metrics like precision, accuracy were also used.

In the paper A CNN-LSM Model for Intrusion Detection System from High Dimensional Data authors describe the use of deep learning techniques of CNN and LSTM for the detection of intrusion over the interne the dataset used by them was KDD99. The proposed model did data preprocessing, then feature extraction and after that continuous testing [8]. Accuracy achieved by the model of CNN LSTM over the KDD99 dataset was 99.78%.

Important technology in future the software defined networking is attacked by new kin of intrusions. The combination of CNN and LSTM where one is used for the extraction of spatial features and other is used for the extraction of temporal features is indeed increasing the accuracy to a large extent. The use of Keras was done for the training of CNN. The proposed IDS model in this paper A Hybrid CNN-LSTM based approach for Anomaly Detection Systems in SDNs was able to grab highest accuracy of 96.32%.

The proposed system describes intrusion on AMI (advanced metering infrastructure). IDS systems are able to detect abnormal activities over AMI networks. Fusion of features was done to represent the different characteristics of data. Used datasets were NSL KDD, KDD Cup 99 the activation function used was ReLU. For NSL KDD the accuracy was almost 99.95% while for KDD Cup 99 was 99.79%. Thus CNN-LSTM approach is efficient for IDS [9].

NSL KDD dataset is one of the most used dataset for applying deep learning based IDS models intrusion detection. The paper describes attack categories and also features present in the dataset. Many machine learning algorithms are applied on the dataset but due to false alarm rate the use of deep learning models becomes important as it deals with complex relationships [10]. The CNN-LSTM model used in the research was able to gain a great accuracy. Also different techniques like DenseNet and Gated Recurrent Unit with Softmax were able to achieve accuracy of 94.98% and 97.36% respectively. The proposed model was able to achieve an accuracy of 99.70% on NSL KDD dataset.

The paper describes the use of the characteristic feature of LSTM of temporal feature extraction for IDS. The paper uses three approaches of LSTM. In the first one LSTM is used without any dimensionality reduction then it is used with PCA and after that with mutual information. The dataset used was KDD99. The model while using LSTM with PCA was able to achieve an accuracy of 99.49%. To see the effectiveness of the model confusion matrix was used.

Recurrent Neural Networks can be helpful to produce new attacks types so that the model could be trained in an efficient manner. The extension of feed-forward neural network is the RNN. To make RNN more powerful for modeling sequences they have cyclic connections. The proposed model contributes for generating malware mutants, then generating the attack signature and after that for synthetic data generation [11].

This literature survey makes a few things clear based on which the ensemble is designed and gets better results improving on the existing models. Firstly, CNN-LSTM is excellent for binary classification but fails at detecting specific types of attacks [12]. RNN-LSTM is the most well- rounded model for multiclass classification with decently high accuracy. LSTM by itself is also a very powerful tool and can be improved upon by using the Modified LSTM(MLSTM) model.

The paper uses RNN-LSTM classifier to detect

intrusion on the KDD Cup dataset. The proposed system before using training dataset had normalized the instances from 0 to 1. Their input vector had 41 attributes while they were detecting 4 attacks and 1 non-attack. Thus hey had input dimension of 41 while output dimension of five [13]. The accuracy which this proposed system achieved was 96.93%. The false acceptance rate of the proposed system was more than other models but accuracy was greater. 9) The proposed system uses spatiotemporal encodes which are unsupervised and with the help of these spatiotemporal encoders the spatial features are intelligently extracted from the network traffic. And after that these extracted features are used as an input to LSTM model. Thus by using these spatial features the LSTM model detects intrusion and classifies it [14]. The proposed system again proves that using neural networks with LSTM gives far better accuracy than other traditional ways .

III. METHODOLOGY

3 different LSTM hybrid models were created and trained individually. These hybrids were chosen so that the shortcomings or weaknesses of one can be compensated by the other. Then these models were ensemble in series with each model filtering out specific cases and passing on the ones it is not good enough to handle to the next one. As a result all will be filtered out depending on the type of cyber attack/anomaly.

A. Datasets used

For the proposed model the main dataset used was the KDD Cup 1999 dataset. Even though it is a quite old dataset it is extremely well endowed and has a lot of cases for the model to train on and test. Along with that the newer NSL-KDD dataset was also used. The data is divided into a few major types of attacks-

1. DOS: Denial of service attack. These attacks make the computing or memory resources too busy and overloaded to deny a legitimate user access to these resources of the machine.
2. U2R: User to root attack. An exploit which allows a user(legitimate or illegitimate ie. someone with access to the machine) is able to gain the root access to the system
3. Probing: Any attempt to gather information about a network in order to bypass or circumvent its security controls and measures is called as a probing attack
4. R2L: Remote to local attack. A remote user who doesn't have access to a machine but is able to send packets to said machine and exploits a weakness to gain access to the local machine is called a remote to local attack.

There are a total 22 attack types in the training set for KDD99, and 15 types in the testing set. The specifics of each attack are different but all of them are classified among these 4 broad archetypes. Along with that the data also contains systems with no anomalies ie. “Normal” states. The dataset has over 4.5 million entries, each being a vector with 41 features. Each entry is labeled as an attack or as normal.

The NSL-KDD dataset is the upgraded version of the KDD 1999 dataset. The NSL-KDD dataset aims to solve some of the major issues that are present in its predecessor. One of the major things is that it removes the duplicate records in the training and testing sets so that the classifiers are not biased for the repeating records. The training and testing sets were also generated from different parts of the original KDD99 dataset to obtain authentic results while using various classifiers. The unbalanced problem of the training and testing data was also solved in this dataset to help reduce the False Alarm Rate(FAR).

All in all, these are both very well-rounded datasets but the biggest problem that is faced when using these is that they are very outdated. There is no idea about the representation of the modern norms and attacks and the respective network activities. Another issue faced is that the probability distributions of the training and testing sets for the data are not the same. This may lead to skew in some of the classifiers that are used with this dataset.

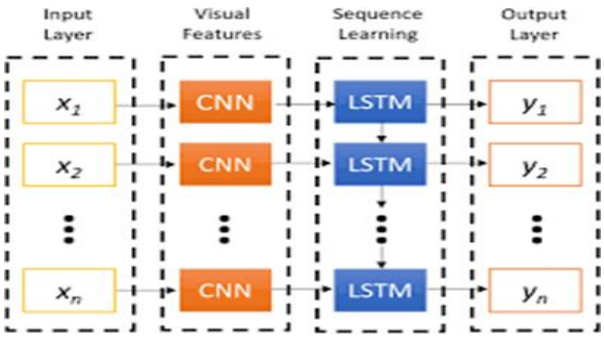
B. Models used

The 3 different LSTM hybrid models implemented are as follows-

1. CNN-LSTM()
2. RNN-LSTM()
3. MLSTM(Modified LSTM)

CNN-LSTM:

The CNN- LSTM model is essentially a bunch of CNN (Convolutional neural network) layers on the input data followed by LSTM layers. The CNN architecture is extremely good at feature extraction and the LSTM layers support learning over time and sequence predictions. The same can be seen in Fig.1 which is a graphical representation of the architecture. These models were first developed for visual time series applications eg.- activity recognition, image and video description etc. This model was also called a Long-term Recurrent Convolutional Network (LRCN) but are now referred to as CNN-LSTMs. These models are good with any data which has spatiotemporal features.



The first evaluation is done by the CNN-LSTM model. This model is a very good first evaluation tool as it can quite accurately discriminate Normal systems and DOS, U2R attacked systems with a sufficiently high accuracy. That leaves only the probing attacks and R2L attacks which are further handled by the next models in the series ensemble.

RNN-LSTM:

LSTMs act like an extension for the Recurrent neural

networks(RNN) in this architecture which extends the memory for the learning of the model. This model is extremely good for learning from experiences that have long time lags between them.

LSTM units are used as the building blocks of a recurrent neural network The LSTM cells can read, write and delete its memory. This is done by the respective gates, it is a gated cell. Input gate controls the entry of new information. Forget gate controls the deletion of information that is no longer useful.Output gate controls whether or not to let the information affect output at the current stage. The LSTM cell can be better understood with the help of

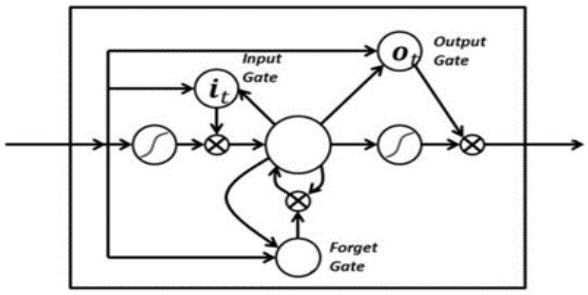


Fig.2 LSTM gated cell

Modified LSTM(MLSTM):

This model builds on the existing LSTM model to provide better flexibility in the application. It also accommodates probabilistic gate cell states in the LSTM model using sigmoid functions. For eg.- Consider the output gate of the LSTM cell. The information to be passed is decided through here. Normally in a LSTM cell it is possible to only let the information pass or not pass ie. boolean logic. With the sigmoid function, a return value between 0 and 1 is obtained at each step in the cell and based on the value the amount of information to be passed is decided (0 being no information to be passed and 1 being all of the information to be passed). This is done at all the gates in the cell, as shown in the diagram below ie. Fig. 3.

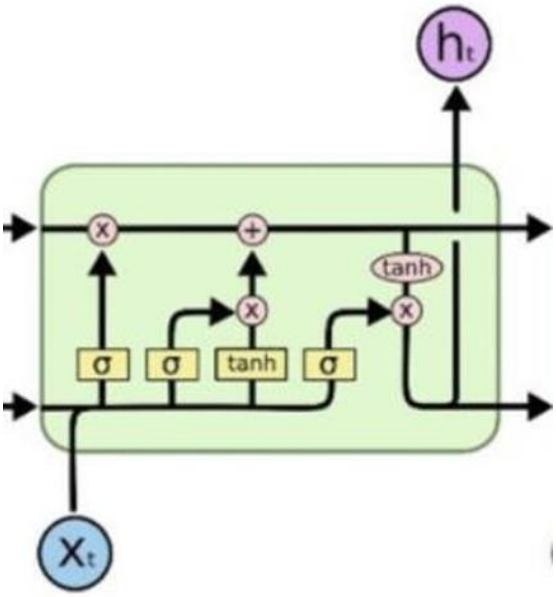


Fig. 3 LSTM architecture

The tan(h) function is to make a vector of new values which will be added to the current state C [14].

C. Proposed Model flow

As stated earlier before the explanation of each model, 3 models are used in the ensemble. First the evaluation through CNN-LSTM is done as it is the most accurate out of all the three for a wide range of attacks as well as binary classification (Normal vs anomaly). The accuracy of the Normal system detection through CNN-LSTM is very high along with Probing and DoS attacks. So many times CNN- LSTM can differentiate 3 out of the 5 possible outcomes by itself. Hence it is used as the first model. However, sometimes for the Probing and DoS attacks, the accuracy might not be high enough to ascertain beyond reasonable doubt whether or not it is the attack specified. In that case the Probing and DoS attacks are also differentiated by the next model.

The next model used in the series-ensemble is the RNN-LSTM model. This is a really good tool for the differentiation of various attacks and is used for exactly that. The Normal system vectors are already filtered out by the CNN-LSTM one step above and hence only the attacks remain to be sorted. RNN-LSTM is quite accurate with that but might fail for R2L(root to local) attacks. Hence it is given all the attack vectors as input(Probing and DoS excluded if CNN-LSTM is accurate), and it differentiates between them well enough. The drawback of the RNN-LSTM, which was the high false alarm rate, is also overcome by using this ensemble as the vectors from which it has to differentiate are almost definitely attack vectors(CNN-LSTM filters out Normal systems).

The final model in the ensemble is the MLSTM. This is the most niche model because it is trained for a very specific attack(R2L) as that is the only one left which still might not be accurately classified after the first 2 steps. The use of MLSTM gives better accuracy and efficiency in training the model as well as removes the need for dimensionality reduction to a certain degree. The flow of the project can be better understood with the diagram ie, Fig. 4.

As with any ML/DL model, one of the most important parts of the training testing process is the preparation and pre-processing of the data. Firstly the obtained data from the dataset is cleaned by removing the duplicates in it or by truncating the incomplete data entries etc. The data is then normalized and then fitted and scaled as per the requirements of the model.

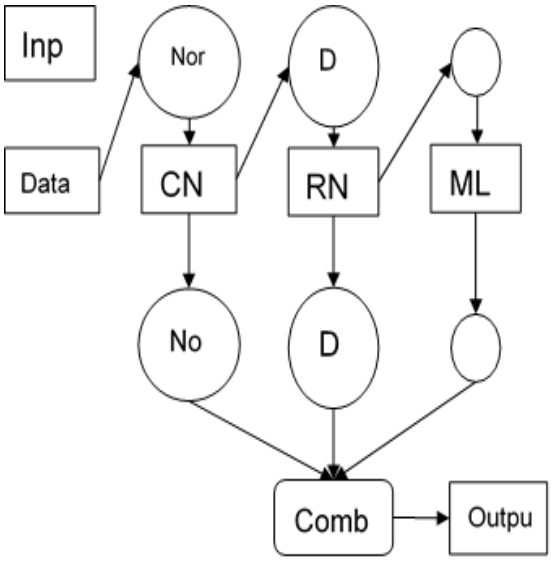


Fig. 4 Project Flow Diagram

In this system, as stated above, the KDD99 and NSL-KDD datasets have been used, which have 22 attack types in all. But based on their nature they are classified into 4 broad archetypes. The ideal case would be to run the multiclass classifier for all of the various 22 attack types included in the dataset but that would be too computationally exhaustive and hence is not feasible for the current scope of the proposed model.

D. Algorithm

Step 1: - Input the data to CNN-LSTM model

a) The convolution layer extracts features from input data.

b) The connected layers of CNN use data from convolution layer to create output.

c) Considering CNN to be a mathematical model M:h(X(0);θ). where can be input vector, and θ is weight of neuron connections.

d) X(l) neuron responses on the t-th layer, which is Wl*Hl*Dl cube.

e) X(l) is average over all spatial positions of X(l), i.e., a Dl-dimensional vector.

f)

$$Eq.1: -- x_d^{(l)} = (1/W_t \times$$

$$H_{wh} \nabla^{W_{t-1}} \quad \nabla^{H_{t-1}} \quad v^{(l)}$$

$$t \quad w=0 \quad h=0 \quad w,h,d$$

g) Use of ReLU activation function.

h) The output is further passed to LSTM. Step 2: - CNN-LSTM classifier working.

a) LSTM uses a sigmoid activation function for the forget gate and input gate.

b) The equations listed below are for forget gate, input gate and output gate respectively.

Eq. 2 : - $ff = f(ff[hf-1, ff] + ff)$ Eq. 3 : - $ff = f(ff[hf-1, ff] + ff)$ Eq. 4 : - $ff = f(ff[hf-1, ff] + ff)$

c) The extracted features of CNN are used to predict the different types of attacks.

Step 3: - Passing CNN-LSTM models output to RNN-LSTM.

a) The RNN-LSTM is provided with CNN-LSTM output with only attacks that are normal system integer filtered.

b) RNN-LSTM employs LSTM cells in RNN structure.

Step 4: - RNN-LSTM classifier working.

a) The RNN-LSTM works on all types of attacks and classifies them.

b) R2L attacks are not properly handled by this classifier.

Step 5: - Passing all remaining data including major part of R2L attack.

a) The MLSTM model classifies the R2L attack accurately.

Step 6: - End

IV. RESULTS AND DISCUSSION

The design of the ensemble can be said to be successful as it worked as intended and gave accurate results for all the classes. The main objective of this ensemble was to combine the good parts of the individual specific models and also try to cover up for the weaknesses of each of the models. Through the experimental results it can be said that this objective has been achieved. Comparing the individual performances of the models and them of the ensemble as a whole it can be said that the ensemble has put together all the benefits of its constituent models and has also made up for the weaknesses of each individual model. The performance metrics used for the evaluation of the models are Accuracy and FAR (False alarm rate).

CNN-LSTM

KDD99		
Accuracy	FAR	
0.999	0.058	Normal
0.941	0.002	DOS
0.948	0.019	Probing
0.414	0	U2R
0.258	0.001	R2L
Overall accuracy	0.933	

NSL-KDD		
Accuracy	FAR	
0.997	0.124	Normal
0.747	0.018	DOS
0.898	0.093	Probing
0.45	0.001	U2R
0.429	0.002	R2L
Overall accuracy	0.832	

Table 1: CNN-LSTM performance metrics

As can be seen in Table 1, the CNN-LSTM model gives high accuracy for binary classification on whether the system is normal or attacked, but fails for U2R and R2L attacks as well as distinguishing between various attack types for the NSL-KDD dataset.

RNN-LSTM-

KDD99		
Accuracy	FAR	
0.963	0.091	Normal
0.987	0.072	DOS
0.969	0.044	Probing
0.978	0.063	U2R
0.688	0.061	R2L
Overall accuracy	0.969	
NSL-KDD		
Accuracy	FAR	
0.924	0.121	Normal
0.981	0.083	DOS
0.977	0.132	Probing
0.961	0.052	U2R
0.582	0.07	R2L
Overall accuracy	0.942	

Table 2: RNN-LSTM performance metrics

Just like seen with the CNN-LSTM model, the results for the RNN-LSTM can also be seen as described in Table.2

MLSTM- As stated earlier, the training for MLSTM was done only for the R2L attacks and hence a separate parametric of the model was not taken.

Following are the results of the designed ensemble as a whole-

KDD99		
Accuracy	FAR	
0.999	0.058	Normal
0.987	0.002	DOS
0.969	0.019	Probing
0.978	0.063	U2R
0.991	0.022	R2L
Overall accuracy	0.993	
NSL-KDD		
Accuracy	FAR	
0.997	0.124	Normal
0.981	0.043	DOS
0.977	0.031	Probing
0.961	0.014	U2R
0.982	0.011	R2L
Overall accuracy	0.987	

Table 3: Ensemble performance metrics

From the results of Table 3, a much higher overall as well as class wise accuracy is obtained from the ensemble than from the individual models.

	FNR
KDD99	
Normal	0.001
DoS	0.059
Probing	0.052
U2R	0.586
R2L	0.742
Overall	0.067
	FNR
NSL-KDD	
Normal	0.003
DoS	0.253
Probing	0.102
U2R	0.55
R2L	0.571
Overall	0.168

Table 4: CNN-LSTM False negative

Another performance metric that was later checked was the false negative rate for each attack and model. This was essential to see what percentage of the attacks were labeled as either harmless or as some other attack. This metric should be as low as possible. The results of the same for CNN-LSTM can be seen in Table 4.

	FNR
KDD99	
Normal	0.001
DoS	0.013
Probing	0.031
U2R	0.022
R2L	0.009
Overall	0.007
	FNR
NSL-KDD	
Normal	0.003
DoS	0.019
Probing	0.023
U2R	0.039
R2L	0.018
Overall	0.013

Table 5: Ensemble False Negative

Similar results for the entire ensemble can be seen in Table 5. As can be seen, the high false negative rates for U2R and R2L are cut down significantly by using the ensemble and hence it is a better way for the

classification of these attacks.

This ensemble will be able to detect a wide range of attacks now without giving up any weakness towards a specific area as the other models will cover the weaknesses if one of them has any. The idea behind the making of this ensemble was hence successful.

The idea behind this ensemble was to improve upon the existing models which have a lot of weaknesses that they cannot make up for individually. When the models included in the ensemble are used in series they make up for each other's weak points and hence give an overall better result for the multiclass classification of the dataset. Consider the CNN-LSTM architecture which is a widely used model and one that is used in ensembles too. It is the best deep learning model for the binary classification (normal vs attack) of the dataset. The biggest problem it faces is that the accuracy for the different attack classes is dismal. This is a big problem when multiclass classification is wanted. Similarly, consider the RNN-LSTM architecture which is robust for multiclass classification of the attacks but the main problem is that it gives a high FAR(False Alarm Rate). When used in series after the CNN-LSTM architecture, it essentially filters out almost all of the Normal system cases hence drastically improving the FAR scores when using RNN-LSTM. This is the way the ensemble performs better than the existing models by using their strengths for good results and also covering for their weaknesses to improve accuracy even further.

V. CONCLUSION

From the results it can be concluded that using an ensemble model helps increase accuracy to a large extent. In both the datasets NSL-KDD and KDD99 model give accuracy and FAR for normal attacks and 4 types of different attacks. From the results it can be seen that the ensemble model performs better on both the datasets comparing CNN-LSTM and RNN-LSTM individually. The ensemble performs better than the existing models yielding a higher accuracy and a low FAR. But the trade-off for this is that the proposed model is definitely more computationally exhaustive than normal single models or traditional ensembles using simpler algorithms. The use of other datasets for training and testing purposes can also be seen as a future scope. But the biggest direction in which the proposed model can be taken in the future is trying to combine simpler algorithms with the proposed model to try and reduce the computational load but also try and maximize the performance metrics as in this ensemble.

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Social Distancing Violation System YOLO version 3

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Abstract— **This paper focuses on solutions for proper social distancing in public places using real-time YOLO object detection in video footage and images. Our proposed object detection model achieved an average accuracy score of 94.75% at an inference speed of 38 FPS on video. This network guarantees inference speed capable of delivering real-time results without compromising accuracy, even in complex settings. The proposed social distancing method yields promising results even in some variable scenarios.**
The recent outbreak and rapid transmission of the COVID-19 pandemic has increased the need to adhere to social distancing norms and wear masks in public. According to the World Health Organization, people should keep at least 3 feet or 1 meter from each other in public places to maintain proper social distancing.

Keywords – Object Recognition Yolov3

I. INTRODUCTION

Since the COVID-19 pandemic swept the world, governments around the world have taken drastic but necessary steps to curb its spread. This completely brought normal daily life to a halt. Months into lockdown, communities are losing their composure as we see the curve flattening in some countries. Relevant authorities such as WHO have set specific guidelines to minimize people's exposure to the virus. Safety measures that people should follow include wearing a mask and keeping a distance of 3 feet, which is approximately 1 meter, from others.There are several countries in the world that have actually made mask- Since the COVID-19 pandemic swept the world, governments around the world have taken drastic but necessary steps to curb its spread. This completely brought normal daily life to a halt. Months into lockdown, communities are losing their composure as we see the curve flattening in some countries. Relevant authorities such as WHO have set specific guidelines to minimize people's exposure to the virus. Safety measures that people should follow include wearing a mask and keeping a distance of 3 feet, which is approximately 1 meter, from others.There are several countries in the world that have actually made mask-

II. SCOPE

Globally, about 5,21,78,723 people have died from COVID-19, and 4,444 have died of about 12,85,379. The most preventative measure required by WHO is to maintain social distancing from others to reduce the risk of transmission whenever they cough, sneeze or speak. During the pandemic, the only system is to maintain social distancing in public places. The mechanism used to monitor social distancing monitors whether people's area units are maintaining a safe distance from each other by analyzing real- time video streams from cameras. It is done through a detection tool.A framework primarily based on deep learning has been developed to use object detection and tracking modelsto help manage the surge in his COVID-19 cases within social distancing tools.
To visualize clusters in the live stream, each bounding box is color-coded to support assignment to teams. People's luck for similar cluster area units is represented by their colors as well. Video used as input for a project

III. PROBLEM STATEMENT

Social distancing is arguably the most reliable way to prevent the spread of infectious diseases. Existing systems do not have monitoring methods to maintain social distancing in public places such as malls, restaurants, streets, and educational institutions.
Existing systems used a sliding window algorithm (a deep learning algorithm) to detect human classes.
The recent events and rapid transmission of the COVID-19 pandemic have increased the importance of the general public to the need for social distancing. With this in mind, people should keep a minimum distance of 3 feet or 1 meter from each other in public places without deviating significantly from the International Health Organization guidelines on social distancing.
COVID-19 with In the fight, social distancing has proven to be an effective way to prevent the spread of disease. People are being asked to limit the ways they interact with each other and reduce the chances of spreading the virus through physical or close contact.

IV. LITERATURE REVIEW

Since late December 2019, following the surge of the COVID-19 pandemic, social distancing has been recognized as a credible practice to prevent transmission of the contagious virus, and on January 23, 2020, Selected as standard practice (B. News, 2020). Between 2,000 and 4,000 new confirmed cases were reported daily in the first week of February 2020, with an exceptional increase in cases within a month. After that, there were first signs of remission for 5 consecutive days until 23 March 2020, with no new confirmed cases (N.H.C. People's Republic of China, 2020). This is due to social distancing practices introduced in China and most recently he has been adopted globally to control COVID-19. Ainsley et al. (2020) examined the association between localeconomic conditions and the severity of social distancing.
The study found that moderate exercise can prevent large

outbreaks. So far, many countries have adopted technology-based solutions to overcome pandemic losses (Punn, Sonbhadra & Agarwal, 2020a). Several developed countries are using GPS technology to monitor the movements of infected or suspected persons. Nguyen et al. (2020) are various new technologies that could play an important role in several practical social distancing scenarios such as Wi-Fi, Bluetooth, smartphones, GPS, positioning (localization), computer vision and deep learning. Provides an overview of the technology.

So far, researchers have done considerable work for detection (Iqbal, Ahmad, Bin, Khan & Rodrigues, 2020; Patrick et al., 2020; Yash Chaudhary & Mehta, 2020). Some researchers are using the internet to provide a smart health system for the pandemic. for medical use (Chakraborty, 2021; Chakraborty et al., 2021). Prem et al. (2020) examined the impact of social distancing on the spread of COVID-19 outbreaks. The study concluded that early and immediate practice of social distancing can gradually reduce the peak of virus attacks. An essential but economically unpleasant move to flatten the infection curve. In Adolph, Amano, Bang-Jensen, Fullman, and Wilkerson (2020), Adolph et al.

Highlighted the state of the United States during the pandemic. Lack of public support from decision makers meant that it was not implemented in the early stages, damaging public health. However, social distancing impacted economic productivity. Still, many scholars were looking for alternatives to overcome the loss.

Researchers use surveillance video and computer vision, machine learning, and deep learning-based approaches to provide effective solutions for measuring social distancing. Pan et al.

(2020b) proposed a framework for recognizing people using the YOLOv3 model and a deepsort approach that uses bounding boxesand assigned identity information to track recognized people. They used the Open Image Data Set (OID) repository, a front view data set. The author also compared the results with faster RCNN and SSD. Ramadas et al. (2020) developed an autonomous drone-based model for social distancing surveillance.

They trained a YOLOv3 model using a custom data set. The data set consists of front and side view images of a limited number of individuals. Work is also expanding to include monitoring face masks. Drone cameras and her YOLOv3 algorithm help detect social distancing and monitor people wearing masks in public from the side or front. Pouw, Toschi, van Schadewijk, and Corbetta (2020) proposed an efficient graph-based surveillance framework for physical distancing and crowd management.

Sathyamoorthy, Patel, Savle, Paul, and Manocha (2020) performed human detection in crowded situations. This model is designed for those who do not adhere to social distancing restrictions. H. A distance of 6 feet between them. The authors used a mobile his robot equipped with an RGB-D camera and a 2D lidar to navigate through crowds without colliding.

From the literature, we concluded that researchers had put in a significant amount of work to monitor social distancing in public places. However, most of the work focuses on front or side camera perspectives. Therefore, this work presents a top-down social distancing framework that provides a better view and overcomes the occlusion problem, thereby playing an important role in social distancing surveillance that calculates the distance between people. fulfill.

V. RESEARCH WORK

Problem Analysis--COVID-19 is a virus that is transmitted by small droplets between people in close contact when talking, sneezing or coughing, and most commonly by inhalation. The pandemic is still ongoing, causing acute respiratory infections in humans and causing many deaths. The risk of spreading COVID-19 can be eliminated by avoiding physical person-to-person contact.

Requirement Analysis--For this system, the basic requirement is an Eclipse IDE with Python and pip installed.

Project output must include a camera or video to display the correct output.

Technical Research--This project proposes a real-time AI platform for human detection and social distancing classification based on infrared cameras. YOLOv3 is proposed in this work for object recognition.is a simple neural network architecture suitable for low-cost embedded devices.

The proposed model is a good option compared to other real-time detection approaches. The

algorithm is also implemented to monitor social distancing from a bird's eye view.The proposed approach is applied to videos recorded by infrared cameras for human detection and social distancing classification.

VI. USE CASE

The system can be used in shopping malls, theaters, concerts, and many other places where social distancing protocols must be followed. Social distancing is arguably the most reliable way to prevent the spread of infectious diseases. Existing systems do not have monitoring methods to maintain social distancing in public places such as malls, restaurants, streets, and educational institutions.

Easily implement a social distancing system using existing cameras already installed in public places. This helps the people of the country.

VII. ARCHITECTURE

Our study performs real-time human identification to track social distancing norms and real-time facial recognition to perform in multiple environments,

including crowded and poorly lit complex environments. We propose a solution to track the use of face masks. The techniques used to formulate this solution are described in this section.

A. Dataset

The dataset used contained 7,959 images, including specific images from the WIDER- FACE and MAFA datasets, and 2 images of masked and unmasked faces. Annotated with faces belonging to one class. Third graders were added manually by annotating each image with an individual person. The bounding box coordinates and labels for each image were then extracted from the XML file and normalized with respect to image height and width. After checking for incorrect annotations, 6,120 images were used for training and 1,839 images were set aside for validation. For social distancing purposes, I created my own dataset to test the algorithm and also tested some images on the web.

B. YOLOv3 Architecture and Functioning

Bochkovsky et al. We have proposed 2020 YOLOv3 and made some significant changes from its predecessor, resulting in significant improvements in both speed and accuracy. We chose YOLOv3 as our object detector of choice because it is very fast, easy to train, robust and stable, and gives promising results even for small objects. For an input image/frame he recognizes objects belonging to three classes: unmasked faces, masked faces and people. This effectively means that the same model is used for both person detection to track social distancing and masked face detection to monitor face masks. This greatly improves overall efficiency and simplicity.

VIII. Algorithm of project:

Tracking Social Distancing:

The solution proposed in our project consists of two steps: calibration and testing. Calibration has two steps:

The user must enter the focal length and sensor dimensions of the camera to be used.

The user must then place the two of them at the minimum respectable social distance (hereafter referred to as the standard social distance).

This has the advantage that you can actually choose the social distancing you want to maintain, according to the specific guidelines the authorities want to adhere to. for example.

: WHO guidelines say the recommended level of social distancing is at least 3 feet [1], while CDC guidelines recommend a minimum of 6 feet. The social distance between two people is evaluated only for the first calibration, and there is no need to provide absolute distance to the model.

This social distancing model uses the principle that the camera lens is essentially convex and the image is essentially captured on the screen. For this model, as already mentioned, we need the focal length and sensor dimensions.

The focal length of a lens is the distance from the optical center of the lens to the focal point. In optics and photography, the focal length is measured in millimeters (mm). The longer the focal length, the higher the magnification, but the narrower the angle of view.

An image sensor is a device in the camera hardware that uses light to capture information and transform the view into an image. The sensor basically acts as a screen onto which every pixel of the image is mapped.

The larger the imaged pixels, the better the image quality.

Field width. H. is the observed width of the real object and w is the measured distance from the camera bed to the object.

Make the person whose distance you want to measure look like this. Person 1 and Person 2 standing at positions (x1,y1) and (x2,y2) in a given image.

To find the depth of an object in a photo, we can get the following from Equation 2:

d = actual height of object (mm) × focal length (mm) / height of object on sensor (mm)

Hey, in the image, object height is only in pixels (px.), so You can use the formula to get the height of the object in the image on the sensor in millimeters. Here the actual human height is assumed to be 1.6 m in this model as the average human height is estimated at 1.6 m for him.

Object height on sensor (mm) = object height in image (px.) × pixel size

where px is the measurement in pixels. A person's depth is therefore equal to the distance they are standing from the camera. Let d1 and d2 denote her distance from the two cameras. To measure the approximate distance between these two of hers in the image, the x-coordinate difference is taken as the social distance width. Social distance width (mm)=(x1−x2)×pixel size

So the actual field width can be calculated by equation (1). 2

w = sensor width x social distance width (mm) / focal length (mm)

Person 1 is at (0, d1) and Person 2 is at (w, d2) Social distance = √ (w−0)^2+(d2−d1)^2

The first calculated social distance in calibration mode is used as the reference social distance. In test mode, the above formula is used to calculate his 2 social his distance.If the calculated social distance is less than the reference social distance, the pair is identified as an offender.

IX. TECHNOLOGY SELECTION:

A. Regression Based Object Detectors(YOLO)

Regression-based object detectors such as You Only Look Once (YOLO) [5] and Single Shot Detector (SSD) Multibox have been shown to be significantly faster than region-based object detectors. It has been. Of the two, YOLO has long been the most popular choice among other similar object detectors. It takes the whole thing as input at once. This makes it significantly faster than other detectors. The model pipeline expects an RGB image divided into grid cells S×S.

Each grid cell is responsible for predicting the B bounding box. Five values are predicted for each bounding box: x, y, w, h, and c. The coordinates of the center of the bounding box for the grid cell are x,y, and the width and height of the bounding box are w and h. The confidence value for an object that exists within the bounding box is c. For class probabilities C, the output of the object detector is a shape tensor.

(S×S×(B×5+C))

B. Detecting Masked Face in the Wild Using LLE CNNs

In, the authors suggested using not only the MAFA dataset, but also the Locally Linear Embedding (LLE) CNN. This model classifies faces as being covered by natural occlusion, such as hands, and other occlusions, such as various types of face masks. This was a breakthrough model in which he outperformed all other models by achieving an average accuracy (AP) of 76.4% on the MAFA [3] face recognition test set.

C. YOLOv3 and Deepsort to Track Individuals in Surveillance Footage

Here, we implemented YOLOv3 object detection and deepsort object tracking algorithms for tracking people in surveillance video. Therefore, each person at position (x,y) maps to the 3D feature space (x,y,d). where d is the person's apparent depth to the camera. The L2 norm is calculated with two of her. Next, the paired person proximity thresholds are dynamically updated based on the person's spatial position relative to a specific range of pixels. Note that the threshold range is set in pixels between (90, 170). In other words, depending on the camera position, there is no tolerance for calibration.

D. Monitoring Face Masks and Social Distancing on Surveillance Footage

Khandelwal et al. focuses on using computer vision-based object recognition models to monitor masked faces and social distancing violations using surveillance camera footage. This solution is specially designed for factoryconstruction. A two-step solution was implemented to detect masked faces. The image is first passed to a facial recognition model using the MobileNetV2 model.

The resulting faces are classified as masked or unmasked using a binary mask classifier. The model was trained on the original dataset. For social distancing, the author uses her SSD for person class detection. The authors implemented his procedure of selecting four points forming a quadrilateral and performing a perspective transformation to allow him to measure a given distance on one plane. To compare these distances against a threshold, you must specify the absolute distance between the two points.

This is feasible in factories and enclosed spaces, but expensive and time consuming in public places and roads. It should be noted that these two models are separate entities and no integrated solution is presented.

X. IMPLEMENTATION

A detailed description of the various experiments performed in this work is presented in this section. This includes video sequences recorded from the floor plan. Data collection is divided into 70% and 30% training and testing. Movement of people throughout the scene is unrestricted. People in the scene move freely. Their visual appearance is affected by radial distance and camera position. From the sample images, we can see that the visual appearance of humans is not identical and that the subjects in the dataset differ in height, pose, and scale.

I used OpenCV for the implementation. The experimental results are divided into two subsections. First, we describe the test results of the pretrained model, and the second subsection describes the results of the recognition model after applying transfer learning and training to the overhead data set. For comparison, test the model using the same video sequence. This section also provides a model performance evaluation along with a comparison with various deep learning models.

Transfer learning techniques are used to improve the accuracy of the detection model.

Using the overhead data set, the model is trained on another 500 sample frames. To train the model, the epoch size is set to 40 and the stack size is set to 64. A new layer is obtained after the model is trained. This is supplemented with more pre-trained models.

In this work, we use deep learning models and an overhead perspective to evaluate the performance of social distancing monitoring frameworks using various quantitative metrics. Precision, Recall, and Accuracy are used to evaluate the efficiency of the recognition model. Furthermore, the findings are also compared with other deep learning models. We used tp true positives, fp false positives, tn true negatives, and fn false negatives to estimate accuracy, recall, and precision. We can analyze that the overall performance of the recognition model improves when the model is further trained on the top view dataset.

XI. CONCLUSION

Create a well-integrated social distancing violation detection system with object detection in YOLO v3. Using the coordinates obtained by perceiving the Person class, we use the principles of optics to estimate the relative distance between her and her two. After rigorous testing, we found the Model to provide fairly accurate results over a wide field of view. This is an essential criterion for use in public places.

With no additional time-consuming calculations or image distortion, this lightweight model is easy to calibrate and works well in real-time with high FPS and excellent accuracy.

In this project, we have developed a program that

recognizes people who are less than 1 meter taller than her and indicates that they are violating social distancing rules with a RED bounding box. Otherwise, a green bounding box means social distancing is maintained.

ACKNOWLEDGMENT

This paper on 'Social Distancing Violation System YOLO version 3' is a result of the motivation and co-operation by my guide Dr Rekha Sharma and teacher Dr. Sheetal Rathi.

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Smart Home Application using AR and IOT

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Abstract— **AR technology reduces design time and energy use. Utilizing AR technology ingeniously can address persistent design issues. The current cycle of the home design business, significant investment, and emphasis on enhanc- ing human-computer interaction shows the level of living space design. We combine the most recent AR techniques in this subject using our interdiscipli- nary knowledge. In this paper, we have presented our work on an IOT- integrated AR framework that is applied to the smart home. An AR-based UI is designed for the end user using a Unity Hub. It is a system that looks for a pre- defined target picture. Scanning target images provides users with access to controls for items such as sensors, fans, light bulbs, etc., via a 3D framework. A target image is chosen in advance so that whenever the Android application scans it, an AR control panel will be presented to the user. Predefined buttons on AR control panels will serve as controllers. Also, data received from the sen- sors are visualized on these AR panels. In the IOT part, NodeMCU is used to provide a cloud server. It will read data present on the cloud sent by the AR control panel or the sensors connected to NodeMCU. NodeMCU will react to that information by operating the devices connected to it.**

Keywords—: IoT, Augmented Reality(AR), Internet of things(IOT), Smart Home Application, Unity..

I. INTRODUCTION

Intelligent devices and today's smart lifestyle have created entirely new opportunities for human-machine connection. AR is among such technologies that have created human-machine interaction. The term "augmented reality," or "AR," refers to a tech- nology that superimposes digital data over the user's perception of the outside world. Numerous devices, including smartphones, tablets, and dedicated AR headsets, can be used to experience it. AR technology is ideally suited for home automation because it enables consumers to engage with digital information in a more natural and intuitive way. In-home automation, AR can be used to create a more user-friendly interface for controlling connected devices. For example, it can be used to display a virtual repre- sentation of the user's home, with the ability to turn lights on and off, adjust the tem- perature, and check the status of security cameras by simply tapping on the virtualrepresentation of the device. The deeper the research goes the more creativity and innovation flow out. [1] Discusses a method where a sensor is used to determine if a person is in the home or not and to operate the appliances accordingly. Additionally, the solution displays a message that details the homeowner's typical energy consump- tion. Additionally, it checks the gas level in the gas cylinder; if it reaches a certain level, it automatically books the gas and notifies the home's owner with a reference number. [2] mentions technologies, specifically the Internet of Things, Artificial Intel- ligence, and Augmented Reality are becoming increasingly popular and are being experimented with by both large corporations and young engineers. The talk about how remote control of these components through voice commands using a smartphone is being discussed and studied. In the manufacturing sector, augmented reality (AR) and the internet of things (IoT) can streamline automation activities and enhance monitoring [3]. It's interesting to observe how improvements in computer vision, mobile computing, and tablet screens are rekindling interest in augmented reality and how it might simplify difficult automation chores by offering lifelike real- time animation for monitoring and automation on the Internet of Things. Also, vari- ous actions can be performed by utilizing augmented reality through image pro- cessing, allowing for objects to be recognized and matched to a database. There are systems that implement [4] object recognition and provide an AR control panel with preconfigured options for device control and sensor data visualization. Such a system must be designed to be scalable and customizable, and have minimized latency from object detection to device control. Users could find it simpler to comprehend and operate the system as a result. AR can also be used to enhance the visual feedback provided by connected devices. For example, a user could use AR to view a virtual representation of their home, with the ability to see the status of lights and appliances in real-time, and even get visual alerts when something needs attention. The system must be as comfortable as possible for the user. The Internet of Things (IoT) is the network of connected objects that use the internet to carry out logical operations, store data on the cloud, and transmit data. IoT includes machine-to-machine (M2M) communication as a component. Deploying Smart Homes, which are characterized by automation, multifunctionality, flexibility, interactivity, and efficiency is currently the key trend in IoT. IoT is important in the fourth industrial revolution, and smart home systems, also known as home automation systems, are gaining popularity as a way to enhance comfort and quality of life. The system described in [5] [6] is an IoT-based, low-cost smart home automation system that uses an ESP32 Wi-Fi module to monitor the status of household equipment. The recent development of the Internet of Things (IoT) and how it has affected the emergence of Smart Homes (SH) and Smart Cities (SC) is noticeable. A long-held goal for many years, smart homes are a key component of smart cities. The research study on SH and IoT technologies yielded seven distinct requirement recommendations for creating SH, which are defined here by [7]. The unique quality of the SH building blocks is used to categorize these recommendations. Modern microcontroller units (MCUs) play a crucial role in home automation by providing the necessary processing power and connectivity for devices to communicate with each other and with a central hub or smartphone app. [8] Demonstrate and analyze the control of home appliances using AR and IoT through a Wi-Fi-based

microcontroller. It also shows how the sys- tem works with multiple devices and how AR and IoT are complementary to each other. Performance measures such as transmission time and Received Signal Strength Indicator (RSSI) are used to evaluate the performance of the system. MCUs are often used in devices such as smart thermostats, smart lights, and smart door locks to control and monitor their functions. The Internet of Things is a system of interconnected gadgets that can collect and distribute data (IoT). Through a smartphone app or central hub, IoT devices like smart speakers, security cameras, and appliances can be remotely controlled and monitored in the context of home automation. Together, MCUs and IoT enable a wide range of home automation functionality, such as remote control of lighting and temperature, automated scheduling, and even integration with voice assistants like Amazon Alexa or Google Assistant. This allows for greater con- venience, energy efficiency, and security in the home. [9] talks about neural fuzzy system for controlling home appliances, with the goal of providing efficient and con- venient integration and inter-operation among appliances in households. The system uses linguistic rules processed by a fuzzy system and adapts itself to the occupants' lifestyle. The implementation of the controller can be demonstrated using the MATLAB/SIMULINK development environment, which includes functions for hardware and internet access. The system can also be applied to control non-time- critical processes. [10] suggests utilizing an app called HoloFlows for smart glasses to use augmented reality (AR) to streamline the modeling configuration of IoT work- flows. By simply connecting two or more physical IoT devices via virtual wires, this program enables end users to explore their surrounding IoT environment and model many types of fundamental processes including sensors and actuators. The under- standing of physical settings and relationships between IoT devices is made easier by AR technology, which also offers a fresh, more logical way to model operations in the cyber-physical world. Several IoT workflows from the smart home domain are used to demonstrate the HoloFlows app. [11] [12] suggests a smart appliance controller that effectively controls aftermarket home products using augmented reality (AR), MQTT, and other platforms. The suggested system is assessed using a number of tests and performance measures, and it uses mobile AR, IoT, and infrared (IR) signals to manage home appliances. The outcomes demonstrate how quickly MQTT can be used to construct a home automation system. The paper also introduces a Raspberry Pi and IoT-based Smart Home Automation system. The system employs computer vision algorithms on the Raspberry Pi to combine cameras and motion sensors into a web application and manage home appliances. Unity is used to create augmented reality (AR) applications. Unity provides a range of tools and features for creating AR experiences, including a visual editor for build- ing 3D scenes, a physics engine for simulating real-world interactions, and a scripting API for programming custom logic. When creating an AR application in Unity, de- velopers typically use the engine's built-in support for AR platforms such as ARKit and ARCore, which provide the necessary APIs for accessing the device's camera, sensors, and display. Developers can also use Unity's support for Vuforia, an AR platform that allows for image and object recognition and tracking. Once the AR ex- perience is built, Unity can be used to export it to various platforms, including iOS Android, and Windows. This allows developers to create AR applications that can run on a wide range of devices, including smartphones, tablets, and head-mounted dis- plays. A smart home application using augmented reality and the Internet of Things would allow for the overlay of virtual information onto the user's physical environ- ment, enhancing their interaction with connected devices. Overall, the integration of AR and IoT in a smart home application has the potential to improve the user experi- ence and make interacting with connected devices more intuitive and seamless.

At last, we have to look for user convenience. [13] [14] Home monitoring and au- tomation should make comfortable living conditions within a home, such as thermal comfort related to temperature and humidity, visual comfort related to colors and light, and hygienic comfort related to air quality. These things are to be considered while making such projects. [15] [16] [17] focuses on identifying behavioral changes that might be connected to health occurrences using sensor data gathered from smart home environments. To find changes in routine behavior and health events, the data is examined using behavior change detection and activity recognition. The study also addresses the issue of class imbalance in deep learning for data from smart homes, offering a data-level perspective with a temporal window strategy to handle the une- ven human activity and enhance classification performance. Last but not least, the research proposes a strategy that delays recognition to incorporate sensor data that arrives after the choice is taken, employing multiple incremental fuzzy temporal win- dows to extract features and obtain better outcomes than the real-time approach in dementia diagnosis. [18] [19] Discusses about providing an economical, low-cost platform for energy monitoring and smart home control (AR). The objective is to raise awareness of energy use while developing innovative ways for individuals with impairments to interact. The system uses augmented reality to display the real-time energy consumption of electrical components, enabling users to interact with the sys- tem and access saved data for energy monitoring. The report also discusses how aug- mented reality, voice control, and a web server are used to let the elderly and partially disabled control household appliances remotely, thereby lowering expenses and the demand for caretakers as the country's aging population grows.

Therefore, proper research is necessary to study the problem from different per- spectives. [20] gives a summary of earlier studies on smart homes, including the tools for regulating and monitoring the indoor environment. It discusses the components that make up smart homes, including sensors, multimedia devices, communication protocols, and systems, and teaches how to employ specialized algorithms drawn from a variety of subjects in the context of smart homes. Additionally, it offers rec- ommendations for further study into the creation of useful and sustainable smart homes.

As a result, we have made an effort to create a project that will implement AR with IOT. Lightbulbs and motors are among the pieces of machinery that will be controlled by an AR interface. Additionally, data from the DHT11 sensor will be shown on an AR interface. Two Android applications were made using Unity, one to display data and the other to serve as a controller. Blynk is used to generate APIs for reading and writing data and virtual buttons to send instructions for which they are programmed. Vuforia is also used to use AR tools in Unity. The image target which will be scanned by the android application is stored in the Vuforia database. The license key for build- ing applications in Unity is also received from Vuforia. NodeMCU provides built-in support for Wi-Fi connectivity. It is relatively inexpensive, easy to use, and has a strong community of developers and users. So, it is used to control the device remote- ly.

II . PROBLEM STATEMENT

The goal is to develop a software program that will enable users to remotely monitor and operate devices. At the conclusion, we will show the DHT11 readings on an AR interface in an Android application. We will also use a similar AR interface to operate a DC motor and light bulb. The project's overarching objective is to improve users' experiences of living in their homes by making them more practical, effective, and secure.

III Proposed System

III. 1- Hardware Components

4-Relay Module, NodeMCU, Light bulb (9W), Breadboard, Jumper wires, DC motor, DHT11 sensor, 9V battery.

Device Description:

1. Relay Module: A relay module is an electrical switch that is activated by an elec- tric current. It is often used to control a high-voltage circuit with a low-voltage sig- nal, such as a microcontroller or a switch. The module typically consists of a relay, a diode, and a transistor or other driver circuit. The relay can be controlled by ap- plying a voltage to the input pins, which causes the relay's internal contacts to switch, thereby turning the high-voltage circuit on or off.
2. Node MCU: NodeMCU is an open-source development board that is based on the ESP8266 microcontroller. It includes on-board Wi-Fi, which allows it to connect to the internet and other devices wirelessly. The board also has a micro-USB port for power and programming, as well as a number of GPIO pins for connecting to sen- sors and other peripherals. NodeMCU can be programmed using the Lua scripting language, as well as the Arduino IDE, which allows for easy access to the board's capabilities. It is commonly used for Internet of Things(IoT) projects and home au- tomation.
3. DHT 11: The DHT11 is a basic, low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and sends digital signals on a single data pin to a microcontroller. The DHT11 sensor is made of two parts, a capacitive humidity sensor, and a thermistor. The DHT11 is a commonly used sensor for temperature and humidity measurements in various applications such as home automation, weather stations and HVAC sys- tems. The sensor has a range of 20-90% for humidity and 0-50°C for temperature with an accuracy of ±5% for humidity and ±2°C for temperature.

III.2 Software

Blynk Cloud, Unity Hub, Vuforia, Arduino IDE, Microsoft Visual Studio.

Software Description:

1. Blynk Cloud: Blynk is a cloud-based platform that allows users to easily connect and control IoT devices. It provides a mobile app and a web-based dashboard that can be used to create and customize user interfaces for controlling devices, as well as a set of APIs and libraries for connecting devices to the Blynk cloud. The Blynk app allows users to create virtual buttons, sliders, graphs, and other widgets that can be used to control devices or display data. The Blynk libraries can be used to connect a variety of microcontrollers, such as the Arduino, ESP8266, and Raspber- ry Pi, to the Blynk cloud, allowing devices to be controlled and monitored remote- ly.
2. Unity Hub: Unity Hub is a management tool for Unity, a cross-platform game en- gine used to develop video games, simulations, and other interactive 3D, 2D, VR and AR content. Unity Hub allows you to manage and organize your Unity pro- jects, as well as easily install and manage different versions of the Unity Editor. With Unity Hub, you can easily switch between different Unity versions, and have multiple versions of Unity editor installed on the same machine. It also allows to easily import and manage your Unity assets and packages, and access the Unity documentation and learning resources. It also has a feature of creating and manag- ing multiple Unity Projects in one place, making it easy to switch between different projects or collaborate with other team members.
3. Vuforia: Vuforia is a software platform for creating augmented reality (AR) expe- riences. It allows developers to create AR applications that overlay digital content, such as 3D models, on the real world using a device's camera. Vuforia uses com- puter vision technology to detect and track specific "image targets" such as QR codes, images or even 3D objects, and then overlays digital content on top of those targets. Vuforia offers a range of features including support for multiple platforms, image and object recognition, 3D model rendering, and multiple tracking capabili- ties. It also has a feature of VuMark, which is a customizable, printable marker that can be used to trigger AR experiences.

The proposed system includes the implementation of AR and IOT in home automa- tion. We have developed an android application using Unity software to put AR inter- face in the front end. The device camera is media for

human and machine interac- tions. NodeMCU is used to launch a cloud server. It is interfaced with various potential home appliances which can be controlled. In our case it is light bulb and a DC motor. Also it has job to take real time information from sensors, in our case it is DHT11 sensor. This system shows bi-directional communication between each other. NodeMCU will be sending signal to operate devices while it will also be receiving real time data from sensors. The devices can be controlled by deploying the cloud server over the internet. This will give remote access to those devices and can be op- erated in real time wirelessly.

IV IMPLEMENTATION

The implementation can be divided into two sections IOT part and the AR application part.

IV.1 IoT implementation

In IoT, first, we have created blynk project with ESP8266 as a board and connection type Wi-Fi. In the blynk project virtual buttons are created and configured. These virtual buttons will act as switches. Virtual buttons V0, V1, V2, V3 are created. Fur- ther in the hardware part, we have integrated a Light bulb (9W) and motor with NodeMCU via relay. Relay is used so we can control high voltage circuits of bulb and motor via low voltage of NodeMCU.
Pin connections from Node MCU to 4-relay module: D1 pin connected to INT 4 pin.
D2 pin connected to INT 3 pin. GND pin connected to GND Vin pin connected to VCC

Pin connections from Node MCU to DHT11: D3 pin connected to data pin(D)
3V3 pin connected to Vcc pin GND pin connected to GND pin

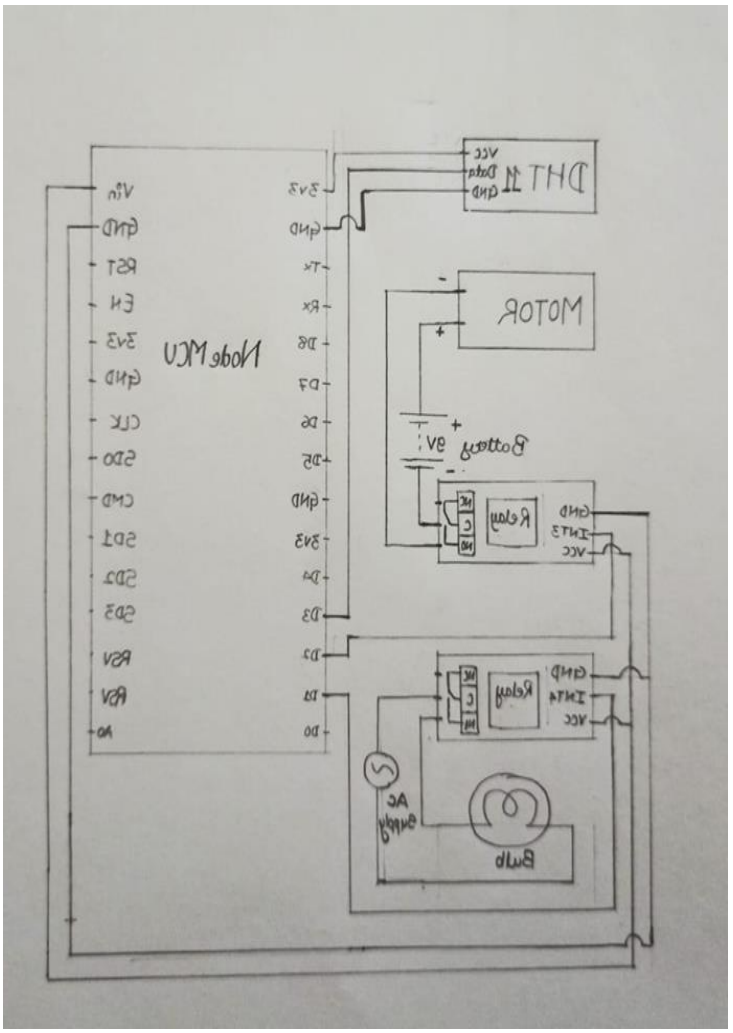

Fig. 1. Circuit diagram

Both the light bulb and motor are connected to a high voltage circuit via a relay in normally open condition. DC motor is provided the power using a 9V battery. On other hand, the Light bulb is connected to an external AC source. V0 and V1 are the virtual buttons assigned for the motor and bulb respectively. These buttons will be assigned APIs to control the respective devices. API format:
https://{server_address}/external/api/update?token={token}&{pin}={value}. This API is used to update the datastream value. V2 and V3 are the virtual buttons assigned for humidity and temperature readings respectively. These buttons will be assigned APIs to read the data sent by the DHT11 sensor. API format: https://blynk.cloud/external/api/get?token={token}_&{pin}. This API is used to get the datastream value.
At last, we created logic in Arduino IDE to launch the Blynk server and control the devices over the internet via APIs.

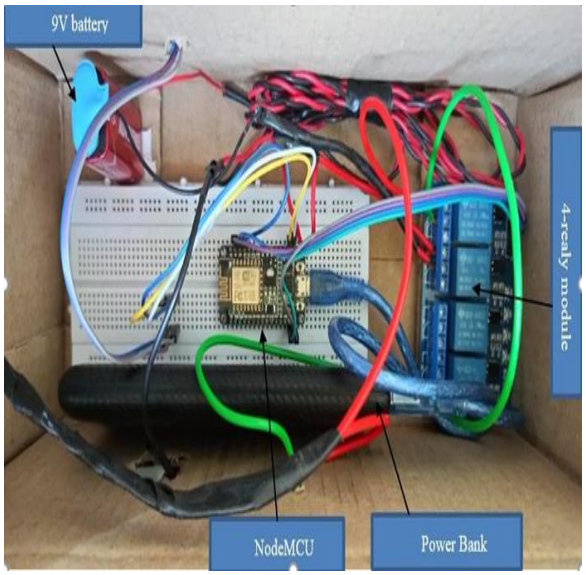

Fig. 2. Hardware Setup

Fig. 3. Blynk Console Dashboard

Fig.2. shows the hardware setup of the project. A 9V battery provides power to the motor. The light bulb receives power from an external AC source. Both light bulb and motor are connected to their respective power source via a relay so that they can be manipulated using a low voltage circuit to which NodeMCU is connected. NodeMCU is programmed with the concerned code priory and is provided with pow- er via a power bank.
Fig.3. shows the blynk dashboard. We can see the configured buttons of our project here.

IV.2 AR implementation

The first step is to integrate the Vuforia engine into Unity so that we may add aug- mented reality functionality to our mobile application. The target image will be added to the Unity project. We will need to create a database in Vuforia for that. The image of our choosing is included in the database, which is subsequently imported into Unity. We will go on to construct an AR interface utilizing various Unity technologies. The logic to each button is added by the C# script. The C# script editing process takes place in Microsoft Visual Studio. Similarly, another unity project is created with the same target image to display readings of DHT11 on the AR interface. There is a start button in this application which is a virtual button. This button is virtual so one must hover over the button so that it can be clicked. Upon clicking, the AR interface shows the reading of temperature and humidity. The display will show a reading of the moment when the button is clicked. In the end, both unity projects are built in an android application. These applications when launched will open the device camera. Whenev- er the camera will capture an image target the screen will display the AR interface. Fig.4. Shows the image target that is used in the project. Vuforia rates each image in the database out of 5 stars. If the image meets the Vuforia standards the more the rating image gets the more easily it is identified by the device. The image used in this project has a 5-star rating.

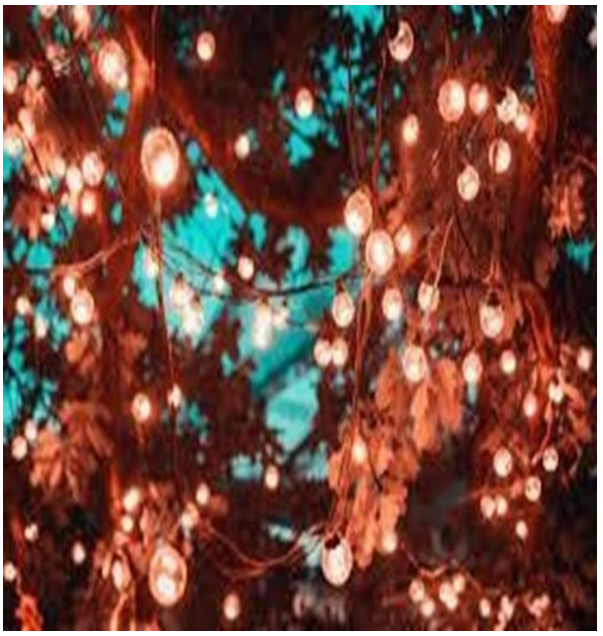

Fig. 4. Image Target

V RESULTS

At the end of the project, we successfully built two AR applications. Fig.5. and Fig.6. shows the AR display. In the figure, we can see the reading of temperature and humidity received from the DHT11 sensor. The data received from the sensor is suc- cessfully shown whenever the virtual button ―start‖ is clicked. Fig.7. shows the AR controller interface. It is equipped with ON/OFF buttons for light and motor. Themotor and bulb successfully respond to the instruction but the latency varies. Fig.8. shows the outer section of the model. It is a cuboidal box. We have a DHT11 sensor and motor attached at the long side of the box while the bulb is on the short side of the box

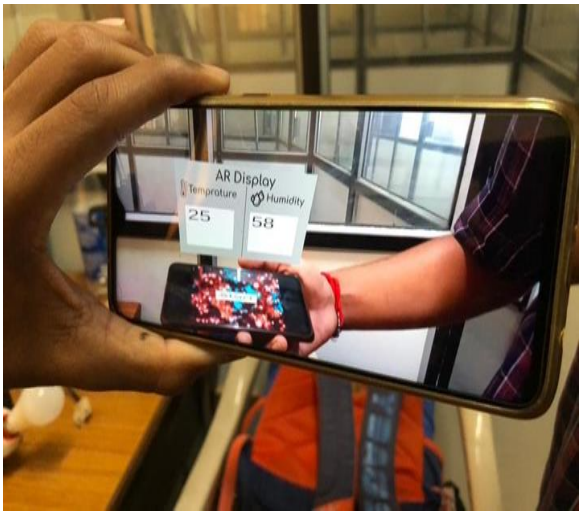

Fig. 5. AR Display showing readings-1

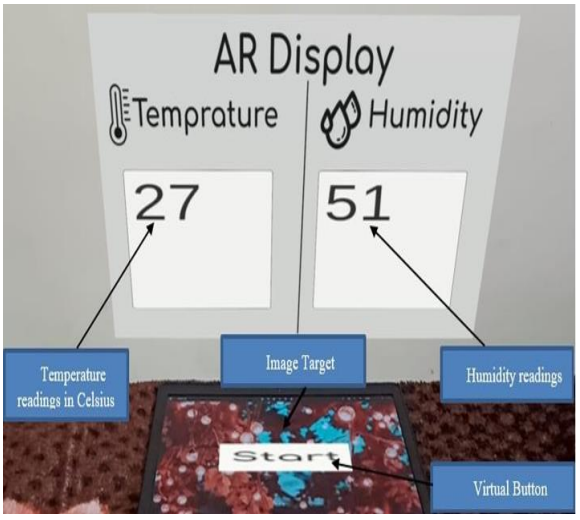

Fig. 6. AR Display showing readings-2

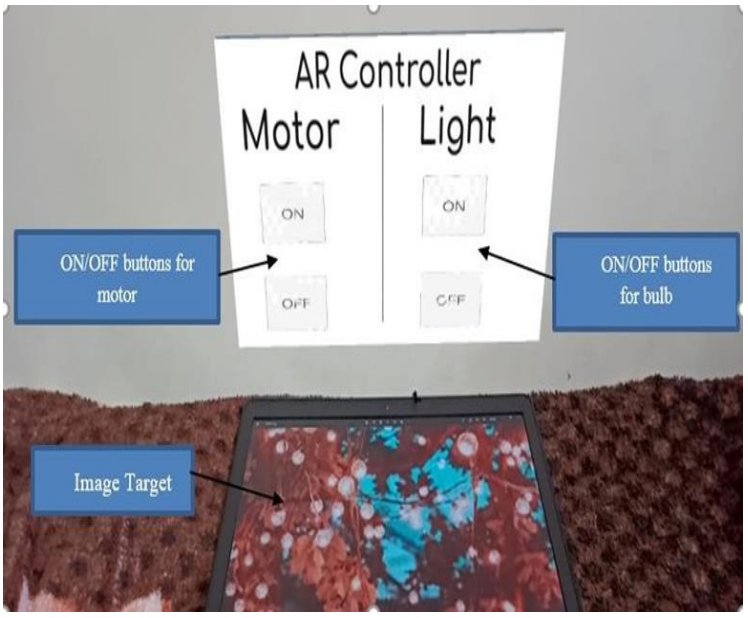

Fig. 7. AR controller

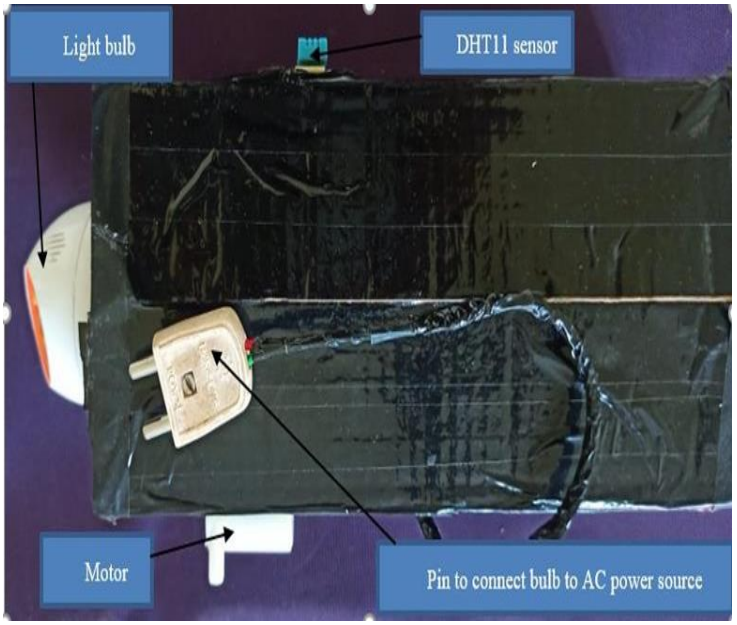

Fig. 8. Outer Section of Model

VI Conclusion

This project includes the successful implementation of AR and IoT for smart homes. The advantage of this system is that it is compact and gives an enhanced user experi- ence. AR provides visual information about the status of devices here it's the tem- perature and humidity of a room. This can make it easier for users to interact with these IOT-enabled devices. There is increased automation and easy integration of smart devices because IOT-enabled devices can easily communicate with each other.

Future scope:

This project has vast potential in the future. Like the use of IOT to gather data on energy usage and consumption, which can be used to optimize energy efficiency and reduce costs. The integration of voice assistants, such as Amazon's Alexa or Google Assistant, to control devices and perform tasks. The use of machine learning algo- rithms to improve the performance of the system and adapt to the user's preferences and habits. The integration of security features such as motion detection, facial recog- nition, and live streaming. The integration of other smart devices and systems, such as smart locks, security cameras, and smart appliances.

It is worth noting that this is not an exhaustive list and the scope of the project will depend on the specific goals and requirements of the project.

Acknowledgement:

The authors would like to express their sincere gratitude to Prof. Ajay Talele for their invaluable support and guidance throughout the research and writing process. Finally, the authors would like to thank their families and friends for their unwavering support and understanding during the time spent completing this research.

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Financial Fraud Detection and Loan Prediction using Machine Learning

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Abstract— **Fraud detection is the process of identifying and preventing fraudulent activities. It helps banks and customers by protecting their personal and financial information, reducing loan default risk, and improving customer retention. Fraud detection techniques include data analysis, machine learning, and biometrics to identify and stop fraudulent activities before they cause harm. Now there are many ways for a person to commit fraud actions hence detection can be difficult. The aim is to find genuine applicants for the bank to avoid the arising issues. Fraud detection can help the bank and as well as customers from many problems such as personalized information security. Loan status makes sure that a loan is approved by the person who can repay on time or before time. Customer churn can help reduce churn by acknowledging the gap and working on it.**

Keywords—Naive Bayes, Logistic Regression, Random Forest, Decision Tree, Bank loan prediction, financial fraud, CART (Classification and Regression Trees

I. INTRODUCTION

As we are aware of the fraudulent activities taking place which can lead to many frauds and losses to banks and as well as customers, personalized information can get in the wrong hands. Fraud can be committed in many ways. The customers hand over their personal information to the bank so it is necessary to keep it safe. Credit card fraud detection with machine learning helps to keep the data safe with the development of the model [1]. Also, whether the loan is approved or not is a big task. Only legitimate loan applicants will receive approval. The purpose of customer churn prediction is to identify customers who have ended their relationship with a company. [3]. The features due to which the customer has churned then are taken into consideration and then the model works on it to let the bank know about it and then make the features stronger. After entering certain required information then the model grabs all the information and predicts the results. Banks make a profit through loans. Many people require loans. But banks expect these people to be genuine applicants for loans [5]. To recognize a sterling applicant, banks perform checking manually, but this will take a longer time and result in more usage of bank resources. Therefore, we are developing machine learning algorithms, so that the system can effortlessly predict eligible candidates for loans [2]. Utilizing AI calculations utilizing the all-around existing datasets, we can make expectations for obscure datasets. Also, banks offer credit cards to their customers, it is similar to loans as they help in buying everyday commodities. But the credit card details are strictly prohibited to share. If anyone steals a credit card and performs transactions as a legitimate person it goes undetectable until the person notices his or her credit card is stolen [4]. Therefore, it is important to quickly recognize if it is a legitimate transaction or not. As credit card details are sensitive banks are not allowed to share and hence only banks can find the legal transaction. Customer retention has a predominant impact on a bank's profit and overall revenue [6]. To renew the services for the customers, primarily we have to understand "why" the customers are quitting the bank. To acknowledge the shortcomings that made customers quit is mandatory this can be automated using machine learning algorithms.

II. LITERATURE SURVEY

In [1], they have performed data normalization before applying Naive Bayes and Clustering which provides only 50% accuracy. Based on supervised learning. Prone to overfitting problems, the Naive Bayes algorithm provides less accuracy where limitations are faced. In [2], they have used machine learning algorithms such as Logistic Regression, Random Forest, Support Vector Machine, and XGBoost predict the eligibility of an applicant for a loan. Determine the best model with maximum accuracy. Concluded that Logistic Regression provides better accuracy than other models. This paper concludes that Logistic regression provides the best accuracy, but there is no implementation for the same.

In [3], they have built a method to predict the customer churn in a Bank, using machine learning techniques KNN, Decision Tree, and SVM. The conclusion is that random forest is way more useful than other models. Focus on the people who use fewer products. Doesn't work well with a large dataset Doesn't work well with a high number of dimensions Sensitive to outliers and missing values.

In [4], as Data Mining Technique Bayesian network classifiers namely K2, Tree Augmented Naïve Bayes (TAN), and Naïve Bayes, logistics, and J48 classifiers. Bayesian Network is a threshold-based model that computes the sum of the output accumulated from child nodes. Accuracy is less compared to Random Forest Algorithm. Assumes that every dataset feature is independent of each other.

In [5], An Approach for Prediction of Loan Approval using a Machine Learning Algorithm. Used a logistic regression approach, to target the right customer for granting the loan. Concluded that applicants with high

incomes and demanding lower amounts of loans are more likely to get approved since they are more likely to pay back their loans. Other characteristics like gender and marital status seem not to be taken into consideration Characteristics like gender and marital status seem not to be taken into consideration.

In [6], Customer Churn Prediction Model using Regression with Bayesian Boosting technique in Data Mining. Prediction algorithm logistic regression is applied to classify the labelled set as churners and non-churners. Handles the great bias problem in the regression model. Prone to underfit while having more attributes. The outcome fully depends on the set of independent variables.

From the above survey we have concluded there is no such web application we will predict outcome for unknown dataset. Also, there isn't any user-friendly interface to check accuracy of algorithms.

III. RESEARCH GAP

- Existing systems have just been compared and stated which algorithm is best.
- It is found that the Random Forest algorithm provides maximum accuracy over Logistic Regression and Naive Bayes algorithm.
- Instead of just detecting the best algorithm, providing an actual implementation would be benign.
- Testing a model using an unknown set of data helps to avoid overfitting problems resulting in good performance of your model in the test set.
- No deployment is done, that is no website is available to access.
- Developing a User Interface which can be user-friendly helps banks to perform secure transactions and avoid abnormal use of data.
- Random forest algorithms are found to handle missing data, just not in the same way as CART (Classification and Regression Trees) and other similar decision tree algorithms do.
- Analysation methods can be used to reduce churns. These methods may include understanding the patterns and improving the Onboarding process.

IV. PROBLEM STATEMENT

Banks handling all the tasks for prediction and detection manually by employees makes them more prone to erroneous outcomes. Also, it uses many assets of banks such as capital for the income of that employee, resulting in more usage of time resources of the bank, etc. Also, human fraternizing behaviour and misconduct can often lead to biased decisions. Therefore, it is essential to automate everything using machine learning algorithms as they are more pragmatic. Machine Learning algorithms undertake tasks faster, with less usage of bank resources, and can predict up to 99% accurate outcomes which are more reliable because it is all calculated using reasonable and realistic datasets using mathematics. "Financial Fraud Detection and Loan Prediction using ML" uses Machine learning classification algorithms such as Random Forest Classifier and Logistic Regression to predict the outcome after training the data. Data cleaning is done as machine learning algorithms are unable to deal with categorical data and null data.

A. Objectives

- To avoid abnormal transaction,
- To analyse churn and helps to reduce it by providing better services,
- To predict whether granting a loan is safe or not for banks to decide,
- To check the loan status and availability of the same by customers,
- To detect fraud to avoid the abnormal use of data,
- To avoid credit card fraud, the bank immediately warns the customer to cancellation of the card,
- To identify and prevent unauthorized financial activity,
- To automate and make every task faster,
- To make unbiaseddecisions.

V. METHODOLOGY

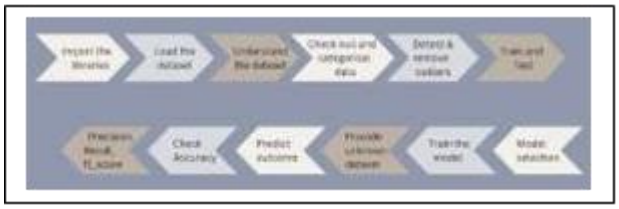

Fig. 1 Workflow and Overview

This diagram shows the flow of model creation. Step 1: Data Preparation

In this paper, Kaggle datasets are used for all three models including Credit Card Fraud Detection, Loan Eligibility Prediction, and Customer Churn Prediction. Features for training the data are used as mentioned in the figure below.

Fig.2.1. Data description is taken from Kaggle

Fig. 2.2. Data description is taken from Kaggle

Fig. 2.3. Data description is taken from Kaggle

Fig. 2.4. Data description is taken from Kaggle

Fig 2.1 depicts the dataset for Loan Status Prediction

And fig 2.2 and 2.3 depicts the dataset for Credit Card Fraud Detection and fig 2.4 shows the dataset used for Bank Customer Churn

Step 2: Data Pre-Processing

A. Handle categorical data using pandas "get_dummies" is a function in pandas that is used to convert categorical variables into numerical variables, also known as one-hot encoding. This transformation allows machine learning algorithms to handle categorical data, which are typically represented as strings, and use them in the training process. The resulting transformed data will have a numerical representation for each category, making it suitable for use in the training process. get_dummies will create a separate column for each unique category in the categorical feature. The resulting number of columns will equal the number of unique categories, so it is important to consider the size of the dataset and the number of unique categories in the feature before applying this transformation. Another way of handling categorical data is using fillna () and mode of values which is used in Loan Eligibility Prediction.

B. Under Sampling

Under-sampling is a technique in data pre-processing where the number of samples from the majority class is reduced so that the balance between classes in a dataset is improved. This technique is used in imbalanced datasets to balance the distribution of classes, reducing the potential for bias in the training of machine learning models.

C. Log Transformation

In the loan eligibility prediction model, log transform is applied to handle skew data using NumPy. Log transformation is a mathematical technique applied to data to modify its distribution by transforming the values using the natural logarithm (base e). It is often used to handle non-normal data, such as data with positive skew, outliers, or a large range of values, to achieve a more normal distribution, making it easier to model and interpret. Log transformation can also help stabilize the variance of the data, leading to more robust statistical analysis and machine-learning models.

D. Detect and Remove outliers

While testing a model 80% of the data is provided to the training model and 20% for the testing. So our models are trained using a training dataset, remaining unknown data can be used for testing which results in a good fit and provides better performance.

Step 3: Train and Test

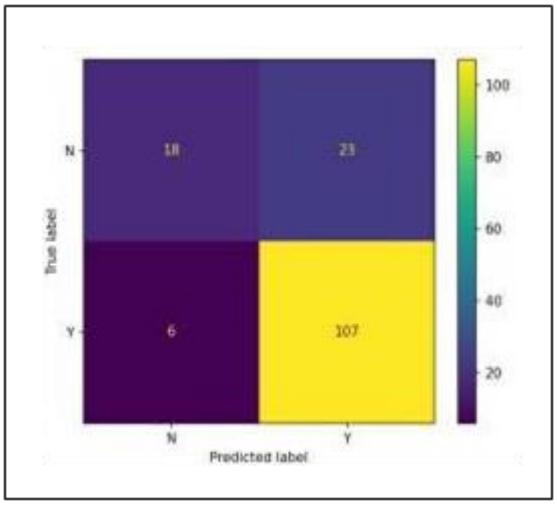

Fig.3 Confusion matrix for Random Forest Classifier in Loan Eligibility Prediction

This diagram shows the confusion matrix for random forest algorithm.

Models after cleaning and understanding of data go for training and testing. Training and Testing are done using train_test_split () which is in sci-kit learn. So we utilized this capability by bringing in it from sklearn.model_selection. This capability separates the highlights and focuses into x_train, x_test, y_train, and y_test. Breaking down the score of the preparation and testing model is utilized. It is used to analyse the score of the training and testing model. This function is used to test the accuracy of how our model predicts unknown data.

Step 4: Model Selection

We conducted a comparative analysis of several algorithms, including the Decision Tree algorithm, Naive Bayes algorithm, and the Random Forest Algorithm, and found out which one gives maximum accuracy in terms of prediction for unknown data.

Decision Tree Algorithm for Credit Card Fraud Detection:

A Decision Tree Classifier is a machine learning algorithm that is used for classification problems. It works by creating a tree-like structure, where each internal node represents a feature or attribute, each branch represents a decision based on the feature value, and each leaf node represents a predicted class label. The algorithm starts by selecting the best feature to split the data, repeats the process recursively until all the data is divided into leaves, and assigns a class label based on the majority class in each leaf.

Based on the score, the performance of our model can be calculated. Furthermore, based on the problem or after analysing the graph, model selection needs to be done. We are provided with the dataset and we need to decide for which we are interested in developing a classification or regression or clustering model. Therefore we preferred using classification models for Credit card Fraud Detection, Loan Eligibility Prediction, and Customer Churn Prediction.

Random Forest Algorithm for Loan Eligibility and Customer Churn Prediction:

The effectiveness of Logistic Regression, Decision Tree, and Random Forest in predicting loan eligibility has been compared, and it was found that the Random Forest Classifier offers the highest accuracy compared to other models. Random Forest is a versatile machine learning technique that can be used for both classifying and predicting outcomes. In this method, multiple trees are generated and each tree provides a prediction. The final prediction is then determined by the class with the greatest number of votes from the trees.

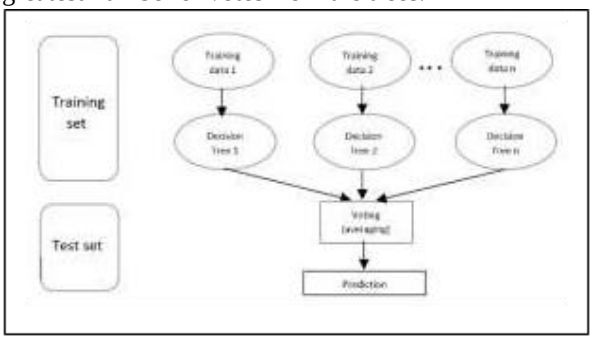

Fig 5

In fig 5 Random Forest Classifier is an ensemble machine learning algorithm that operates by combining multiple decision trees to produce a single prediction by aggregating or voting.

Step 5: Predict the Outcome

The predicted Outcome is the most important as it is for which we have implemented the project after training the model with known data.

Step 6: Accuracy, Precision, Recall, f1_score

The Confusion Matrix (CM) is used to analyse and determine the performance of the proposed loan prediction model.

- True Positive (TP), when both the actual and predicted values are positive (1)
- True Negative (TN), when both the actual and predicted values are negative (0)
- False Positive (FP), when the actual value is negative and the predicted value is positive (1)
- False Negative (FN), when the actual value is positive (1) and the predicted value is negative ()

Accuracy = TN+TPTN+FP+TP+FN (1)

Precision = TPTP+FP (2)

Recall = TPTP+FN (3)

F1 Score = 2*{Precision*Recall % Precision + Recall} (4)

VI. FUNCTIONALITIES

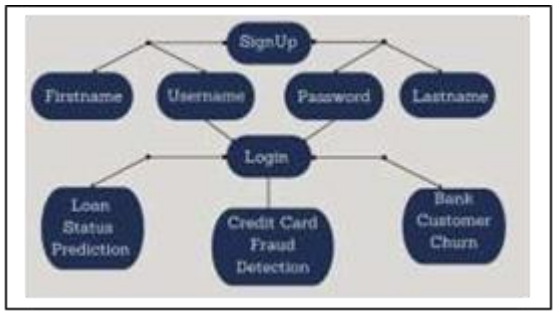

Fig.6. Interface Process design of the model. This diagram describes the main page layout.

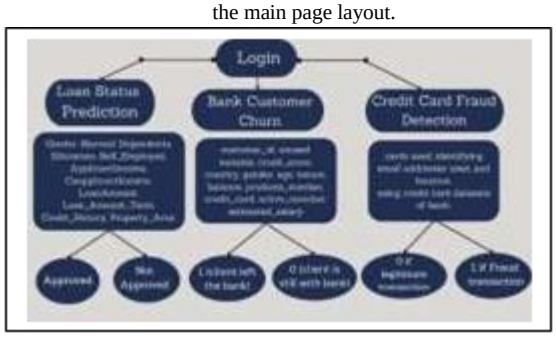

Fig.7 Interface Process design of the model

This diagram shows the features needed to predict outcome for single transaction.

In Fig 6, Financial Fraud Detection and Loan Prediction using ML: -

1] Loan Status Prediction

2] Bank Customer Churn Prediction 3] Credit Card Fraud Detection

Firstly, a bank employee needs credentials to get authorized access to the model. He needs to sign up using valid details like First name, Last Name, Username, and Password so that he could use it for further login.

Then there would be provided features to be filled in such as Loan Amount, Credit history, Applicant's Income, Dependants so that after training the data with this we can predict the outcome of the following to approve the loan or not.

In, Bank customer churn there would be credit score, balance, age, tenure, salary, products associated with bank, active member for the model to detect the churn. If the model predicted "1" then it would indicate that the client left the bank, and "0" then it would indicate that the client is still with the bank.

The bank, "0" if there would be a legitimate train, Credit card fraud detection model will detect fraud by considering the features like Average amount of transactions, current transaction amount, declined or not, foreign transaction or not using datasets of transaction and "1" if a fraud transaction is detected

VII. RESULTS

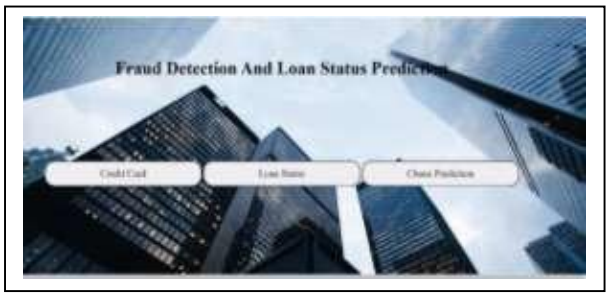

Fig.8 Main page

The main page of the website contains three sub-models namely Credit Card Fraud detection, Loan status prediction and Bank customer Churn prediction. Credit card fraud detection page then we go to the prediction We can see two sections which will first depict comparison of accuracy of various algorithms and second will predict for unknown values and give you if transaction is fraud or not

1] Credit Card Fraud Detection

Fig.10. This figure shows a User Interface where users can enter details about a transaction and get predictions for that single transaction.

Fig.11. This picture shows if a single transaction is legitimate or fraudulent.

Fig.12. User Interface for uploading csv file.
In this diagram model accepts csv file of n no. of transactions.

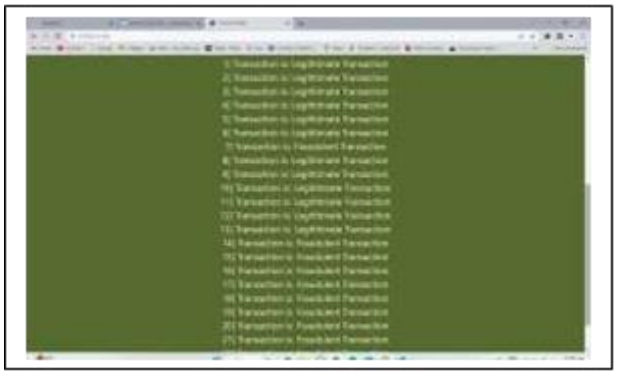

Fig 13. This picture shows which of the following transactions in the uploaded csv is fraud and which one is legitimate.

VIII. RESULT ANALYSIS

For finding the best algorithm we have found the accuracy, f1 score, precision, recall, and confusion matrix. The algorithm which will give the best accuracy will be used for our model. Following are the results that we will consider to get the best algorithm. We have seen that the Random Forest algorithm gives the best accuracy of about 85% and the rest algorithm's false negatives and false positives can create trouble and loss to banks and customers. In credit card fraud detection section, we have seen decision tree algorithm gives best accuracy of 91-92%. For bank customer churn and loan status prediction we have created user friendly website similar to the screenshots of credit card fraud detection website.

IX. CONCLUSION

Users will be provided with a website containing three models. Credit Card Fraud Detection helps to detect and prevent fraudulent transactions. Loan Status Prediction used to predict the eligible candidate to grant the loan and to decide whether to avail of a loan or not. Customer Churn Prediction is used to understand customer history and accordingly improve banking services.
Utilizing a variety of machine learning algorithms, this project is implemented using classification models to perform predictions. We wanted the best accuracy so we used Random Forest Algorithm for Loan Eligibility

Prediction and Customer Churn Prediction Decision Tree algorithm for Credit Card Fraud Detection.

To develop and train our model we have implemented several best practices. We have used the Flask framework to design our website.

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Security of Cloud Computing

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Abstract— **Security of cloud computing is a firm hand of cyber security devoted to securing cloud computing systems. Security of cloud computing or directly cloud security touch on to a board set of policies, technologies, applications, and controls utilized to protect virtualized IP, data, application, services, and the associated infrastructure of security of cloud computing.**

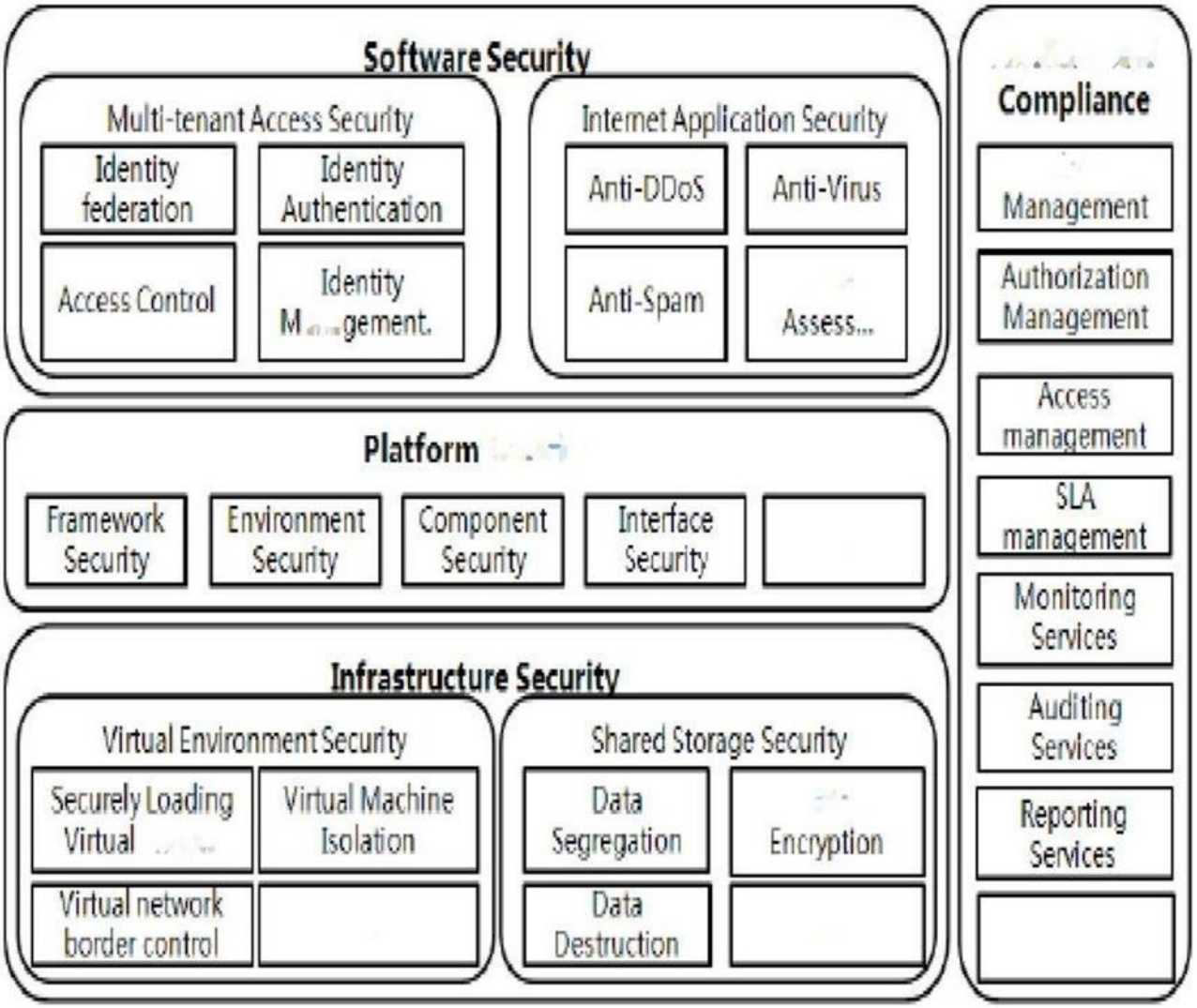
Keywords— Security, Cloud Computing

I. INTRODUCTION

The security of cloud computing is a collection of technology designed to address internal and external threats. Security of cloud computing or more clearly cloud security touch on to a board set of policie , technologies , applications ,and controls make use of to protect virtualized IP , data , application , services , and The related infrastructure of cloud computing .Cloud computing Industry is growing .According to Gartner, World Wilde cloud services revenue is on pace to surpass $6.3 billion in 009, a .3% increase from 008 revenue of 6 . billion, according to Gartner , Inc. The market is expected to reach $0. billion in 03. Business are increasing cloud adaption. We expect a great deal of migration towards cloud computing within the federal government in addition to the already robust private sector growth. The growth of the cloud should not protect the data that goes into it.

II. ARCHITECTURE

Security in cloud computing is a major concern. Proxy and brokerage servies should be employed to restrict a client from accessing the shared data directly. Data in the cloud should be stored in encrypted form.



III SECURITY OF CLOUD COMPUTING

Security is protection from, or resilence against, potential harm caused by other,by restraing the freedom of others to act. Security of cloud computing is a collection of security measures designed to protect cloud-based infrastructure, application and data.

These security measures are configured to protect cloud data, support regulatory compliance and protect costomerrs privacy as well as setting authentication rules for indivial user and devices. From authencating access to filtering traffic , cloud security can be configured to the exact need of the business .and because these rules can be configured and managed in one place ,administration overheads area reduced and IT tearms emprovered to foucs on other area of the business.

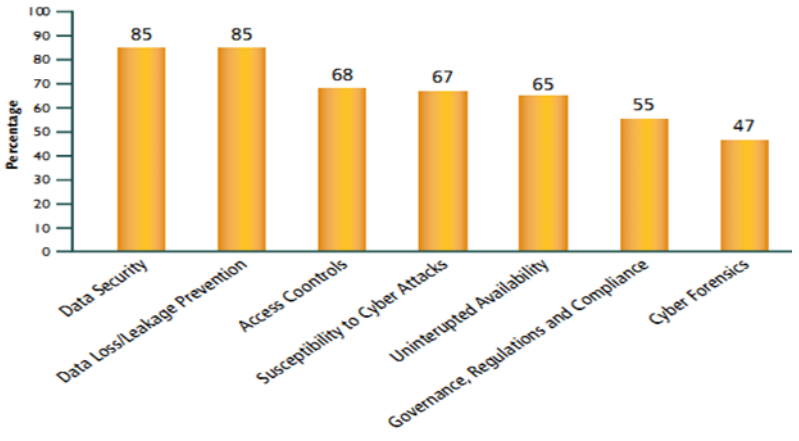


Fig.cloudsecurity

CLOUD COMPUTING

Cloud computing is based on five attributes: multitenancy, massive scalability, elasticity, pay as you go, and self-provisioning of resources.

Multitenancy:Unlike previous computing models, which assumed dedicated resources (i.e., computing facilities dedicated to a single user or owner), cloud computing is based ona business model in which resources are shared (i.e., multiple users use the same resource) at the network level, host level, and application level.

Massive scalability: Although organizations might have hundreds or thousands of systems, cloud computing provides the ability to scale to tens of thousands of systems, as well as the ability to massively scale bandwidth and storage space.

Elasticity:Users can rapidly increase and decrease their computing resources as needed, as well as release resources for other uses when they are no longer required.

Pay as you go:Users pay for only the resources they actually use and for only the time they require them.

Self- provisioning of resources:

User self – provision resources, such as additional system (processing capability, software, storage) and network resources.

CLOUD SECURITY DESING PRINCIPLES

The security design principle are the key pillars for implementation of cloud security to project system, application and platform security architecture.

Below are the key desing principles which needs to be considered for cloud technology adoption.

.

1) Security at all layers: Ensure robust security is applied to all layers [physical, network, data, application,etc. of their architecture with multiple security controls. This will ensure end to end protecting of application/ data hosted by departments on cloud platform.

2) Safeguard data while at rest and in transit: Identify and Classify the dada in terms of critically / sensitivity and define their levels. This can be prevented via using the available security controls like access control, tokenization, encryption, etc.

3) Monitoring and auditing: Ensure monitoring, auditing and alerting is configured to capture the changes in the department's system in real time. Further, log integration and metric collection can automatically investigate, act and respond.

4) Access management and Controls: Ensure implementation of principle of selective privileges and impose segregation of duties with appropriate access and authorization. Centralized identity and access management can eliminate any unauthorized access and information loss/ theft

5) Readiness for security events: Department/CSP need to prepare system for any unusual security event. Regular vulnerability and security tests need to be conducts to identify the security gaps and issues. Drill can be conducted to record the response of the cloud systems at different layers.

6) Automate security best e practices: Automating software/hardware/application, based security system via AI/ML/Bots to improve the ability to secure environment which can perform regular checks and implement the controls needed to restrict the attack and enhance cloud security.

7) Cloud Vendor Lock-in: Department to ensure that there is no vendor lock-in by Cloud services provider while hosting the application/data, as there is no standard guidelines between different cloud providers for data migration and exports, so it becomes difficult to migrate data from one cloud provider to another or migration to on-premise Dara centre.

BENEFITS OF SECURITY OF CLOUD COMPUTING

. High Availability – Ensuring continuity is one of the primary reasons behind businesses looking for reliable cloud security solutions. The right cloud computing security solutions. The right cloud-computing security solution should incorporate real-time support,*7*36 live monitoring of business assets and have redundancies built-in so your website and applications remain online and functional even in the case of an attack.

With cloud service providers, such as Active Co 's cloud Services vancouver, you can rest assured that your core business assets, such as website and applications will always remain functional globally[3].

cloud DDoS protection – Traditional network infrastructure work on the basic of origin and backup serves that can be easily disabled DDoS attacks that are capable of generating up to 0Gbps of traffic. These attacks can take anywhere from hours to mitigate during which your services may be completely or partially affected and your business sustains severe financial and reputation loss. To ensure continuity of service, you need managed hosting providers and/or content delivery networks with DDoS absorption capabilities as well as real- time scanning to identify and prevent/mitigate DDoS attacks. This is done through the CDN`s capability of making use of a global network of PoPs that can manage spikes in legitimate traffic and divert synthetic spikes from a attack on the network. This enables CDN`s to both bring downtime down to zero as well as enables security controls that feel intuitive.

Flexibility- the right cloud computing solution for your business ensures irrespective of capacity. whether you`re experiencing a surge in legitimate traffic or in the case of an attack, the solution should be able to provide you enough flexibility to avoid server crashes and avoid unnecessary costs during lean hours through up or downscaling.

Data Security- Ensuring the privacy and security of your business` sensitive information and transactions is a top priority for your cloud computing security solutions. It should be able to prevent third parties for eavesdropping or tampering with your data through the right security protocols, such as, transport layer security

[TLS]- the replacement to secure sockets layer [SSL] Ecommerce sites are particularly vulnerable to data breaches and should take care to implement a CDN with PCI compliance and other relevant digital rights management layers

Regulatory compliance- Ecommerce businesses and financial institutions also face a greater degree of both industrial and governmental compliance and regulations checks. With the right CDN, you will be able to build a highly compliant infrastructure that is capable of always protecting your consumers` data.

. Round The Clock Support- cloud Services Vancouver Have a host of companies offering cloud security solutions. The right cloud security solutions for your business, however, should be able to render downtimes to near zeros. It should be able to provide you with effective and time-sensitive customer support *7*36 any time of the day or night with live monitoring.

SECURITY OF CLOUD COMPUTING ADAVATAGES

1) Shifting public data to a external cloud reduces the exposure of the internal sensitive data
2) Cloud homogeneity makes security auditing / testing simpler
3) Clouds enable automated security management
4) Redundancy / disaster recovery

IV. CONCLUSION

The cloud computing has the potential to be a disruptive force by affecting the deployment and use of technology. The cloud be the next evolution in the history of computing, following in the footsteps of mainframes, minicomputers, PCs, servers, smart phones, and so on, and radically changing the way enterprise manage IT. Cloud computing provides advanced computing resources available on – demand, that scale as needed, with regular updates and without the need to buy and maintain an on – premise infrastructure. With cloud computing, teams to marked as they can rapidly acquire, scale services, without the considerable effort that requires managing a traditional on – premise infrastructure.

The version of this template is V. Most of the formatting instructions in this document have been compiled by Causal Productions from the IEEE LaTeX style files. Causal Productions offers both A templates and US Letter templates for LaTeX and Microsoft Word. The LaTeX templates depend on the official IEEEtran.cls and IEEEtran.bst files, whereas the Microsoft Word templates are self-contained.

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Challenges In Big Data

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Abstract— **Moment Big Data draws a lot of attention in the IT world. The rapid-fire rise of the Internet and the digital frugality has fueled an exponential growth in demand for data storehouse and analytic, and IT department are facing tremendous challenge in guarding and assaying these increased volumes of information. The reason associations are collecting and storing further data than ever ahead is because their business depends on it. The type of information being created is no more traditional database-driven data appertained to as structured data rather it's data that include documents, images, audio, videotape, and social media contents known as unshaped data or Big Data. Big Data Analytics is a way of rooting value from these huge volumes of information, and it drives new request openings and maximizes client retention. This paper primarily focuses on agitating the colorful technologies that work together as a Big Data Analytics system that can help prognosticate unborn volumes, gain receptivity, take visionary conduct, and give way to more strategic decision-timber. Further this paper analyzes the relinquishment, operation and impact of big data analytics to the business value of an enterprise to ameliorate its competitive advantage using a set of data algorithms for large data sets similar as Hadoop and MapReduce.**

Keyword- Big Data, Analytics, Big Data Issues,Challenges

I. INTRODUCTION

Big Data Analytics reflect the challenges of data that are too vast, too unshaped, and too presto moving to be managed by traditional styles. From businesses and exploration institutions to governments, associations now routinely induce data of unknown compass and complexity. Gleaning meaningful information and competitive advantages from massive quantities of data has come decreasingly important to associations encyclopedically. Trying to efficiently prize the meaningful perceptivity from similar data sources snappily and fluently is grueling . therefore, analytics has come inextricably vital to realize the full value of Big Data to ameliorate their business performance and increase their request share.

The tools available to handle the volume, haste, and variety of big data have bettered greatly in recent times. In general, these technologies aren't prohibitively precious, and much of the software is open source. Hadoop, the most generally used frame, combines commodity tackle with opensource software. It takes incoming aqueducts of data and distributes them onto cheap disks; it also provides tools for assaying the data. still, these technologies do bear a skill set that's new to utmost IT departments, which will need to work hard to integrate all the applicable internal and external sources of data. Although attention to technology isn't sufficient, it's always a necessary element of a big data strategy. This paper discusses some of the most generally used big data technologies substantially open source that work together as a big data analytics system for using large amounts of unshaped data to make further informed opinions.

II CHARACTERISTIC OF BIG DATA

II.1. Volume

This refers to extensively large data. In 2016, the data created was only 8 ZB; it's anticipated that, by 2020, the data would rise to 40 ZB, which is extremely large.

II.2. Variety

A reason for this rapid-fire growth of data volume is that data is coming from different sources in colorful formats. We've formerly bandied how data is distributed into different types. Let us take another regard at it with further exemplifications.

II..3. Velocity

The speed of data accumulation also plays a part in determining whether the data is big data or normal data. As can be seen in the image below, mainframes were originally used when smaller people were using computers. As computers evolved, the customer garcon model came into actuality. latterly, web operations came into the picture and their fashionability extended to further and further bias similar as mobiles, which led to the creation of a lot of data.

II.4. Value

How will the birth of data work? Then, our fourth V comes in; it deals with a medium to bring out the correct meaning of data. also, you need to make sure whatever analysis you have done benefits your business, similar as in chancing out perceptivity, results,etc., in a way that wasn't possible earlier.

II.5. Veracity

Since packages get lost during prosecution, we need to start again from the stage of mining raw data to convert it into precious data. And this process goes on. There will also be misgivings and inconsistencies in the data that can be overcome by veracity. Veracity means the responsibility and quality of data. The veracity of data must be maintained. For illustration, suppose about Facebook posts, hashtags, bowdlerizations, images, videos,etc., which make the posts unreliable and hinder the quality of their content. Collecting loads and loads of data is of no use if the quality and responsibility of the data aren't over to the mark.

III BIG DATA APPLICATIONS

III.1. Banking

Since there's a massive quantum of data that's gushing in from innumerous sources, banks need to find uncommon and unconventional ways to manage big data. It's also essential to examine client conditions, render services

according to their specifications, and reduce pitfalls while sustaining nonsupervisory compliance. fiscal institutions have to deal with Big Data Analytics to break this problem.

III.2. Government

Government agencies use Big Data and have cooked a lot of running agencies, managing serviceability, dealing with business logjams, or limiting the goods of crime. still, piecemeal from its benefits in Big Data, the government also addresses the enterprises of translucency and sequestration.

III.3 Education

Education concerning Big Data produces a vital impact on scholars, academy systems, and classes. By interpreting big data, people can insure scholars ' growth, identify at- threat scholars, and achieve an extemporized system for the evaluation and backing of headliners and preceptors.

III.4. Healthcare

When it comes to what Big Data is in Healthcare, we can see that it's being used tremendously. It includes collecting data, assaying it, using it for guests. Also, cases ' clinical data is too complex to be answered or understood by traditional systems. Since big data is reused by Machine Learning algorithms and Data Scientists, diving similar huge data becomes manageable.

III.5.E-commerce

Maintaining client connections is the most important in thee-commerce assiduity. E-commerce websites have different marketing ideas to vend their wares to their guests, manage deals, and apply better tactics of using innovative ideas with Big Data to ameliorate businesses.

III.6.Social Media

Social media in the current script is considered the largest data creator. The data generated substantially correspond of videos, prints, communication exchanges, etc. A single exertion on any social media point generates a lot of data which is again stored and gets reused whenever needed. Since the data stored is in terabytes, it would take a lot of time for processing if it's done by our heritage systems. Big Data is a result to this problem.

IV BIG DATA ISSUES

IV.1. Storage Issue

With vast quantities of data generated daily, the topmost challenge is storehouse(especially when the data is in different formats) within heritage systems. unshaped data can not be stored in traditional databases.

IV.2. Processing Issue

Processing big data refers to the reading, transubstantiating, birth, and formatting of useful information from raw information. The input and affair of information in unified formats continue to present difficulties.

IV.3. Security Issue

Security is a big concern for associations. Non-encrypted information is at threat of theft or damage by cuber-criminals. thus, data security professionals must balance access to data against maintaining strict security protocols.

V BIG DATA CHALLENGES

Challenges in big data can be astronomically alienated into three types the first type is data challenges, the alternate type is data process challenges, and the third type are data operation. Data challenges are the challenges that are associated with the characteristics of big data. Process challenges are the challenged that faced during the processing of data whereas operation challenges pertaining to diving the data similar as furnishing security. The characteristics of big data bring numerous challenges to it similar as its high volume, variety, etc. Process challenges are related to data accession, pre-processing, data analysis, and data visualization whereas operation challenges are related to sequestration and security. Figure 1 shows the different types of challenges associated with the different phases of the big data analysis process. .

V.1. Data Challenges

Experimenters have given numerous delineations of big data and grounded on their understanding towards they come up with several new characteristics of big data. experimenters bandied the 3V's characteristics of data(Volume, Variety, and Volume), 4th V was introduced by IBM as veracity. experimenters have bandied 5th and 6th V's as variability, and value. The 10 V's of big data are taken under consideration. there are numerous worth mentioning prominent challenges associated with the characteristics of data. Some of the prominent challenges are bandied as follow. .

V.2. Volume Challenges

The unknown increase in data through internal and external sources has redounded in a massive quantum of data. This high volume of data brings the challenges to the data itself similar as the storehouse of the data for processing isn't possible through traditional tools and therefore more innovative styles should be developed to handle this data deluge.

V.3. Variety Challenges

The massive data can be present in the form of structured,semi-structured, and unshaped. Research studies show that 95 of the data is present in unshaped form. thus, converting it into a form so that the analysis can be performed is a big challenge. . haste Challenges. haste indicates the speed of the data generated through the bias. Data can be reused in two ways batch processing and real- time processing. In batch processing, the data is stored and also reused whereas real- time processing is nonstop. In online shopping, real- time processing is needed to induce value for guests. .

V.4. Veracity Challenges

Data veracity indicates the quality and delicacy of data.

It deals with the fabrications, imprecision, messiness, and lost substantiation in data. It defines the responsibility of data when a significant decision needs to be taken. In social networking spots, stoner opinion can be classified as positive, negative, or neutral. .

V.5. Value Challenges

Big data contains precious information that needs to be uprooted from the large datasets. This brings a big challenge to data as rooting the high information from data in a cost-effective manner and making use of it for business intelligence, health sectors,etc.

V.6. Process Challenges

Process challenges are related to processing and assaying large datasets. It brings a significant challenge to the process as the data is present in different forms and conversion of it into one form for analysis purpose is a grueling task. It can be divided into four corridor Data Acquisition and Storage, Data Prepossessing, Data Analysis and Modeling, Data Visualization. .

V.7. Data Acquisition and Storage

Data accession is the process of acquiring and storing the data for the unborn exercising some precious information. The data is acquired from colorful sources similar as from detectors, social networking spots, blogs,etc. and hence the data is present in different forms(structured, semi-structured, and unshaped) bring a significant challenge to data. The alternate challenge is associated with the storehouse because the data generated through colorful bias doesn't mean that whole data carry meaning to it thus the smart sludge must be applied for generating the applicable datasets. Storing this massive data set can affect in high- cost scalable systems to handle the data. .

V.8. Data Preprocessing

Data preprocessing is the process to collect the quality data from large datasets as low- quality data leads to low-quality knowledge. thus, data preprocessing plays a significant part in knowledge discovery. In this stage noise, missing values, inconsistent and redundant data,etc. are removed before applying the big data mining ways to its data. In big data preprocessing utmost of the sweats are done in the point Selection system whereas some of the families of it are ignored similar for case reduction, missing value insinuations, noise treatments. .

V.9. Data Analysis and Modelling

Data analysis is the process that discovers the retired information from the data and helps the associations to make a better decision. To efficiently prize the knowledge from the large datasets extraordinary ways are needed. To induce the retired pattern from the large datasets Wal- Marts employs statistical and machine literacy ways.

V.10. Data Visualization

A big data visualization fashion presents the logical data visual form. It makes operation of colorful types of graph for representing the precious information for decision timber. the visual report has a better impact on information candidate rather than the textbook reports. Visualization tools like Tableau and Qlik View are the tools used for visualization still according to the experimenter these tools can not be fruitful shortly where data is growing every alternate by each one of us.

V.11. Management Challenges

Management challenges are related to those challenges encountered by an association which is related to the sequestration, security, governance of data. operation challenges are also faced because we've a lack of data for professed professionals who know the rearmost tool and ways to employ the correct system for dealing with each phase of data. Security and sequestration will always be the major enterprises as data are largely sensitive similar as fiscal data, military data, insurance canons and contains different kinds of information that can ruin if the unauthorized stoner has access to it.

VI ADVANTAGES OF BIG DATA

VI.1. Making wiser decisions

Big data is primarily being used by numerous diligence, similar as trip, real estate, finance, and insurance, to enhance decision- timber. Businesses can use big data to directly prognosticate what guests want and do not want, as well as their behavioral tendencies because it reveals further information in a usable format. Big data provides business intelligence and slice- edge logical perceptivity that help with decision- timber. A company can get a more in- depth picture of its target request by collecting further client data.

VI.2. Detection of Fraud

financial companies especially use big data to identify fraud. To find anomalies and sale patterns, data judges use artificial intelligence and machine literacy algorithms. These irregularities in sale patterns show that commodity is out of place or that there's a mismatch, furnishing us with hints about implicit fraud. For credit unions, banks, and credit card companies, fraud discovery is pivotal for relating account information, accoutrements , or product access. By spotting frauds before they beget problems, any assiduity, including finance, can give better client service.

VI.3. A rise in productivity

They've been suitable to increase deals and ameliorate client retention as a result of this rise in productivity. ultramodern big data tools make it possible for data scientists and judges to assay a lot of data snappily and effectively, giving them an overview of further data. They come more productive as a result of this. also, big data analytics aids data scientists and judges in learning further about themselves to figure out how to be more effective in their tasks and job liabilities. As a result, investing in big data analytics gives businesses across all sectors a chance to stand out through bettered productivity.

VI.4. Enhanced client support

As part of their marketing strategies, businesses must

ameliorate client relations. Since big data analytics give businesses access to further information, they can use that information to make further specialised, largely personalized offers to each individual client as well as further targeted marketing juggernauts. Social media, dispatch exchanges, client CRM(client relationship operation) systems, and other major data sources are the main sources of big data. As a result, it provides businesses with access to a wealth of data about the requirements, interests, and trends of their target request.

VI.5. Greater invention

Innovation is another common benefit of big data, and the New Vantage check set up that11.6 per cent of directors are investing in analytics primarily as a means to introduce and disrupt their requests. They reason that if they can ripen perceptivity that their challengers do not have, they may be suitable to get out ahead of the rest of the request with new products and services. Disadvantages of Big Data

VII DISADVANTAGES OF BIG DATA

VII.1.A talent gap

A study by At Scale set up that for the once three times, the biggest challenge in this assiduity has been a lack of big data specialists and data scientists. Given that it requires a different skill set, big data analytics is presently beyond the compass of numerous IT professionals. Chancing data scientists who are also knowledgeable about big data can be delicate. Data scientists and big data specialists are two well- paid professions in the data wisdom assiduity. As a result, hiring big data judges can be veritably expensive for businesses, particularly for launch- ups. Some businesses must stay a long time to hire the necessary labor force to carry out their big data analytics tasks.

VII.2. Security hazard

For big data analytics, businesses constantly collect sensitive data. These data need to be defended, and security pitfalls can be mischievous if they aren't duly maintained. also, having access to enormous data sets can attract the unwanted attention of hackers, and your company could come the target of a implicitcyber-attack. You're apprehensive that for numerous businesses moment, data breaches are the biggest trouble. Unless you take all necessary preventives, important information could be blurted to rivals, which is another threat associated with big data.

VII.3. Adherence

Another disadvantage of big data is the demand for legal compliance with governmental regulations. To store, handle, maintain, and process big data that contains sensitive or private information, a company must make sure that they cleave to all applicable laws and assiduity norms. As a result, managing data governance tasks, transmission, and storehouse will come more grueling as big data volumes grow.

VII.4. High Cost

Given that it's a wisdom that's constantly evolving and has as its thing the processing of ever- adding quantities of data, only large companies can sustain the investment in the development of their Big Data ways.

VII.5. Data quality

Dealing with data quality issues was the main debit of working with big data. Data scientists and judges must insure the data they're using is accurate, material, and in the right format for analysis before they can use big data for analytics sweats. This significantly slows down the reporting process, but if businesses do not address data quality problems, they may discover that the perceptivity their analytics produce are useless or indeed dangerous if used.

VII.6. Rapid Change

The fact that technology is evolving snappily is another implicit disadvantage of big data analytics. Businesses must deal with the possibility of spending plutocrat on one technology only to see commodity better crop a many months latterly. This big data debit was ranked fourth among all the implicit difficulties by Syncsort replies.

VIII CONCLUSION

Moment’s technology geography is changing presto. Organizations of all shapes and sizes are being dragooned to be data driven and to do further with lower. Indeed however big data technologies are still in a incipient stage, fairly speaking, the impact of the 3V’s of big data, which now is 5v’s can not be ignored. The time is now for associations to begin planning for and erecting out their Hadoop- grounded data lake. Organizations with the right architectures, gift and vision in place are well equipped to take their big data strategies to the coming position and transfigure their businesses. They can use big data to unveil new patterns and trends, gain fresh perceptivity and begin to find answers to pressing business issues. The deeper associations dig into big data and the more equipped they're to act upon what’s learned, the more likely they're to reveal answers that can add value to the top line of the business. This is where the returns on big data investments multiply and the metamorphosis begins. employing big data sapience delivers further than cost slice or productivity enhancement but it surely reveals new business openings. Data- driven opinions always tend to be better opinions.

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Bitcoin Price Prediction

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Abstract - **One of the most well-known and valuable cryptocurrencies in the present financial market is bitcoin, which draws investors and creates new study opportunities for academics. Numerous studies have been conducted using various machine learning prediction algorithms to forecast Bitcoin prices. Important features are mined from a dataset that has a strong link to the price of Bitcoin, and then random data chunks are selected to train and test the model. The model's ability to predict prices may be compromised by unfitting results brought on by the random data that was used for model training. Here, an appropriate training procedure for a prediction model is being examined. The suggested approach is then used to train a straightforward LSTM and sentiment analysis model to forecast the price of bitcoin. When the LSTM model is trained using a suitable data chunk that has been identified, trustworthy results for the prediction are found.**

***Keywords - Bitcoin, Machine Learning, Price Prediction, LSTM, Sentiment Analysis*.**

I. INTRODUCTION

Bitcoin is a digital currency and an advanced kind of payment network. Bitcoin applies peer-to-peer technology to work with no central authority or banks, handling transactions and the issuing of Bitcoin are carried out collectively by the same. Bitcoin is open source; its design is public; nobody owns or controls Bitcoin and everyone can hold a part of it. Through many of its special and different properties, Bitcoin allows exciting uses that could not be covered by any other payment system. Bitcoin market is a highly volatile market working 24/7. It is the leading cryptocurrency because of its open nature and high adaptability. Profit-making in the stock market is frequently done with the aid of algorithms rather than any direct human investments Numerous case studies have been undertaken in order to reach the conclusion that numerical methods provide better results than humans.

As Bitcoin's price has very high volatility, many people are attracted to the research of predicting the price trend of Bitcoin because investors have a chance to gain high profit from the price change. The primary way a bitcoin market differs from a typical stock market is through the abundance of novel features it offers. Applying new forecasting methods that are appropriate for the bitcoin industry is necessary Less research has been done on predicting bitcoin prices than has been done on the stock market .In this study, we use sentiment analysis and a long short-term memory (LSTM) to forecast the Bitcoin price trend [5].

II. LITERATURE SURVEY

A literature survey was done to determine the best algorithm for predicting Bitcoin's price from numerous studies that had been published in international publications.

Numnoda et al. have put their prediction Gated Recurrent Unit (GRU) model into practice and obtained incredibly precise results. Their prototype, however, has a high temporal complexity. In this constantly shifting context, this complicates the anticipated outcomes. Additionally, the chosen qualities are insufficient to forecast Bitcoin values because a variety of factors, including social media and the policies and legislation that each nation declares to deal with digital currency, can have a significant impact on price fluctuations [1].

Mangla et al. have contrasted Recurrent Neural Networks (RNN), Logistic Regression, Support Vector Machine, and Auto Regressive Integrated Moving Average (ARIMA) as four various price prediction models. Their key result is that ARIMA performs badly for forecasts that go beyond the following day. For up to six days, their RNN algorithm can anticipate price changes with accuracy. Additionally, a separable hyperplane is required for the logistic regression model to produce reliable results [2].

Guo et al. have employed a hybrid approach that combines an LSTM network and multi-scale residual blocks to forecast the price of bitcoin. However, their analysis lacks thorough criteria that assess the investor's attention to earlier identification of bitcoin market volatility, leading to a lessprecise forecast [3].

Awoke et al. have contemplated the basic GRU and LSTM deep learning models. However, more research is needed to take additional parameters into account and improve the model's accuracy [4]. Rana et al. have used a very precise LSTM (Long Short Term Memory) model and conducted their research on a huge scale, which made their process somewhat complicated [5]. Summary of this literature survey is that all proposed methods use machine learning and deep learning to predict the Bitcoin price. Above paper used various models such as GRU, RNN, SVM, ARIMA and LSTM to predict bitcoin prices. But all the model had some limitations. To overcome the limitations this paper proposes use of Sentiment Analysis with LSTMalgorithm to find better results

.

III. PROBLEM DEFINITION

To create a model with a low error rate and high precision of accuracy that will allow us to forecast the price of the crypto currency being utilized (in this example, Bitcoin). The model cannot predict the future, but it can suggest a broad trend and the overall direction in which to expect price movement.

IV. EXISTING SYSTEM

In the existing systems we saw use of LSTM model. In this model we can see that the predictions are not up to mark. It is because the bitcoin is very volatile. So to overcome this limitation we try to incorporate sentiment analysis with LSTMto get the sentiments of tweets that shows how it affects the changes in bitcoin market [5].

V. SYSTEM ARCHITECTURE

5.1 Proposed System:

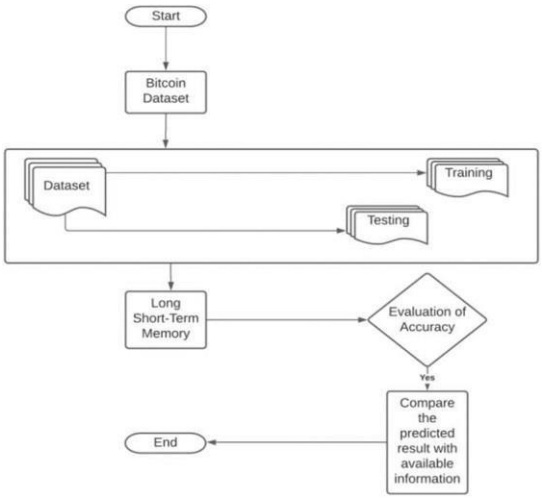


Fig-1:System Architecture

Algorithm

1. Download dataset from Coinbase pro API
2. Import necessary Library
3. Load dataset
4. Visualize the data to explore the trend in the data.
5. Splitting the dataset into training and testing data
6. Building LSTM Model
7. Fitting the training data
8. Prediction on testing data model
9. Gathering Tweeter Data for sentiment analysis
10. Applying Sentiment Analysis

We first get the data set from the web tool Coinbase pro API. The informational set shows the cost of Bitcoin in US dollars (USD). The dataset contains all Bitcoin price information fromOctober 27, 2015 and October 30, 2021.

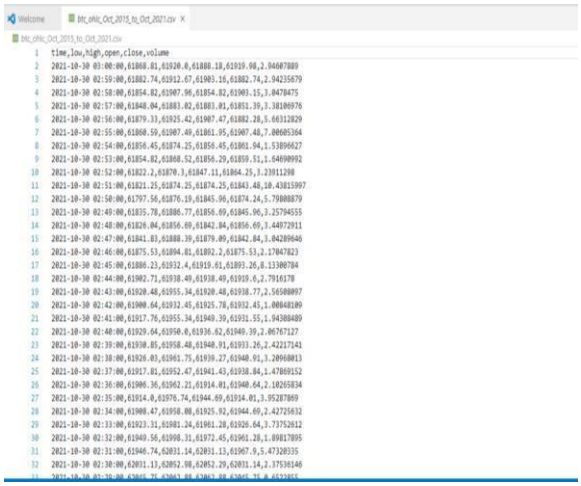


Fig-2:Bitcoin Dataset

The second step is cleaning and getting ready the data set. To do this, all the rows' blank data must be deleted. Filtering away extraneous aspects found in the data obtained is another aspect of it For our model, we will only make use of the columns with the labels Date, Price, Open, High, and Low.

Table -1: Features Used In the Dataset

btc_input_df_datetype.info()
<class 'pandas.core.frame.DataFrame'> RangeIndex: 3113276 entries, 0 to 3113275Data columns (total 6 columns):

#	Column	Dtype
0	time	datetime64[ns]
1	low	float64
2	high	float64
3	open	float64
4	close	float64
5	volume	float64

dtypes: datetime64[ns](1), float64(5)memory usage: 142.5 MB

The dataset is then tested, with training coming later. We train our model utilizing the algorithm and the features that are taken into consideration in order to predict the future price of the crypto currency. The testing phase is now underway, during which we examine the data to see how well our model forecasts the price of Bitcoin using an algorithm.
Finally, we assess the model's correctness once it has been tested and trained using the features of the data set. We assess the accuracy and effectiveness of our model by comparing the anticipated price of the cryptocurrency at a given time period with the actual price of Bitcoin at that same time.

5.2 Model used:

Recurrent neural networks of a special kind can be trained to recognize long-term dependencies in data. This is made feasible by the repeating module of the model, which consists of four interconnected levels.

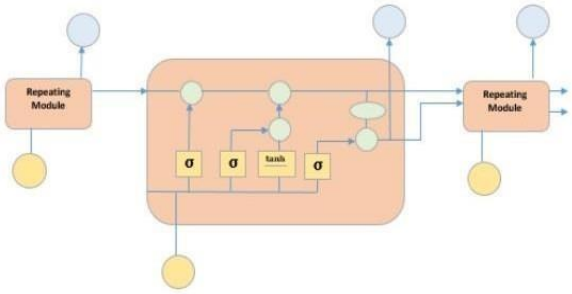


Fig-3: LSTM

Four neural network layers are illustrated in the image above as yellow boxes, while the input is represented by yellow circles, point wise operators by green circles, and cell state by blue circles. An LSTM module, which contains a cell state, three gates, and the ability to selectively learn, unlearn, or retain knowledge from each of the units, offers this capability.. By allowing just a few linear exchanges, the cell state in LSTM aids in the information's uninterrupted flow across the units. An input, output, and forget gate is present in each component, and it has the ability to add or remove data from the cell state. The forget gate chooses which information from the previous cell state should be ignored using a sigmoid function. The input gate controls the information flow to the active cell state by point-wise multiplying "sigmoid" and "tanh." The output gate ultimately determines which data should be transferred to the following concealed state.

5.3 Sentiment Analysis:

To assess whether a passage of text is favorable, negative, or neutral, apply the sentiment analysis process. In text analytics, topics, categories, or entities inside a phrase are given sentiment scores using a combination of natural language processing (NLP) and machine learning (ML) approaches.
Sentiment analysis is a tool that data analysts use to gather information for market research and reputation management of brands and products. This process is also very helpful for learning what customers believe and acting on this to improve the 'customer experience' Additionally, businesses that analyze data typically incorporate sentiment analysis APIs from third parties into their own infrastructures in order to get insightful data and share it with their own clients.
Continue reading, and we'll explain how sentiment analysis works, along with the benefits and drawbacks of a rule-based sentiment analysis approach, while also explaining the functions of NLP and machine learning techniques. Sentiment analysis is a technique for determining if a piece of text is good, negative, or neutral.
The APIs or python library which we planned to use are as follows,
Tweepy - which is python client
TextBlob - Textual Data Parser and provides built program of sentiment analysis for textual data.
Natural language toolkit corpora - A suite of libraries and programs for symbolic and statistical natural language processing for English written in python programming language.

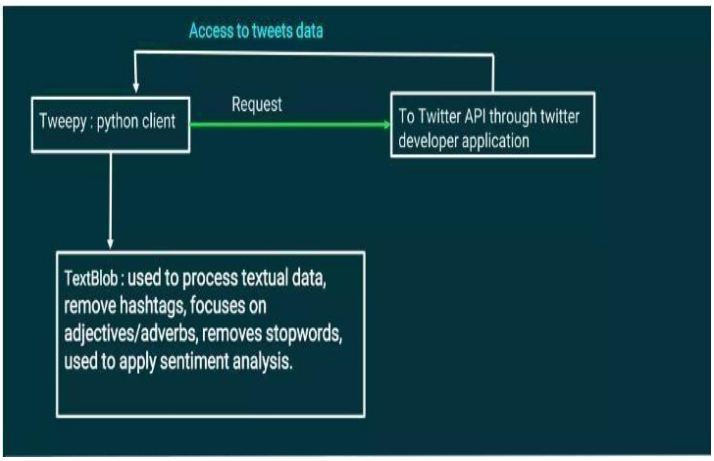


Fig -4: Sentiment Analysis Model

VI. METHODOLOGY

6.1 Lag Plots:

Fig -5: Lag plot

We must create a lag plot of the time series data once the dataset has been filtered and cleaned. The lag is the amount by which one data point in a time series of data lags behind another. To examine and determine whether the time series data exhibits any patterns, lag plots are used. For searching patterns like trends, unpredictability, and seasonality, they are crucial. The lag of the time series data points on the y-axis and the depiction of time series data on the x-axis together create the graphic Lag graphs are being developed for minute, hourly, daily, weekly, and monthly lags. It is clear that the daily, hourly, and minute lag plots are all positively correlated. Weekly lag results in a significant reduction in correlation, which practically disappears for monthly lag plots. Therefore, it makes logical to keep the autocorrelation while only resampling the data at the daily level.

6.2 Train-Test Split:

Train-test splitting is the next action that must be taken. We will use sixty data samples from our model for testing, while the remaining resampled data will serve as the training sample. Following this, the train-test split graph will be drawn. Figure 4 displays a clear train-test plot of the closing prices.

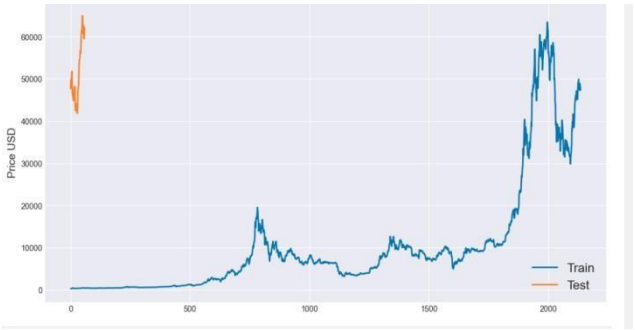


Fig-6: Train-Test Split Graph

6.3 Scaling:

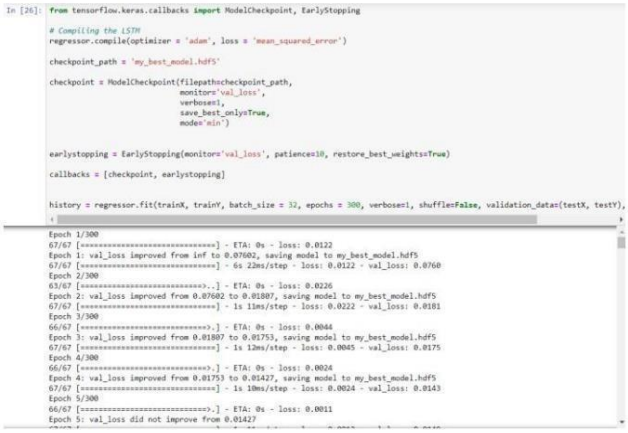
The data will then be scaled because both the training and test sets require scalability. Because doing so would result in data leakage from the test set to the training set, scaling should be performed after the train-test split. This is an essential point that needs to be made. Scaling before the train-test split would cause the training process to be impacted by the test set, leading to the model producing an inaccurate prediction.

6.4 Data Generator:

Post scaling, we will proceed with making the datagenerator function, which will make the data ready for the LSTM model feed. We structure our model by taking a window of the most recent five days of data and using that information to anticipate the data for the current day. The input sequence will be divided into windows of data suitable for fitting an LSTM model by a newly developed function. To determine how many prior timesteps are used to forecast the upcoming timestep, we must establish a lookback period.

6.5 Restructuring input into a 3D Tensor form:

To prepare the input data for LSTM, we must transform it into a three-dimensional Tensor containing samples, timesteps, and features. The number of data points we have is represented by samples. The width of the sliding window depends on the number of timesteps in a sample. It should be noted that timesteps are different from the sliding step of the sliding window. As a result, timesteps is equal to the amount of time steps over which our RNN will run. The number of features in each timestep is the final component of features. 5.3.6 Generating the Epochs. We are importing the Model Checkpoint and Early Stopping callbacks from the keras library's callback module. These callbacks are used to save the model after each epoch or at various checkpoints as a best practice. Additionally, Early Stopping is utilized to halt training when the best loss is achieved, or when a monitored parameter reaches a point where it stops improving.



```
In [26]: from tensorflow.keras.callbacks import ModelCheckpoint, EarlyStopping

# Compiling the LSTM
regressor.compile(optimizer = 'adam', loss = 'mean_squared_error')

checkpoint_path = 'my_best_model.hdf5'

checkpoint = ModelCheckpoint(filepath=checkpoint_path,
                             monitor='val_loss',
                             verbose=1,
                             save_best_only=True,
                             mode='min')


earlystopping = EarlyStopping(monitor='val_loss', patience=10, restore_best_weights=True)

callbacks = [checkpoint, earlystopping]

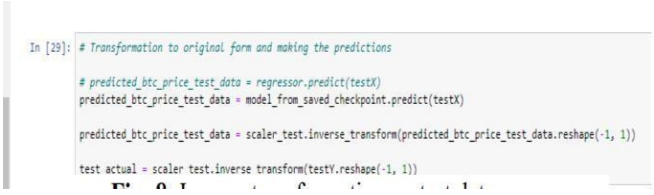

history = regressor.fit(trainX, trainY, batch_size = 32, epochs = 300, verbose=1, shuffle=False, validation_data=(testX, testY),

Epoch 1/300
67/67 [==============================] - ETA: 0s - loss: 0.0122
Epoch 1: val_loss improved from inf to 0.07602, saving model to my_best_model.hdf5
67/67 [==============================] - 6s 22ms/step - loss: 0.0122 - val_loss: 0.0760
Epoch 2/300
63/67 [===========================>..] - ETA: 0s - loss: 0.0226
Epoch 2: val_loss improved from 0.07602 to 0.01807, saving model to my_best_model.hdf5
67/67 [==============================] - 1s 11ms/step - loss: 0.0222 - val_loss: 0.0181
Epoch 3/300
66/67 [============================>.] - ETA: 0s - loss: 0.0044
Epoch 3: val_loss improved from 0.01807 to 0.01753, saving model to my_best_model.hdf5
67/67 [==============================] - 1s 12ms/step - loss: 0.0045 - val_loss: 0.0175
Epoch 4/300
66/67 [============================>.] - ETA: 0s - loss: 0.0024
Epoch 4: val_loss improved from 0.01753 to 0.01427, saving model to my_best_model.hdf5
67/67 [==============================] - 1s 10ms/step - loss: 0.0024 - val_loss: 0.0143
Epoch 5/300
66/67 [============================>.] - ETA: 0s - loss: 0.0011
Epoch 5: val_loss did not improve from 0.01427
```

Fig -7: Code for the generation of epoch

6.6 Utilizing testX and drawing a line graph againstthe actual testY, the LSTM Prediction:

The expected scale will be between zero and one as a result of prior scaling performed with the aid of MinMaxScaler. It is necessary to change this scale back to the initial data scale. As can be seen in Figure 6, we will utilize inverse transformation to scale back the data to its initial appearance.



```
In [29]: # Transformation to original form and making the predictions

         # predicted_btc_price_test_data = regressor.predict(testX)
         predicted_btc_price_test_data = model_from_saved_checkpoint.predict(testX)

         predicted_btc_price_test_data = scaler_test.inverse_transform(predicted_btc_price_test_data.reshape(-1, 1))

         test_actual = scaler_test.inverse_transform(testY.reshape(-1, 1))
```

Fig -8: Inverse transformation on test data

Following that, we create a graph plot in Figure 7 that contrasts the actual test data (in blue) with the anticipated test data (in red). Here, it is clear that the expected test results and the actual test results are advancing together.

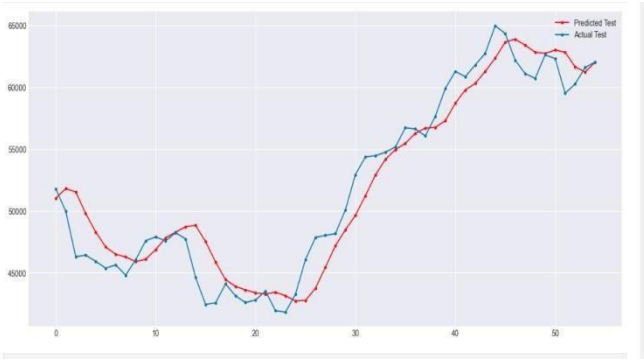


Fig -9: Plot of predicted test and actual test data

6.7 Utilizing trainX and a line graph to compare the predicted trainX to the actual trainY:

With the exception of the fact that we are applying inverse modifications to the train data in this stage, it is very identical to the prior step.

```
In [31]: # Transformation to original form and making the predictions

         predicted_btc_price_train_data = model_from_saved_checkpoint.predict(trainX)

         predicted_btc_price_train_data = scaler_train.inverse_transform(predicted_btc_price_train_data.reshape(-1, 1))

         train_actual = scaler_train.inverse_transform(trainY.reshape(-1, 1))
```

Fig -10: Inverse transformation on train data

Then, we will create the plot for the real train data (in blue) and the anticipated train data (in red) (in blue). Because they are made of training data points, Figure 9 demonstrates that the anticipated train and actual train graphs are well in sync.

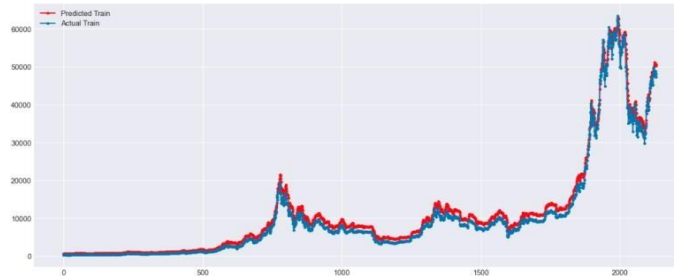


Fig -11: Plot of predicted train and actual train data

6.8 Root Mean Square Error:

The root mean square error (RMSE) for the test and train data will then be generated. A regression line's ability to fit the data points is gauged by its root mean square error (RMSE).

```
In [33]: rmse_lstm_test = math.sqrt(mean_squared_error(test_actual, predicted_btc_price_test_data))

         print('Test RMSE: %.3f' % rmse_lstm_test)

         # With 2 Layers + Dropout + lookback=5 => I got - Test RMSE: 1666.162  => This seems best

         Test RMSE: 2039.115
```

Fig -12**:** RMSE of test data

The RMSE of train data is then created. The RMSE loss produced for train data is much lower than the RMSE loss for test data because the whole training and fit function was run on the training data set.

```
In [34]: rmse_lstm_train = math.sqrt(mean_squared_error(train_actual, predicted_btc_price_train_data))

         print('Test RMSE: %.3f' % rmse_lstm_train)

         # With 2 Layers + Dropout + lookback=5 => I got - Test RMSE: 1047.916  => This seems best

         Test RMSE: 1823.588
```

Fig -13: RMSE of. train data

VII. RESULT

We can forecast Bitcoin values for the next five days thanks to an LSTM model that has been trained on historical data. According to the dataset that we used to develop the model, the last historical price for Bitcoin that we have is as of October 30, 2021. In order to forecast Bitcoin prices for the following five days, we are now looking beyond that specific day. It should be emphasized that we are once more forecasting the price for the following day utilizing data from the lookback period. Here, the lookback time is set to five days, meaning that we are forecasting the price of bitcoin for the following day using data on prices from the five days prior. For testing, our model is using sixty different numbers of data points. The testX has been moulded into a three-dimensional array in the form of samples, timesteps, and features in order to feed the input into the LSTM's model.

We use the final five components of the three-dimensional tensor. As a result, this procedure is looped five times, with each iteration producing the forecasted price for the following five days in a row. As a final step, we create a graph in Figure 12 that compares the whole test data prediction (including the following five days) to the actual testY. We reserve the expected test results (in red) and the actual test results (in blue) up until October 30, 2021.

Finally, as illustrated in Figure 14, we are creating a graph that compares the whole prediction of the test data (including the following five days) to the actual testY. We reserve the anticipated test data (in red) and the actual test data (in blue) on the ground up until October 30, 2021, since this is the time frame for which we have the real ground truth. Only the anticipated price of Bitcoin after the given date is available.

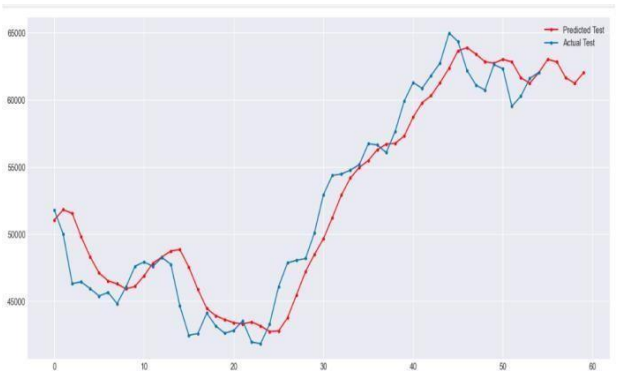


Fig -14: Plot of the entire test data prediction (including thefive future days) and actual testy

VIII. CONCLUSION

The LSTM model that will be used in this case is a simple model that only considers a few factors that have an impact on the price of bitcoin. Our model predicts future prices with a reasonable amount of accuracy. But for the model to be more useful, extra aspects of the Bitcoin price need to be taken into account. Since the data on this website holds a high level of credibility, we suggest choosing Coinbase as the source of datasets. In-depth examination of the subject of LSTM and deep learning in general would be part of future work. Such factual findings would be helpful for LSTM-based cryptocurrency price predictions in the future.

ACKNOWLEDGMENT

Project guide Prof. Pallavi Chandratre, Project Coordinator Prof. Reena Deshmukh, HOD Dr. Uttara Gogate, College Principal Dr. P. R. Rodge, and colleagues all contributed to the success of the project.

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Blockchain Technology: A Comprehensive Review of its Principles, Applications, and Challenges

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Abstract— **Blockchain is a decentralized and distributed ledger technology that is being widely adopted across various industries to improve the security, transparency, and efficiency of data management. This research paper provides a comprehensive review of blockchain technology, its principles, applications, and challenges. The paper first introduces the fundamental principles of blockchain, including its architecture, consensus mechanisms, and cryptographic techniques. Then, it explores the diverse applications of blockchain, ranging from financial services and supply chain management to healthcare and voting systems. Finally, the paper discusses the main challenges that blockchain faces, including scalability, interoperability, and regulatory issues.**

Keyword- Blockchain, Bitcoin, Cryptocurrency

I. INTRODUCTION

The emergence of blockchain technology in 2008 with the advent of Bitcoin has sparked a new wave of interest in decentralized and secure data management. Blockchain is essentially a distributed ledger that allows for secure and transparent transactions without the need for intermediaries. The technology has since evolved beyond cryptocurrency to find diverse applications across various industries, including finance, supply chain management, healthcare, and voting systems. Despite its immense potential, blockchain technology still faces numerous challenges that hinder its widespread adoption. This research paper provides a comprehensive review of blockchain technology, its principles, applications, and challenges.

Blockchain concept can be applied in both financial and non- financial services. It can be classified as public blockchain, private blockchain and hybrid blockchain. In a Public or permission less blockchain, anyone on the network can read or write the record by showing the proof of work for the same[1]. This is fully decentralised and results in high rise of potential users. Crypto currencies like Bitcoin, Ethereum and Block stream are built with public blockchain methodology[2]. In a private blockchain, only the owner has the option to change the record/transaction[3]. This infrastructure is alike with existing centralised authority system and can be replaced to private blockchain to reduce cost and increase efficiency. The hybrid or permissioned blockchain is mix of both public and private blockchain,where few nodes/people in the network are allowed to change the record. This concept can be used by group of organisation for collaboration. Throughout this paper the permission less blockchain technology is considered with an example of Bitcoin cryptocurrency[4]. The blockchain is accumulation of numerous technologies like RSA encryption, Merkle tree, distributed computing, game theory and mathematical proof. Blockchain elements and technologies. Following section briefs about the basic elements of blockchain and its technologies

A. Block

Primary element of blockchain is a block, which contains the number of deals limited to the capacity defined by the different exercise. Once the block is validated, it is attached to the rearmost added block in irrecoverable chain. Attaching the hash value of former block to the current block forms the chain of valid deals as displayed in theFig.1.1.

Figure 1.1: Structure of Blockchain [5]

Each block is a combination of block header and data, where block header is used to store metadata of block like the block number, timestamp, hash of previous block, hash of current block, Merkle tree root and mining statistics like nonce and difficulty as mentioned in the Fig.1.2. The data part contains the list of valid transactions added into the block in chronological order. Every block header ties the transactions by Merkle tree root and any alteration in one transaction or even changes in the transactional order can be identified easily, because every block inherits from the previous block[6]. Previous block's hash is included with current block to make the blockchain tamper proof.

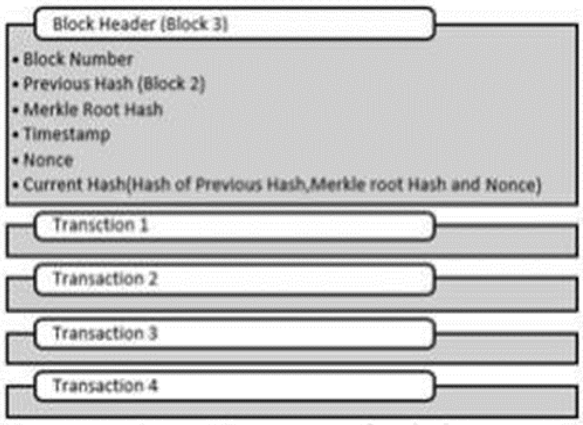

Figure 1.2: Structure of a Block [5]

[7] On January 3, 2009, the Genesis Block with serial number 0 was born. Six days later, the block with serial

number 1 appeared and connected with the Genesis Block to form a chain, thus the blockchain was born. Computer experts describe it as a de-centralized distributed ledger database. Each block is like a hard disk, which saves all the information and encrypts it in the block through cryptography technology. With-out mutual trust, blockchain technology can provide a decentralized and transparent data storage mode by using the mutual cooperation between blockchain network nodes based on consensus mechanism and distributed P2P network protocol for com-munication. The data stored in blockchain is packaged into blocks to form a chain structure and copied to each node, so it's called distributed public account book. With the cooperation of cryptography, hash technology, consensus algorithm, smart con-tract and other related technologies, the data in the blockchain is easy to verify and difficult to be maliciously modified and completely destroyed.

II. PRNCIPLES OF BLOCKCHAIN

The paper starts by introducing the fundamental principles of blockchain technology. The architecture of blockchain is explained, including the concept of blocks, nodes, and the peer-to-peer network. The paper then discusses the consensus mechanisms that ensure the integrity and immutability of the blockchain, including Proof-of-Work (PoW), Proof-of-Stake (PoS), and Delegated Proof-of-Stake (DPoS). The cryptographic techniques that underpin the security of the blockchain, including hashing, public-key cryptography, and digital signatures, are also explained in detail.

Blockchain has four basic characteristics: The first is that information cannot be tampered with. Users jointly maintain the security of data on the Internet to ensure that it cannot be tampered with. Once the information is validated and added to the blockchain, it is stored permanently. Unless more than 51% of the nodes in the system can be controlled at the same time, the modification of the database on a single node is invalid, so the block chain's data stability and reliability are extremely high. The second is to become decentralized and distributed, and it is important to note that distributed is a physical centre, not a management canter. For example,large-volume transactions are carried out simultaneously, and the decentralized approach will save resources, make trading autonomous and simplistic, and avoid the risk of being manipulated by the central agent. The third is privacy and supervision. From the current construction of the block-chain, these two seemingly contradictory points of privacy and supervision can be integrated. Because the exchange between nodes follows a fixed algorithm, the rules of the program in the blockchain will automatically determine whether the activity is valid. Hence, their data interaction is not trustworthy, and therefore the two sides of the transaction can generate mutual trust without disclosing their identities. The fourth point is the smart contract, which can realize the legal application based on the blockchain contract rules, and the top-level governance node can formulate the smart contract.[2]A smart contract is a contract written by code and automatically executes the contract signed by both parties in the contract when the conditions are met. Smart contracts are widely used in many fields.

III. BLOCKCHAIN ARCHITECTURE

The blockchain architecture comprises several components, including blocks, nodes, miners, and consensus algorithms. Each block contains a set of transactions that are cryptographically hashed and linked to the previous block, forming a chain of blocks (hence the name blockchain). Nodes are participants in the network that store and validate transactions. Miners are nodes that compete to validate new transactions and add them to the blockchain. Consensus algorithms are mechanisms used to ensure that all nodes in the network agree on the validity of new transactions

IV. APPLICATIONS OF BLOCKCHAIN

The paper then explores the diverse applications of blockchain technology. The paper highlights the potential of blockchain to transform the financial services industry, including banking, insurance, and investment. The paper also discusses the potential of blockchain in supply chain management, where the technology can improve transparency, traceability, and efficiency. The paper then explores the potential of blockchain in healthcare, where the technology can improve data security, interoperability, and patient privacy. Finally, the paper discusses the potential of blockchain in voting systems, where the technology can improve the security, transparency, and accessibility of elections.

V. CHALLENGES OF BLOCKCHAIN

Finally, the paper discusses the main challenges that blockchain technology faces. The paper highlights the scalability issues that arise from the limited processing power and storage capacity of the blockchain network. The paper also discusses the interoperability issues that arise from the fragmentation of the blockchain ecosystem. The regulatory challenges that arise from the lack of legal clarity and the potential risks of criminal activities are also discussed. Finally, the paper discusses the social challenges that arise from the potential impact of blockchain on employment, privacy, and inequality.

V. CONCLUSION

In conclusion, blockchain technology has immense potential to transform the way we manage data and conduct transactions. The technology's decentralized and secure nature offers numerous advantages over traditional centralized systems. However, the technology still faces numerous challenges that hinder its widespread adoption. As the technology continues to evolve and mature, addressing these challenges will be crucial to realizing its full potential.

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Digitizing Doctor Handwritten Prescription

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***Abstract*—Nowadays whenever we come across a handwritten document, which is manually written ,often we find that it is not readable by normal people . This happens mostly in the case where a patient gets prescribed, and the patient is supposed to carry this document to consult another doctor or to bring medicines from pharmacy they have to consult the doctor again if they have lost the prescription paper. In this era of digitalization, this method is still followed where people get handwritten documents but are unable to understand what is written. We are proposing a system which can transform this process into a digital, efficient and transparent way. In the proposed system the written text will be converted into digital readable from by comparing medicine database with the help of a Personal Digital Assistant(PDA), and this p will be saved. So whenever we need the content of the document, it will be stored and can be accessible. The main purpose of this is to reduce time and make use of the modern era of digitalization to ease out the tiring process of identifying what is written and transforming it into texts.[1]**

I. INTRODUCTION

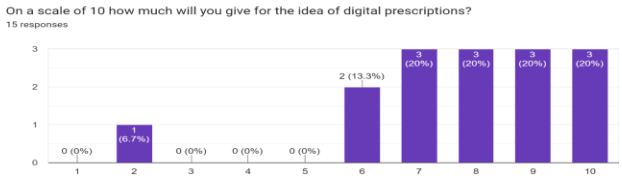
In this era of digitalization, use of Mobile Phones and Computers may be very common than ever, but most of the people still prefer the traditional feeling of writing with hand on paper. Despite of accessibility to various technologies related to writing tools, many people still choose to take their notes with pen and paper. After all, this method has provided us well for many years. However, there are certain flaws in conventional way of handwritten text.

Whenever we come across a handwritten document, which is manually written ,often we find that it is not readable by normal people . It is commonly known that doctors have illegible handwriting. This happens mostly in the case where a patient gets prescribed, and the patient is supposed to carry this document to consult another doctor or to bring medicines from pharmacy. The doctor usually knows what is written, but when patients or other parties are involved they often have problems with reading and interpreting the text. We are trying to resolve this problem by recognizing doctor's handwriting using handwriting recognition and converting it into legible format. In this project, we are trying to propose a system which can transform this process into a digital, efficient and transparent way. In the proposed system the written text will be converted into digital readable form by comparing medicine database with the help of a Personal Digital Assistant(PDA), and this prescription will be saved. Also we are trying to store all their prescriptions in a central storage to make sure that no medical details are missed. Doctor can get the history of medical details directly from the system. Pharmacist can get prescription directly from the system. The Patients can also see their medical reports and laboratory details as well. So whenever we need the content of the document, it will be stored and can be accessible.

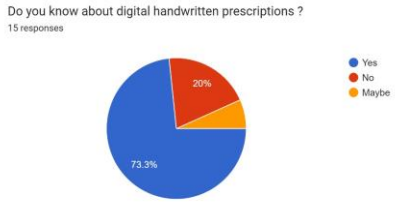
The objective is to yield the most appropriate textual inter- pretation of a given set of handwritten strokes and the system will try to look for a match in the medicine database. After verifying with the doctor it can be uploaded to cloud, once found. This will be available in pharmacies and authorized pharmacies can get the list as per customer's request. In current scenario hospitals are trying to change into e-prescription but major challenges in this area is the handwriting recognition of doctors. Automation should eliminate many of the errors that occur when pharmacists misunderstand or medication names or dosages conveyed messily on paper.**[1]**

II. LITERATURE REVIEW

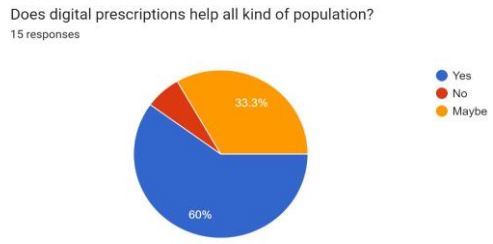
we conducted the survey and the results were also in the favor of making such system which can digitize the doctor handwritten prescription and it also shows that many people every year are affected by this problem of wrong medicine because of lack of clarity of doctor handwritings.



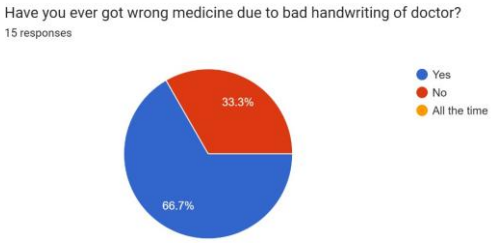
The above graph shows that most of the people want the digital handwriting platform.



The above chart shows that almost 73% people have the knowledge about the digitizing platform.



The above chart shows that this system will help all kind of people .



The above chart shows that almost 67% of people are prescribed the wrong medicine.

I. METHODOLOGY

To make this system it requires a huge amount of data so we are trying to use the already existing open source dataset which are available online and then we will be augmenting the dataset for more variations in the images so that we can have a more accurate and robust model.

The second step after collecting the dataset comes is the data preprocessing step, in this we will be using an opencv library for the image augmentation and segmentation so that they can be easily fed to our deep learning model and then we are going to use the CNN to train the model, The architecture for the model is yet to be finalized but the initial thinking is leading us to the usage of CNN or LSTM which are good for capturing long distance context and CNN are good for image recognition. Then the tech stack which we are thinking to use is the django for backend and html,css, javascript or react for frontend, the database we are thinking to use is mongodb as they are convenient to store the images and data.

Then we are thinking to use the more advance multimodal model like layoutlm for document classification and get the data from the document so that we cans store them easily in the database and there is no need for manual entering the data like date and patient name as that can be classified using the deep learning model like layoutlm etc.

This is the fully functional model which we are thinking to implement to solve this major problem and we think it will be effective and will help many doctors and people and will save the lives by prescribing the correct medicine.

II. CONCLUSION

We believe that this project can make an impact in the current medical field problems like prescription forgery,losing prescription, brand name usage in prescription, scanning large handwritten documentaries, scientific proofs etc. This sys- tem will help in making prescription by reading document so that could become more handy and digitizing this could also eliminate many human errors leading to proper treatment of the patient by getting the right medicine .**[2]**

III. FUTURE SCOPE

Major Challenge in Designing this system is different handwriting styles and lack of enough training data Hence at the beginning itself the product cannot give its full productivity. There can be problem like internet availability, reach to common people and others but within the span of time the product can reach its targeted audience and can make the expected change. In the coming time we will try to analyze the more handwriting styles and work according to the data set.[3]

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Personalised Data Structure And Algorithm Planner

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Abstract—**Data Structures and Algorithms (DSA) are fundamental concepts in computer science that form the basis of efficient problem-solving, they play a very efficient role in job placements. However, learning and mastering DSA can be a challenging task for students and professionals alike, every year lakhs of engineers struggle to clear the technical rounds due to their weak DSA preparation. To address this challenge, this paper proposes a Personalized DSA Planner that provides a customized study plan to each individual to help them effectively learn and master DSA concepts. The project features a user profile creation system, personalized plan generation based on individual goals and progress, task management, progress tracking and a resource pool for learning materials. The project also provides a cost- effective solution for DSA learning and has the potential to greatly impact the way individuals approach and learn DSA. It also promotes a sense of "Learning by own" in every individual. This study aims to evaluate the effectiveness of the Personalized DSA Planner and provides insights into the benefits of personalized learning in the field of computer science.**

Keywords—Data Structures, Personalised planner, Algorithms, programming languages, Prototype, Resource Center, problem solving.

I. INTRODUCTION

Data structures and algorithms are the foundation of computer science and play a crucial role in software development and problem solving. The term DSA stands for Data Structures an Algorithms. As the name itself suggests, it is a combination of two separate yet interrelated topics – Data Structure and Algorithms. An algorithm is defined as a process or a set of well-defined instructions that are typically used to solve a specific set of problems or perform a particular type of calculation. A data structure is a specific way of storing and organizing data in our devices to use the data efficiently and effectively [1] As technology continues to advance, the demand for individuals proficient in data structures and algorithms has increased, making them essential for job placement in the technology industry. The newbies to computer science or more precisely Data Structure lack the knowledge of what is data structures and algorithms are, how they work behind the code and how these algorithms are used in real life. Knowingly or unknowingly, we use data structures and algorithms in our day-to-day life [2].

However, the ideas behind data structures and algorithms might be confusing and daunting for someone who is new to computer science. The project being implemented by this study paper attempts to increase readers' knowledge of the subject. The project offers a customized data structure and algorithm planner that will assist each person in their learning process. This project would be implemented through website with a user-friendly interface, and it aims to provide a system that dynamically selects and optimizes data structures and algorithms for a specific task, considering the specific characteristics of the data and the user requirements. It can be used to improve the efficiency and effectiveness of data processing and analysis tasks by selecting the best-suited data structure and algorithm for the task at hand. The planner can use machine learning and other optimization techniques to make its selections, and continuously update its decision- making as the task and data evolve.

The paper provides a walkthrough, beginning with the abstract, where the reader is given a summary of what the paper is about. The introduction discusses the significance of data structure and algorithm and its impact on job placements, and this is followed by a review of several research papers and discussion of some useful insights for further implementation of the proposed system and also the key features that are to be added in future implementation. Thus, the paper concludes by letting everyone comprehend how the idea of a personalized planner would have a significant impact on education and would help close the gap between each person and their ideal careers.

II. LITERATURE REVIEW

Monica Bulger in her research paper “Personalized Learning: The Conversations We’re Not Having” tends to explain the concept of enjoying while learning [3]. A number of modern technology initiatives in education are still motivated by the desire to provide tailored education to all students, and new technology promises to level the playing field by empowering access to knowledge and teaching. Insights into personalised learning are presented in this paper, which covers a wide range of potential applications — from personalized user interfaces to adaptive tutors, from student centered classrooms to learning management systems — with high hopes for their potential to revolutionise education.

Eric Fouh in his research paper “Evaluating Online Tutorials for Data Structures and Algorithms Courses” changed the traditional and old method of learning DSA with the help of pen and paper and with the help AV (Algorithm Visualizer) [4]. AV is used for dynamic exposition and to increase student interaction with the material. Using this feature a drastic change amongst student was seen.

Cilfford A. Shaffer in his research paper “Creating Engaging Online Learning Material with the JSAV JavaScript Algorithm Visualization Library” showed that how the trend of AV with java is declining and hence the author focused on JSAV (JavaScript Algorithm Visualiser) development library [5]. It simplifies the function of AV on many engagement levels including interactive exercises. This paper contains a list of shortcomings, one of these objectives is to include built-in assistance for locating misunderstandings and the production of data to reveal students' misconceptions. The security and reliability of the grading are two more significant issues that need to be addressed. At the moment, the grading is carried out on the client side, making it easy for anyone proficient enough in JavaScript and browser web development tools to cheat. The results would be even more reliable if a method for server-side regrading of the submissions could be set up.

In his research work "Data Structure and Algorithm in Non computer Major," Zhao Wang provides a quick overview of how algorithms aren't just tied to computers and processes; they're also a reflection of learning and a lifelong pursuit of knowledge [6]. This paper suggests the implementation of a website that offers nine modules of teacher-student interaction, lesson plans, teaching teachers, teaching content, course homework, my grades, study guides, and course resources. The teaching content and course information are organised by a tree structure that is self-contained, clear, and acts as a type of data logical structure.

The authors Shraddha Ghadge and Virajas Mane focuses on the visualization of various data structures and algorithms created by web development in the research article "A survey paper on Data Structure and Algorithm Visualization" [7]. Which algorithm or data structure the user wants to see is their choice. It also allows for the depiction of certain cases by modifying the values or weights. The DSA visualizer is a pleasant educational activity that improves students' capacity for quick learning and understanding the topic; this tentative notion may eventually be employed in our project. This paper falls short of being a fully working website because it does not incorporate a code editor or the proper data structures and algorithms codes.

Author Mr. Victor Adamchik in his research paper, "Data structure and Algorithm in Pen Based Computing Environments," discusses the traditional teaching methods that instructors have adapted to teach students about the fundamentals of data structures and algorithms as well as how new contemporary practises have the potential to bring about a revolutionary shift in the field of education [8]. Investigating the suitability of a Tablet PC environment for teaching data structures and algorithms is one of his study's main objectives. In this setting, sketching becomes a crucial component of computer science research. It enables the expression of ideas and their sharing in a highly participatory setting. Thus, their suggested solution of leveraging the pen-based gesture interface will encourage students' algorithmic thinking and intuition for problem-solving. The proving techniques used in, say, an advanced course on algorithms present significant challenges to computer science students. This paper does not address solutions to proofs using pens.

The author of the research paper "Personalized Learning Path of a Web-based Learning System" focuses on how an interface agent compiles a list of suggested readings based on pre-test results for students [9]. The personalization agent then rates the list based on how challenging each learning unit is. The new difficulty level of a learning unit is derived by linearly combining the course difficulty as assessed by the students and the courseware developers, with varied weights assigned to each. This paper gives a complete insight about how ML algorithms are embedded in creating a teaching system.

I. METHODOLOGY

In Data structure and Algorithm, algorithms are evaluated based on three aspects: specification, verification, and performance analysis. Specification formalizes the details of the problem the algorithm is intended to solve and involves defining the relationship between inputs and outputs. Verification confirms that the algorithm does what it is intended to do, while performance analysis assesses how efficiently the algorithm operates. These three aspects are dependent on the specific problem being solved [10]. The purpose of a customized DSA planner is to create a clear road map for each person in order to improve their professional abilities and give them assistance in closing the employment gap.

A. Conceptual Diagram:

Fig. 1. Flowchart

Depending on their expertise and level of confidence in the subject, users would be divided into three categories after logging into their accounts: beginner, intermediate, and advanced. When a user selects Beginner, they would be given a choice to choose time limit and programming language; based on their selection, they will receive a customised planner. This personalised planner will be developed by using Machine Leaning algorithms where datasets will be labelled with time limit and difficulty level. In the intermediate level, users must choose several topics that they are already familiar with; next, a quiz would be taken. If the user passes the quiz, their answers will be saved, and they can choose to study more. Based on that, they will receive a personalized learning plan. If the user fails the quiz, they can either retake it or limit the number of topics they choose to learn about. In the advanced level the user will be given coding problem or quiz, and based on the results, they can continue their educational journey. After selecting a topic, users will receive related documentation and videos. User can choose between multiple videos according to their comfort level and understanding level. Consequently, based on their time constraints, concerns, and degree of understanding, users will receive a customized plan and specific resources from the vast pool of DSA resources.

A. Hardware and software Requirements:

1. Frontend Requirements:

- HTML
- CSS
- JavaScript
- React JS

2. Backend Requirements:

- MongoDB

B. Prototype

Fig. 2.1 Prototype

The project's high-fidelity prototype is shown in the picture above. The user will arrive at the webpage and be prompted to sign up for an account or log in using their data. The user will be prompted for details including their name, age, and educational background.

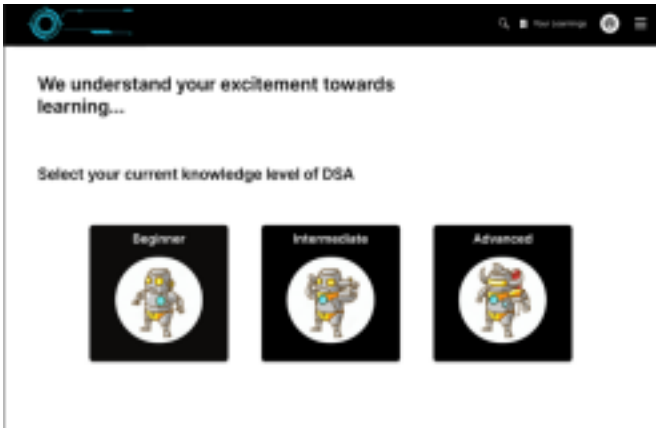

Fig. 2.2 Prototype

Students can select options like Beginner, Intermediate, and Expert after logging in. Beginner students are those who know nothing about DSA, intermediate students who know little about DSA, and expert students who really understand DSA. They will thus receive a quiz depending on the option and subject they selected. After passing the test, individuals may continue their DSA adventure using the programmes we have provided for them. Beginner students may access the plan by choosing the time frame during which they wish to learn DSA; as a result, they will receive a customised plan. This plan includes of written materials and videos on that specific subject.

Fig. 2.3 Prototy

The user will then be presented with questions according to their level of expertise after choosing their level. For instance,the novice level user will need to decide which language they want to use to continue their DSA journey and how long they want to spend learning it. Similar questions will be posed to intermediate level users on the language they prefer and the amount of time they have before they must take a brief quiz to verify their stated understanding of data structures and algorithms. The expert level user will next have to take a difficult level quiz depending on his knowledge and skill set. afterwards, the user may browse the website to look for things that interest him.

Fig. 2.4 Prototype

The below prototype illustrates the section where the learner will be asked about topics that they are already familiar and comfortable with. The software would generate a personalised learning and practise schedule for them to follow in order to learn and practise the areas they haven't mastered, based on the feedback we received.

A. Characteristics

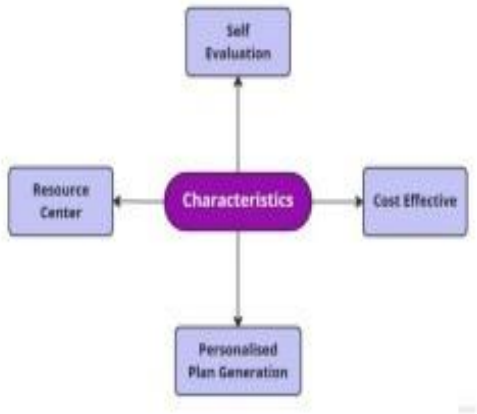

Fig. 3
Characteristics

1)Self-Evaluation

Users of the system would be able to monitor their development, assess their performance, and maintain track on how close they are to achieving their desired goals.

2) Cost Effective

The system would be completely free to use, making it accessible to all DSA learners without incurring any additional costs. This feature gives the project an extra edge over other DSA resource systems.

3) Personalised Plan Generation

The system would provide a personalised plan based on the user's profile that would include a daily schedule for every individual as well as all the topics that's needed to be covered in order to achieve their desired goal.

4) Resource Center

The user would have access to a pool of resources and materials to aid the individual on their DSA journey, such as documentation, topic related videos, websites and even simple quizzes.

I. FUTURE SCOPE

The system can have its own teaching content and collaborations with technical experts to reach a larger audience. Data Visualization tools or simulation can be incorporated on the website to make learning more practical and understandable. The proposed design seeksto offer users a fully personalized plan where they can explore different resources and advance their programming knowledge. Verified bloggers and collaborators can publish their content on the website and educate people with their thought process. The design may be improved further to support competitions between the various levels, making it simpler for users to assess their learning progress.

A collaborative environment would be provided for solving real life problems along with practicing algorithms. Further implementation of practice problems and exercises to assess and enhance comprehension and application of data structures and algorithms would also be done.

II. CONCLUSION

In conclusion, a personalized DSA planner project is a promising solution that addresses the challenges faced by DSA learners in their journey. This project provides a personalized plan, tailored to the individual needs and goals of each user, making it a highly effective tool for achieving success. The features offered by the project, including task management, progress tracking, data analytics, and a resource center, empower agents to stay organized and motivated. Furthermore, the project offers a platform for collaboration and a sense of community among DSA agents, which can help to overcome challenges and support their success. The project's cost-effective approach makes it accessible to a wide range of users, regardless of their budget or resources, and has the potential to greatly impact the DSA industry. An in-depth study of this project can provide valuable insights into the effectiveness of personalized planning for DSA participants and inform the development of similar systems in the future. Overall, the

personalized DSA planner project represents a promising solution for enhancing the success and efficiency of DSA agents and merits further research and exploration.

VI. ACKNOWLEDGMENT

We would especially like to thank Mr. Shailesh Sangle, the research head and our guide, for his contributions towards the growth of the paper. Additionally, we would like to thank our principal, Dr. B.K. Mishra, for motivating us to present our concept as a research article.

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Impact of Educational games on teaching and learning outcomes

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Abstract—**This abstract addresses the importance of Games which helps in teaching, games have become an important part of our culture in a relatively short period of time. Industry is also developing into a major pillar of many modern economies, with game development tax schemes being introduced into many developed countries. These are coinciding with a period of time where it has never been easier to release a game onto the educational market. It is still essential to have a good understanding of the technical aspects involved in making games and the considerations involved in designing games which help people in learning. Sometimes the best way to develop this knowledge is to begin at the very beginning, so we'll look at some game history. This paper practically develops a game-based learning system to improve self-efficacy for student's learning. Game-based learning is combined with educational and information technology. From the e-learning carried on, game-based learning is getting more attention. With game-based learning, the course material is mapped into the game to create a scenario-based learning environment. Repeated self-learning, ongoing interaction, and feedback can all help learners become more engaged and motivated. Consequently, game-based learning could successfully accomplish the learning objective.**

Keywords--E-learning, interactive classrooms, modern education.

I. INTRODUCTION

For the majority of students, when learning operating systems, besides continuous memorization and recitation, the programming homework in the course also creates a bottleneck for the students in their learning. Students have lost faith in the curriculum for a variety of reasons, which has reduced their enthusiasm to learn and made them want to give up. This study combines games with course content to design an online multiplayer collaborative learning game, so that when students engage in the games, it creates a desire to win arises through the model of mutual competition. The students can thus learn knowledge relating to the course on their own, and in turn, gain a victory in the next game, improving the learning effects.

II. PROBLEM DEFINITION

These days, students use mobile phones in addition to desktops and laptops. Finding the course materials requires higher education students to spend a lot of time online. Sometimes the teacher delivers the materials, but the students who want to enroll in a particular course for a semester are unable to acquire a quick overview of the course before the semester begins. There are many online learning platforms available today, but not many of them are single-page and responsive. Additionally, in today's world of lifelong learning, students must always have access to course materials and from any location. Nowadays, finding course materials online is simple, but getting access to them is difficult due to the materials' closed access. Most of the time, registering is required in order to download files, but once they do, they discover that the materials cost money.

At a simple level, games-based learning can be defined as “learning that is facilitated by the use of a game.” This can be at any academic level from preschool through to lifelong learning, from simple memorization and recall to high level learning outcomes such as evaluation or creativity. The game can be used directly or as a supplement, and it can be played in person with real things or online with a computer. Because there is no single approved classification and definitions vary depending on the disciplinary backgrounds of individuals who construct them, the challenge lies in the precise definition of the term "game." Game based learning is also an active learning technique where games are used to enhance student learning. Here, the learning comes from playing the game and promotes critical thinking and problem solving skills. Game based learning can be accomplished with digital or non-digital games and may include simulations that can allow students to experience the learning firsthand.

There are now numerous online learning platforms available, but only a select few are single page and responsive. Because the old system uses simple HTML design, the typical web application for e-learning does not provide the students with a decent browsing experience. This project's main goal is to give students better and more effective access to course materials, information, and other useful features. In this project, a single-page, responsive web-based courseware system will be created, allowing students to access course materials that have been submitted by university professors so that they can discover everything in one place. Its main goal is to make it simple for teachers and students to communicate with one another and access

coursework at any time and from any location.

III. LITERATURE SURVEY

Games-based Learning (GBL) has developed a reputation with educationalists it is perceived as a potentially engaging form of supplementary learning that could enhance the educational process and has been used at all levels of education including primary, secondary and tertiary education. Despite this recognition and utilization there is still a lack of empirical evidence supporting GBL as an approach. This paper presents the findings of a systematic literature review performed from 2000 to 2013 specifically looking at quality empirical studies associated with the application of GBL in Primary Education (PE) categorizing studies into: behavioral change, affective and motivational outcomes, perceptual and cognitive skills and knowledge acquisition and content understanding. This paper presents a synthesis of these high quality studies associated with GBL. According to the studies, GBL has been utilized to teach a range of disciplines to kids and teenagers in physical education, with math, science, language, and social studies being the most common. However, the analysis shows that more Randomized Controlled Trial (RCT) studies should be performed comparing GBL to traditional teaching approaches to ascertain if GBL is a useful, viable teaching approach at PE level; there is a distinct lack of longitudinal studies and further longitudinal studies are required; further studies are required looking at whether there are pedagogical benefits of using 2D or 3D games at PE level to assess if 3D immersive games are indeed necessary; further studies are also required to perform comparisons between single and collaborative play and to identify the pedagogical benefits.

Games are an efficient way to learn skills and attitudes that are difficult to pick up by rote memory. Games have the potential to teach, train, and educate. This is just one of the many assertions made about learning games. Because they (theoretically) offer a variety of approaches that can address cognitive and affective learning (such as knowledge construction, skill acquisition, and attitude acquisition), educational games are becoming more and more recognized as new instructional technology with significant potential. The expectation is that playing (educational) games will inspire and involve students in the learning process, which is probably most important. This boost in motivation is thought to result in higher mental effort investment, more deliberate information processing, and more. The game-based learning environment has the following characteristics:

1. Use the game method to motivate students to rethink their original knowledge

2. This game provides instant feedback to help teachers understand the student's actual teaching progress and make various suggestions promptly

3. Through the game, students can share a lot of information and acquire knowledge.

4. Learning through games can ensure that students are not bored comfortably facing learning.

5. The game usually comes with discussion and social networking activities

IV. METHODOLOGY

Here are some specific algorithms or strategies that can be used to create effective game-based learning experiences:

Goal setting: Define clear and measurable goals for the game that align with the learning objectives.

Feedback System: Provide immediate feedback to the player on their progress and performance, including areas where they can improve.

Scaffolded Learning: Gradually increases the complexity of the game mechanics to match the player's skill level and keep them engaged.

Collaborative Learning: Encourage players to collaborate with each other, for example by sharing their knowledge, working on team challenges, or competing with each other.

Personalized Learning: Provide personalized learning experiences by adjusting the game mechanics and content to the player's preferences and learning needs.

Storytelling: Use storytelling to create an immersive and engaging game experience, incorporating plot twists, character development, and interactive narrative elements.

Multiple Intelligences: Incorporate multiple intelligences, such as visual, auditory, and kinesthetic learning styles, to cater to a range of learning preferences.

Game-based Assessments: Use game-based assessments, such as quizzes or puzzles, to evaluate learning outcomes in a fun and interactive way.

Emotion-based Learning: Connect learning to emotions by incorporating elements such as humor, drama, or surprise, to create a more memorable and engaging experience.

Gamification: Use gamification techniques such as points, badges, and leaderboards, to motivate players to engage with the learning content and achieve their goals.

These algorithms or strategies can be combined and adapted to suit different learning objectives, audiences, and game types. By using these strategies, game-based learning can be an effective way to engage learners, promote knowledge acquisition, and improve learning outcomes. Creating a gaming atmosphere that is adapted to all the learners' ability:

1. Start with a simple game: Begin your lesson by introducing a simple game that focuses on a particular concept. This game should be easy to learn and simple to play.
2. Explain the game: Once the game has been introduced, explain the rules and objectives of the game. Allow students to ask questions and provide additional instruction to ensure they understand the game.
3. Introduce the concept: After the game has been explained, introduce the concept that the game is teaching. Provide examples and use visuals to further explain the concept.
4. Have students play the game: Allow the students to play the game in pairs or small groups. As they play, monitor their progress and provide guidance when needed.
5. Review the concept: After the game has been played, review the concept by having the students answer questions about the

6. Provide feedback: Finally, provide feedback to each student on their performance and understanding of the concept. Encourage students to continue to practice and play the game.

V. RESULT AND DISCUSSION

The use of digital games has great potential in higher education to provide active, fun, and engaging online education. The results of the analysis of the prior research data indicate that students' interest in adopting game-based learning has increased. Even though the participants were limited in that universities with its student of selected courses and section . By including complementing incentive factors, portable digital games can enhance both "hard" skills (like abilities or job-specific skills) and "soft" skills (like teamwork) (e.g. fun and competitive). Official training method. Alternatively, this game can be played by an individual or student pairs.

If the coach sets a large and continuous-time at his disposal, such as a 3-hour time slot, you can even play the game at the same time. However, teachers should be careful when estimating how long it will take for the time to play the game to complete until it is needed to complete the game task. Finally, for all digital games, it's important to pay attention to the learning curves that students face when using technology and take appropriate steps to reduce technical barriers.

The mpact of educational games on teaching and learning concepts has been overwhelmingly positive. Games can increase engagement and motivation, improve learning outcomes, promote personalized and collaborative learning, and provide more effective assessment of student progress. As technology continues to advance, we can expect to see even greater benefits from educational games in the future.

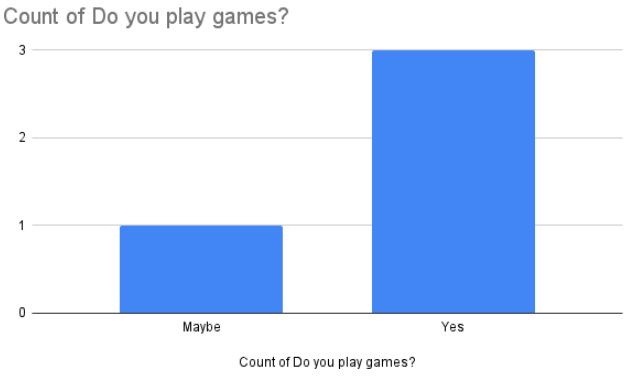

Fig.1

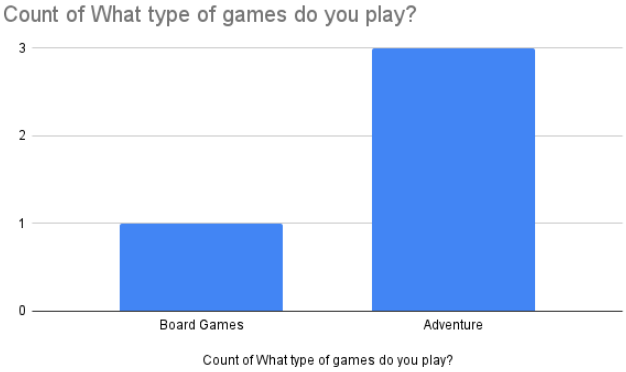

Fig.2

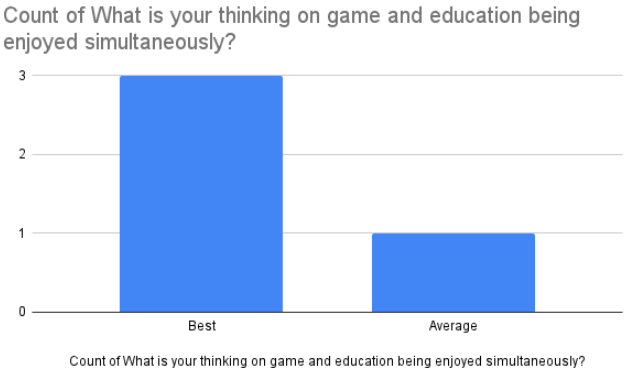

Fig.3

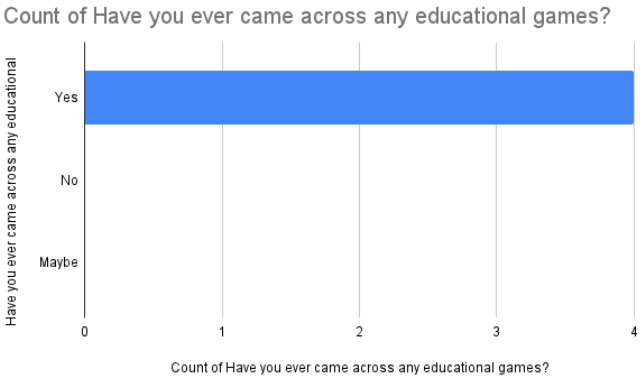

Fig.4

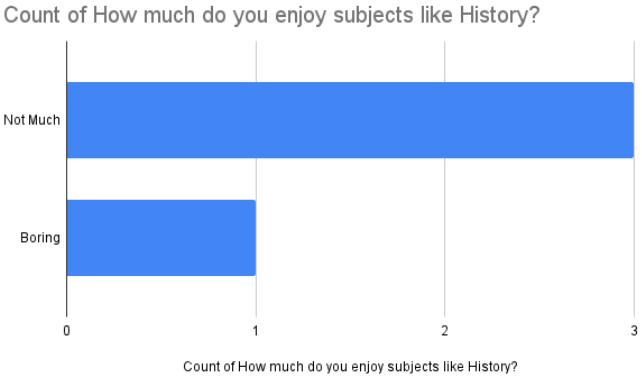

Fig.5

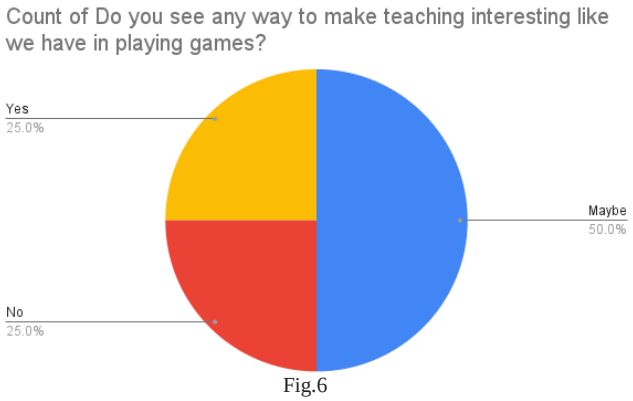

Fig.6

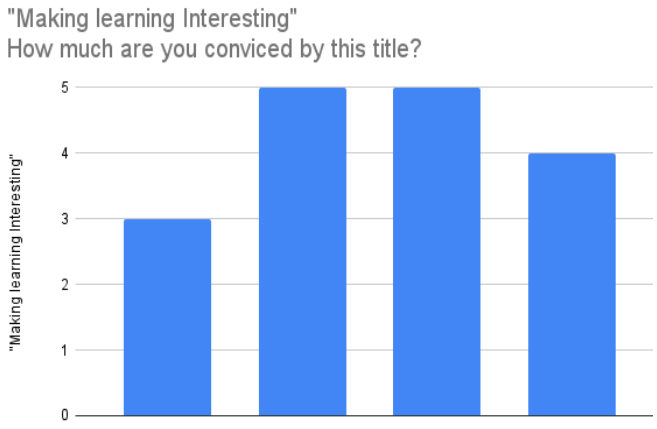

Fig.7

The above survey results reflect the amount of games today's generation plays and the type of it. From the results it is clearly understood that adventure games are quite popular among the students. The response on gaming plus learning also has a positive reply from the respondents. Clearly we can see that educational games can have a positive impact on today's generation.

VI. FUTURE SCOPE

The future scope of educational games on teaching and learning concepts is significant. Game-based learning has already demonstrated many benefits over traditional teaching methods, and as technology continues to advance, these benefits are likely to increase. Here are some potential future impacts of educational games on teaching and learning concepts:

Increased engagement and motivation: educational games have been shown to increase student engagement and motivation. As game design and technology continue to advance, games could become even more engaging, incorporating interactive 3D environments, artificial intelligence, and other advanced features to keep students engaged and motivated.

Enhanced learning outcomes: Games can be designed to promote active learning and problem-solving, allowing students to apply what they have learned in a practical context. As game-based learning becomes more sophisticated, it could help students develop a deeper understanding of complex concepts and improve learning outcomes.

Personalized learning: educational games can be designed to adapt to the individual needs and preferences of each student. As game design technology continues to advance, games could become more personalized, tailoring the learning experience to the student's individual learning style, skill level, and interests.

Collaborative learning: Games can be designed to promote collaboration and teamwork among students. As game-based learning becomes more social, games could help students develop important interpersonal skills and learn how to work effectively in a team.

Improved assessment: Games can be used to assess student learning outcomes in a more meaningful and engaging way than traditional assessments. As game design and technology continue to improve, games could become more effective at assessing learning outcomes, providing teachers with valuable insights into student progress.

Overall, the future scope of educational games on teaching and learning concepts is exciting. As technology advances and game-based learning becomes more sophisticated, we can expect to see even greater benefits for both students and teachers.

VII. CONCLUSION

There are many opportunities to implement the concept of the game in education, and there are many types of games available in the learning process, including problem-solving, practice, simulation, puzzles, and educational games. In this paper, the main purpose was to highlight some of the literature reviews by analyzing 6 core-papers. Furthermore, the literature review identified studies related to game-based learning that focused on the rapidly emerging learning paradigm and practice of using computer games and encouraging the learning process, which determined positively for both stuff in their experience. This review of general game-based learning summarizes some of the benefits of applying game-based learning to improve student performance. Social game mechanics increase student motivation and learning needs, develop stronger relationships with team members and colleagues, and ultimately help the knowledge discovery process. The methodology, explained in common figure to show the six phases to follow through any system development to enhance a game based. In general, we need to combine traditional gaming frameworks with clear pedagogical elements to help students achieve their full educational potential. In conclusion, we hope that educational institutions will introduce game applications to improve learning.

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Survey Analysis on Learning Management System

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Abstract—**This paper addresses the importance of e-learning in modern education, as well as its technical aspects, market, advantages and disadvantages, comparison to instructor-led training, and prospects for its eventual replacement of traditional classroom instruction. As more users become computer literate, the idea of e-learning is currently growing in popularity. Faster bandwidths have made a significant contribution to the expansion of e-learning. E-Learning is being used by many universities and higher education institutes. Large corporations are also making significant investments in interactive classrooms and e-learning. E-learning will soon replace paper books in the form of tablets with touch screens as the future of education since it is a fun, interesting, and interactive method to study.**

Keywords--E-learning, interactive classrooms, modern education.

I. INTRODUCTION

The science of learning without using printed instructional materials on paper is best described as e-learning. It is the delivery of information for education and training through telecommunications technology. E-learning is becoming the model for modern education as information and communication technology development continues to advance. The asynchronous and synchronous learning network model is one of the key benefits of online learning since it frees interactions between students and instructors from time and geographical constraints. This method of instruction and learning is also referred to by a variety of other names. Online learning, virtual learning, distributed learning, network learning, and web-based learning are a few of them. E-learning is much more than just online learning; because the letter "e" in E-learning stands for the word "electronic," E- learning would include all educational activities carried out by individuals or groups working online or offline. As a result, e- learning relies on learning content that can be accessed anytime, anywhere. This content is created utilizing videos, audio, text, animations, and/or simulation to enhance learning.

We currently have the impression that knowledge is everywhere and that e-learning approaches have made this feasible. The industrial sector is gradually converting to e-learning approaches for staff training and favoring them over a workforce of many hired trainers in the informal education sector. This guarantees the best possible use of two of an organization's most important resources, namely income and time. Even in the formal higher education sector, many universities and institutes now provide students with a variety of online courses in two formats: 1) as a supplement to their traditional courses, and 2) as pure online courses. The students enrolled in these online courses can even take their exams online. E—learning thus becomes integral part of both students and concerned authorities and feasible to both.

II. PROBLEM DEFINITION

These days, students use mobile phones in addition to desktops and laptops. Finding the course materials requires higher education students to spend a lot of time online. Sometimes the teacher delivers the materials, but the students who want to enroll in a particular course for a semester are unable to acquire a quick overview of the course before the semester begins. There are many online learning platforms available today, but not many of them are single-page and responsive. Additionally, in today's world of lifelong learning, students must always have access to course materials and from any location. Nowadays, finding course materials online is simple, but getting access to them is difficult due to the materials' closed access. Most of the time, registering is required to download files, but once they do, they discover that the materials cost money.

There are now numerous online learning platforms available, but only a select few are single page and responsive. Because the old system uses simple HTML design, the typical web application for e-learning does not provide the students with a decent browsing experience. This project's main goal is to give students better and more effective access to course materials, information, and other useful features. In this project, a single-page, responsive web-based courseware system will be created, allowing students to access course materials that have been submitted by university professors so that they can discover everything in one place. Its main goal is to make it simple for teachers and students to communicate with one another and access coursework at any time and from any location.

III. LITERATURE SURVEY

Without a doubt, the global socio-economic problems brought on by the Covid-19 pandemic were severe. Many nations have put restrictive measures in place to limit social gatherings and encourage social segregation to control the spread of the disease. This resulted in the closure of institutions of higher education and a significant change from conventional classroom-based teaching and learning to a virtual approach. Due to Covid-19, higher education may have changed and migrated online, but it is unclear whether this change has a positive impact on teaching and learning outcomes. In the age of the COVID-19 epidemic, this literature study is being performed to gather relevant

information on the outcomes, difficulties, and opportunities of e-learning and e-teaching. While many studies on the epidemic have been published, very few of them discuss the depth of e-learning and e-teaching outcomes, accompanying difficulties, and opportunities during the Covid-19 period. Numerous difficulties with teaching and learning that academics and students experience are discussed in the literature. These obstacles include being unable to access or use online teaching and learning resources; finding it difficult to adapt, especially for students from low-income families and those who live in remote areas; and experiencing related stress, sadness, and anxiety.

Multimedia, static images, moving images, video, music, text, and many other learning aids can all be crucial components of an efficient e-learning system. Virtual learning environments handle database handling, file management, feedback management, content management, content delivery, management of financial transactions, etc. in addition to providing a user interface. It benefits not only the students but also the administrator, teachers, instructors, and trainers. There are two primary types of virtual learning environments: commercial mode and non-commercial mode, both of which support the ideas of open source.

The study would thus benefit with respect to below points:

1. Constant accessibility (supports anywhere anytime concept)

2. Concepts are more clearly explained because of the additional resources, such as videos, audios, animations, simulations, blogs, and professional assistance.

3. It helps with development at the individual level through one-on-one interactions with teachers and saves time and money.

4. Students always have a variety of additional options available to them to meet their educational needs.

5. Every learner has the freedom to go at their own speed. This pace does not have to be static or constant; it can also change dynamically for each person.

6. It offers a quicker method for students to have their progress reviewed at various levels and by various teachers.

7. The students can receive feedback and solutions more quickly to their doubts.

Web technology is used by e-learning as its fundamental technical foundation for knowledge delivery. A greater need for technology assistance is anticipated soon because e-learning is currently on the rise in academic and industrial settings. Its versatility, user-friendliness, reach, ease of accessibility, consistency, and repeatability are its primary benefits in addition to cost-effectiveness.

Categories of E-learning:

1) Courses:

Most e-learning discussion centers on academic programs. Usually, educational course materials or courseware are altered, and additional media are added before being transferred to a networked environment for online access. Today, educational institutions use several well-liked learning management systems (LMS), including WebCT and Blackboard. Courseware creators have started using creative presenting techniques including simulations, storytelling, and numerous distinctive qualities into the materials to create a more interesting courseware. E- learning and classroom environments are remarkably comparable in that both students and teachers are involved in the same course structure and flow.

2) ***Informal learning***:

Although one of the most flexible and dynamic aspects of learning, information learning is one of the least acknowledged. Our search is motivated by our need for information (as well as how we plan to use it). A strong toolkit for knowledge workers' portfolios includes search engines (like Google), information storage tools (like Furl), and personal knowledge management tools like wikis and blogs. According to Cross, we learn more in the workplace during downtime than in a classroom setting. Via informal learning, sometimes through trial and error and other times through conversations, we advance more quickly in our careers.

3) Blended Learning:

A smooth transition from in-person instruction to online instruction is made possible through integrated learning. Online and face-to-face instruction are both used in integrated learning, which is also known as blended learning. One cannot overstate how effective this approach is. It promotes education and information review outside of the classroom. In blended learning, face-to-face instruction is combined with a variety of delivery methods, including collaboration software, web-based courses, and computer communication techniques. The best classroom instruction is combined with the best online instruction in integrated learning.

4) Knowledge Management:

E-learning technology is a focus of globalization because it could make better learning opportunities available to a wider audience than has ever been possible. It has been proposed that establishing a learning society is a necessary step for a country to take on the path to a prosperous knowledge economy. Knowledge management is a crucial process that deals with how to build a culture of knowledge sharing for activities like information exchange, adoption, and distribution within an organization.

5) Learning Network:

Building and maintaining relationships with people and information while communicating to promote one another's learning is the process of creating a learning network. As a result, (LN) is growing and providing opportunities for its members to interact online and share knowledge and skills.

IV. METHODOLOGY

Web technology is used by e-learning as its fundamental technical foundation for knowledge delivery. A greater need for technology assistance is anticipated soon because e-learning is currently on the rise in academic and industrial settings. The analysis, design, documentation, implementation, and distribution of instruction over the Web should all be supported by software tools that support the crucial process of instruction design.

There are three different categories of online learning

knowledge representation tools. In general, we may say that each kind of tool stresses a particular step in the process. Tools for the curriculum offer a structured and uniform environment to promote classroom learning; their roles are especially useful in the beginning and choosing phases. While knowledge representation tools concentrate on formulation and representation, digital library tools enable effective and efficient access to resources to help exploration and collection.

A) Curriculum tools:

In secondary schools and colleges of education, curriculum tools are frequently used. To facilitate class activities, materials are chosen and arranged. To facilitate collaboration and evaluation, extra features are added, such as online forums and quizzes. Three interconnected components make up a typical commercial curriculum tool: administrative tools, student tools, and instructional tools. The creation of courses and computerized quizzes are examples of instructional tools. Authentication and authorization tools for file management are included.
Among the capabilities of student tools are:

1. Browsing course materials, including readings, assignments, projects, and other resources. Explore Courses according to category.
2. Search Courses with keyword.
3. Scheduling and monitoring of learning progress: activity logs, personal calendars, and reminders for the submission of assignments.
4. Self-testing and evaluation: assessments created by teachers to evaluate pupil performance.

B) Digital library tool:

While curriculum tools assist with classroom activities, digital library tools concentrate on finding materials. These features aid in the information search's exploration and gathering phases. Users of a vast amount of digital content can find the information they need with the aid of digital library technologies. Search, browsing, and finding unique collections or exhibits are frequently included in digital library services. To find resources and investigate connected issues, search and browsing are utilized. Organized resources found in special collections or shows provide curious users a priceless resource.

C) Knowledge Representation tool:

Tools for knowledge representation assist students in graphically reviewing, capturing, or developing information. Most curriculum tools use a text- based, syllabus-based approach to describing course content. This method frequently fails to clearly define how the ideas and abilities covered in one course relate to those covered in another. Additionally, it fails to demonstrate the body of information that a student will have attained by the completion of their academic program. When creating spatial semantic displays of the knowledge, concepts, and skills that the learner knows and gains, a visualization tool. It can involve both students and instructors in an active learning process.

D) About us section:

This section provides information about the creators through which the students and learners would get to interact with. They would also come to know about their achievements, their work and get an idea of how they can build up their knowledge.

E) Login system:

The login system ensures the registration through which the learner can have their own profile and track their progress. It helps them to easily connect with the working team by their username. Their profile is secured as the password is included.

F) Contact:

Through this, the learner could easily connect with the team and the creators via their email ids, Instagram account, twitter or google account. This helps them to post their grievances, doubts etc. so that the learning would made effective. The students can also give feedback or suggestions through which the learning process could be improved for better understanding and outreach to more and more students around to achieve the best goal and provide the students a best platform to enhance their skills.

G) Responsiveness of the website:

The website is handy and easily accessible if it is responsive. If the design of the website is made interactive with the user such that it responds to the queries instantly, it is considered successful. It fits well with all the dimensions of the device, making it feasible for the students to use using mobile phones or laptops, iPad etc.

H) ***Panels in our Website*** (May change in time)

We have decided to include 3 panels in our Project. The panels and its details are as follows.

a. Teacher Panel

i. Login/Register/OTP verify via email.
ii. Forget Password/Change Password/
iii. Profile/Social Accounts
iv. Send message to Enrolled Student (Individually or All)
v. Category CRUD
vi. Upload content according to category
vii. Upload study material according to course
viii. Can see the total enrolled students and their progress.
ix. Count Total views of content.

b. Student Panel

i. Login/Register/OTP verify via email.
ii. Forgot Password/Change Password/Profile
iii. Enrolled Courses
iv. View the profile of content creator.
v. Send message to Content Creators (Individually or All)

c. Admin Panel

i. Manage everything.
ii. Search anything
iii. Add/Update/Delete Any Content
iv. Enable disable any course, student, or teacher.

I) Business Model

We have our Business Model of Learning Management System.

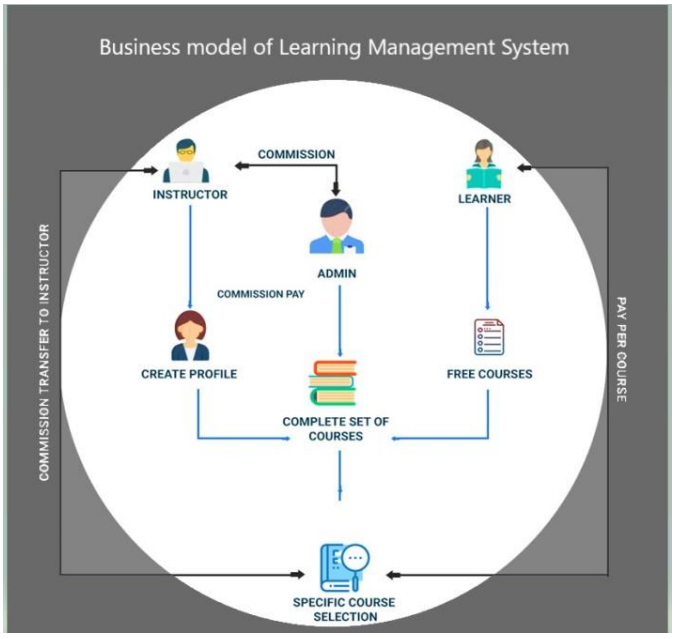


Figure 1: Our main Business Model

V. RESULT AND DISCUSSION

Numerous studies and academic institutions are interested in evaluating various e-learning, online learning, blended learning, and face-to-face course formats to determine which is more beneficial in terms of, for example, learning outcome and student satisfaction. However, research demonstrates that learning and teaching are complicated processes that are impacted by factors more than just the teaching method. We should therefore investigate the numerous variables that affect teaching and learning in various circumstances and forms. The focus of this literature review has been on the elements that influence students' engagement in e-learning, online learning, and blended learning in higher education, with a focus on teacher preparation and professional development. The review's research findings reveal that among the many factors, some stand out more than others, including educator online presence, interactions between students and content, and intentional links between online and offline activities as well as between campus-related and professional activities. More precisely, the studied literature provides a wealth of recommendations for various course designs that are successful in each situation. According to studies, e-learning and blended courses should be created to promote coherence among students, teachers, and content as well as between online and offline activities, campus-related and practice-related activities, and between online and offline activities.
The responses included approval over responsiveness of the website, easily access factor, instant response factor, different options through navigation bar, etc. The content provided on the website was up to the point with respect to the user according to their requirements. However, less approval was given towards recommendation factor as it does not provide suggestions on the history that one has gone through.

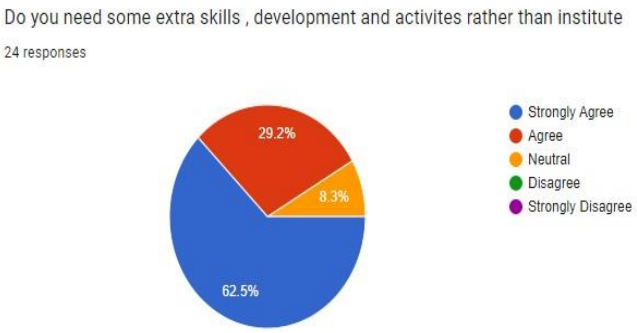
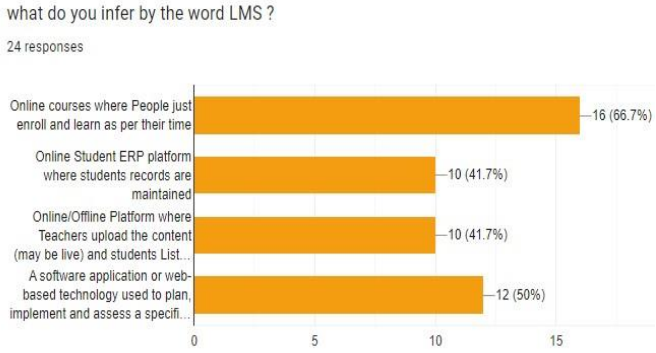


Figure 2



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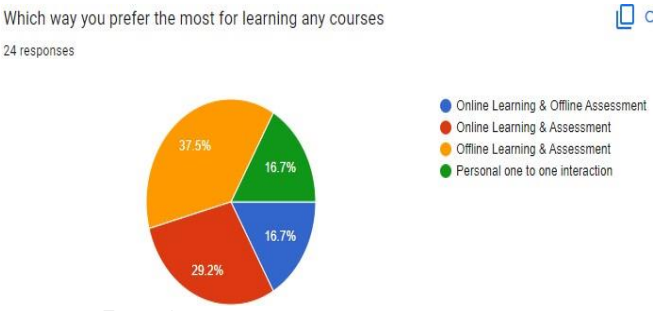

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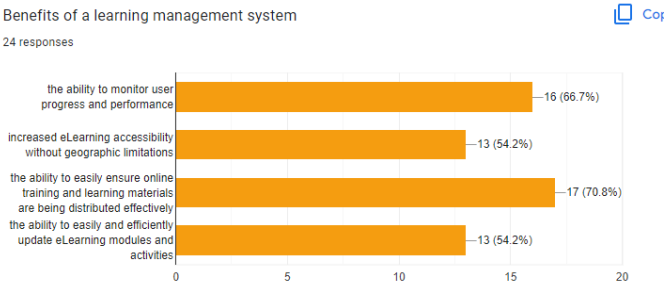

Figure 5

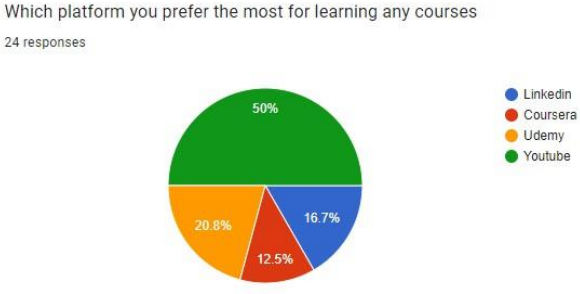

Figure 6

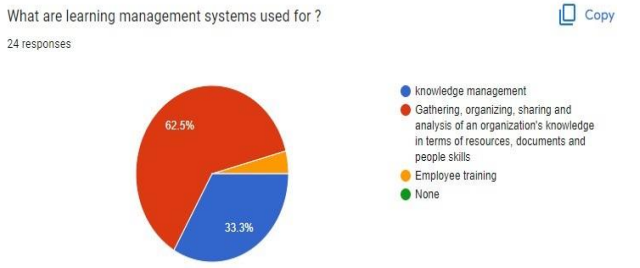

Figure 7

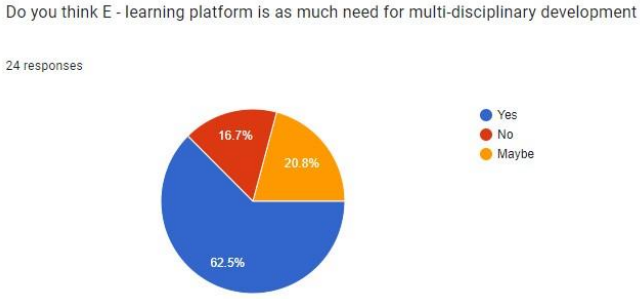

Figure 8

Online education includes virtual courses provided by major universities. Online learning, or virtual lessons delivered via the internet, offers an alternative to traditional courses taken in a real educational building. It is a trend in online learning that increased the World Wide Web, and the commercial Internet became more widely used in the 1990s. The student Experience is frequently asynchronous, yet it can also have synchronous parts. a large for the administration of online courses, most institutions use learning management systems courses. As remote education philosophies change, digital tools that promote learning and the practice of teaching is evolving as well.

In the survey conducted, it was understood that given the improvements in delivery methods, online learning environments provide a greater degree of flexibility than traditional classroom settings. Additionally, more varied portrayals of student groups can be seen on online platforms. Interacting with students from different places than one's own fosters diversity and may provide a range of viewpoints on the course material.
Completely online courses are often provided using either an asynchronous learning format or a synchronous learning style. Through a college or university's learning management system, most of the online learning takes place (LMS). A LMS is a piece of software used to manage, distribute, and track educational content. As reported by 99% of colleges and universities, the use of an LMS is almost universal, according to the Educause Center for Analysis and Research (ECAR). Among faculty, 87% report using a LMS and find them useful for "enhancing teaching (74%) and student learning (71%)". Similarly, 56% of students who utilize an LMS in most or all of their classes do so because 83% of them do.

From the survey we got to know that 66.7% of student infer that Online courses where People just enroll and learn as per their time. 37.5% of student prefer Offline Learning & Assessment, 62.5% of student think E - learning platform is as much need for multi-disciplinary development, 50% of student prefer YouTube for learning courses, 70.8% students think that the main benefit is the ability to easily ensure online training and learning materials are being distributed effectively .

Thus, to make this online learning process more powerful, effective and trustworthy, a proper assessment is required. Through our project, we would ensure that to do so , following points would be taken care of:

Randomized quizzes
Task submissions
Video assessment
Certification

VI. FUTURE SCOPE

In comparison to the conventional classroom teaching methods, the new online education technologies, and e-learning tools are far more interactive, individualized, and engaging. E-learning strategies give students the option of a completely customized, self-paced online curriculum for at-home learning in addition to a classroom environment that is far more engaging. Many educational institutions throughout the world are adopting a blended learning format by utilizing internet- and multimedia-based instruction platforms, computer-aided learning, technology-enhanced e- learning materials, and learning content management systems on various sizes. The learning content that is enriched by media-enabled technology is more interesting than the options that use dry textbooks.

E-learning has quickly transformed from a futuristic idea to a useful method of teaching. It will still be a very effective self-study platform and teaching tool in the classroom. The use of e-learning programs will become more prevalent in experimental topics, skill-based learning, and military training as virtual reality and augmented reality technologies advance. Numerous vendors of educational technology are also making hints about the advent of mobile learning solutions, or e-learning, as the next development in educational technology. More animations would add up, scientific laboratories, simulations would stimulate the e learning. Different methods of evaluation would be made to avoid the cheatings during any tests. More of the factors would be added to provide all the resources at one place.

VII. CONCLUSION

Online education has the potential to improve students' retention of what they learn. This is so because several supportive elements exist, such as student motivation, literacy, and self-assurance. In addition, it indirectly influences how well students grasp the learning content. E-learning involves more than just a shift in technology. It is a component of redefining how our species imparts knowledge, abilities, and values to future workers and students. E- learning is becoming the standard method of delivering education and training in many industries.

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Healthcare, Fitness And Exercise Planner

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Abstract-**Healthcare systems globally have experienced intensive changes, reforms, developments, and improvement over the past 30 years. Multiple actors (governmental and non- governmental) and countries have played their part in the reformation of the global healthcare system. New opportunities are presenting themselves while multiple challenges.The Indian hospital industry accounting for 80% of the total healthcare market is expected to touch US$ 132 billion by 2023. In the Economic Survey of 2022, India's public expenditure on healthcare stood at 2.1% of GDP in 2021-22 against 1.8% in 2020-21. The purpose for a Global Strategy on Digital Health is to promote healthy lives and wellbeing for everyone, everywhere, at all ages. To deliver its potential, national or regional Digital Health initiatives must be guided by a robust Strategy that integrates financial, organizational, human and technological resources.**

I. INTRODUCTION

Mobile medical Apps, healthcare applications and medical patient programs are currently growing rapidly in popularity. Mobile health, called Health solutions, grow together with the global increased use of smartphones.

In addition, the attention to the healthcare process is shifting to be more and more patient- centric. In reality, mobile health care programs will become one of the greatest revenue contributors. Based on recent data it can be anticipated to grow to $58.8 Trillion in 2022 from $25.39 Billion in 2017. Thus, we'll see it more than double during the coming years.

II. NEED OF HEALTHCARE MOBILE APPS

The speedy adoption of smartphones and increased dependence on them is among the chief reasons for increases in much of the medical app development. People today find it hard to spare time to get routine check-ups and health tracking. Introduction of mobile programs for health care has made it feasible for folks to maintain a Continuous check on their wellbeing and know about health through predefined parameters

III. RESEARCH OBJECTIVES

Some of the main objectives of mHealth include improving healthcare quality, reducing clinical errors, and integrating resources; these purposes may also improve patient lifestyle. In his study, Mueller [9] found that a high percentage of patients with serious conditions used mobile monitoring, claiming many benefits such as faster input from physicians on their health status. In addition, they anticipated that this heart failure monitoring device would be low-cost and effective. The use of mobile technologies to monitor equipment seems to be a feasible alternative for enhancing patient-provider communication. The present research will look at the impact of mobile health apps on primary care practitioners' patient care.

Accordingly, the primary objective of the study is to investigate the impact of mobile health applications on primary care professionals' patient care.

IV. LITERATURE

The term mHealth, also known as mobile health, has emerged as one of the most intriguing new discoveries in recent years. mHealth has a wide range of definitions; the U.S. health officials define mHealth as using mobile wireless devices to enhance health outcomes, health services, or research. The WHO defines mHealth as "the use of mobile or wireless technologies to assist individuals in achieving their health objectives." Physiological sensors, as well as integrating communication devices and computers, have made it possible for mHealth to take off in a big way.

With today's mHealth technology, there are three main types of mobile devices that may be used to gather health-related data: basic phones, handsets, and smartphones. In addition to making phone calls, basic phones only allow for text message communication. The small form factor of feature phones allows them to have multimedia display capabilities. Another popular feature phone was Motorola's RAZR, with a small color display around 15.2 cm squared. Phones using the SYMBIAN computer system faced a few limitations when it came to programming. This may be seen as an extension of telemedicine/telehealth, because the phone can be used to send and receive health- related data. It is now possible for individuals and healthcare providers to transmit text messages and pictures containing important health data to medical institutions and experts in remote areas, who can subsequently reply with professional advice through the same methods.

Due to the ease and portability of mobile phones, medical advice may be sent while the patient is still at their home or at the site of an accident, saving time and money on transportation. Basic mobile phones, features phones, and, of obviously, smartphones all have this "any-where" functionality. Smartphones with advanced software, such as WhatsApp, make it simple to send pictures, text, and video back and forth. WhatsApp's secure conversations are especially attractive in the medical field since they maintain the confidentiality of the provider-patient relationship.

One thing to keep in mind is that in this scenario, the medical understanding is being given by someone in another country or region.

The strong graphical and coding capabilities of

smartphones allow the development of applications that explain medical/surgical procedures apart from medical evaluations like the case mentioned previously. When sent to distant or conflict areas, medical personnel known as medics are often required to deal with trauma situations in the absence of doctors and surgeons, including performing invasive operations such as blood transfusions and lot of carbon emissions.

Apps that combine speech, pictures, and video into step-by-step instructions may help the physician execute these operations. However, even after up to two years of rigorous training, these doctors are expected to be well-versed in a wide range of medical problems and treatments, including more than a hundred different kinds of medical and surgical operations. There is no way a doctor could know everything about everything, so having this information provided in easy-to- access, searchable media-rich forms on a smart phone, instead than in cumbersome paper documents, may be very helpful to the medical community in many situations.

V. MHEALTH AND HEALTHCARE

The current part of the study examines the existing research on the influence of mobile applications on primary healthcare patient care. The structures and applications of mHealth are also discussed in this section. Leong et al found that healthcare employees at a Singaporean tertiary critical care hospital were surveyed about their phone cleaning habits, emotions, and views. The researchers also looked at how positions in phone hygiene started to promote phone hygiene. According to their survey, 11.5 percent of healthcare professionals cleaned their phone on a regular basis, while 9.4 percent had never cleansed it, but this was changed to 16.9 percent and 3.8 percent, respectively, once phone hygiene stations were put up.

Feroz et al. looked at the possibilities of using a mobile phone to improve performance of healthcare employees in low- and middle-income countries. Health professionals' services had a substantial effect on child mortality and morbidity rates, as well as the burden of noncommunicable and communicable diseases, according to the evidence they provided. The cost of a mobile instant service for patients with t2dm mellitus was assessed by Islam et al.. The intervention expenses for the text-messaging programmed on mobile phones totaled $2842. As a result, it was a useful complement to diabetes patients' therapy and was expected to save money in low- resource situations. It has a major effect on healthcare in many ways because of telehealth (mHealth).

With smartphones, medical advice, and clinical decision support may be delivered through multimedia. In poor nations, smartphones may be an effective support tool for healthcare personnel. Many new health mobile devices, such as smartwatches and activity sensors, have recently become available.

So, according Hasandokht et al., because women are the most regular users to Isfahan health centres, in order to help women with hypotension who have been sent to treatment centers, a package of corrective measures has been put together. Most of the survey participants would use mobile phones to access free mental health surveillance and self-management programs. When it comes to mobile health, SMS is a go-to service. It can be used for everything from patient follow-up to tracking health behavior to collecting data about patients. In comparison to patients who got conventional treatment, those who received SMS had higher rates of reporting on antiretroviral therapy (ART) drug adherence.

The results of this research indicate a positive attitude regarding the use of mobile phones in follow-up services. Chen & Allman-Farinelli, (2019) estimates that sending appointment reminders through text message or email improves show up by as much as 7%. SMS increases clinic attendance, which helps both the clinic and the patients. According to Zolfaghari et al., patients who get SMS treatment and follow-up phone calls show greater improvement in glycated hemoglobin (HbAtc). Public health centers' most popular activities include follow-up and communication.

Certain populations, such as pregnant women, newborns, children, and the elderly, get mobile phone services such as prescription reminders or visit attendance.

As cellular telephones have the potential to improve primary care, the goal of the study is to find out how health centre employees in Zahedan feel about using mobile phones to provide services. To improve technology acceptance, it is necessary to distinguish between the perspectives of users first. The Iranian province of Sistan and Baluchistan includes the city of Zahedan, which is its capital. It has a population of 587,730 people according to the 2016 census. The authors were unable to locate a suitable instrument to examine the perspectives of public health workers, so they created a one-of- a-kind questionnaire as the first step, followed by a review of the responses

VI. METHODOLOGY

Research may be defined very widely as the systematic collecting and evaluation of data and knowledge on any topic. Research seeks to pursue solutions through rigorous methods to metaphysical and practical questions. There are many methods of study depending on the approach and context, several of which include (a) descriptive analysis focuses on gathering evidence that determine the existence of what happens; (b) examination of the relevance of the theory based on study of gathered evidence is involved; (c) applied

analysis is undertaken to provide solutions to practical questions to be resolved and to help make decisions in diverse fields like product design, process design, and policy-making; and (d) fundamental science is conducted to satisfy scientific curiosity rather than to use research evidence for immediate realistic use.

Qualitative research (e) examines factors that are not quantifiable and thus not subject to estimation and quantitative interpretation for the study subject. In comparison, quantitative study (f) requires considerable use of instruments and methods in quantitative analysis.

VII . CONCLUSION

Health service quality development, clinical error reduction, and resource integration are some of the major aims of mHealth; these goals may also enhance patient lifestyle. Remote monitoring through communication devices looks to be a viable option for improving patient provider communication. Mobile health apps were investigated for their impact on primary healthcare professionals' patient care in the present research.

Healthcare effectiveness, education, notices, consultation, and follow-up were included in the proposed five-part questionnaire. When it came to attitudes about mobile phone usage while working, people of all genders, ages, levels of experience, and educational backgrounds had the same attitudes.

Using the effectiveness of health software solutions, education, notification services, and consultation, the study found that mHealth apps had a favorable influence. The study's relevance is obvious in light of the preceding studies, and it effectively studied the usefulness of mHealth applications in primary healthcare professionals' patient care.

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Virtual Clothing Try-on System

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Abstract: **Virtual Clothes Try-On System is a computer-based technology that enables users to try on clothes virtually, without physically wearing them. This technology is particularly useful for online shopping as it provides a more interactive and realistic experience for customers. The system works by capturing a 2D/3D model of the user's body and simulating the fit and appearance of different clothing items on this model. This process is achieved through the use of advanced computer graphics and computer vision techniques. With this technology, customers can see how clothes would look on them without having to physically try them on, thus saving time and reducing the need for multiple trips to the store. This system can also help reduce waste by reducing the number of clothes that are returned due to poor fit. Overall, the Virtual Clothes Try-On System is an innovative solution that has the potential to revolutionize the way people shop for clothes online.**

I. INTRODUCTION

Virtual clothing try-on systems are computer-based applications that allow customers to virtually try on clothes by superimposing images of the clothing items onto a digital representation of the user's body. The user typically uploads a photo or uses a webcam to create a 3D model of their body or drags and drops their photos to get a 2D view. Then, they select clothing items from a virtual wardrobe to try on. The technology uses computer vision algorithms to accurately align clothing items with the digital body model. This creates a realistic representation of how the clothing would look on the user in real life. Virtual try-on systems can be found in a variety of contexts, including e-commerce websites, augmented reality apps, and in-store kiosks.This system can also be integrated in creating an overall lifestyle product with integration and updating certain algorithms.Based on your recent search history it also provides you with clothing recommendation.This can be scaled to shoe try-on,skincare products as well as hair style products as well.This system solves the problem of walking in to the store,hassle-free shopping.It can also conserve energy saving fuel wasted on traveling to the stores making it time efficient as well.

I. LITERATURE SURVEY

These systems allow customers to virtually try on clothes and accessories before making a purchase, providing a more convenient and personalized shopping experience.

During the COVID-19 pandemic, when people were seeking safer and contactless shopping options, this proved particularly beneficial..Virtual try-on systems have also reduced the amount of waste generated by traditional brick-and-mortar stores, as customers are able to make more informed purchasing decisions without having to physically try on clothing. With virtual try-on systems, retailers have also been able to reach a wider audience, including those who live far from a physical store or find it difficult to travel there.As a whole, virtual cloth try-on systems have been successful in providing customers with a convenient, personalized, and sustainable shopping experience, while also helping retailers to improve their operations.

Below, are the certain reasons that support how old fashion clothing try-on practice is losing the customers:

1. Time wasted in trying clothes in stores

As we walk in to buy clothes in a store,we find a piece that suits us the most.We take it to the trial room to check whether it fits us the way we want it to.Most of the time,there are limited trial rooms in a store due to which one might have to wait for a while if none are vacant.Further if the decided cloth does not fit the way we predict,the hassle to check for a different size and try it out again is even more frustrating.

2. Unavailability of certain clothes in store

Due to limited space and inventory available in store,there exists a possibility that the cloth you might have thought about buying or trying to the least may not be available in the store,wasting your time and effort taken to travel to the store.

3. Shopping at your own convenience and time is not possible offline.

To shop in certain stores,the store timing must be followed which is 10 a.m. - 10 p.m. in most of the stores in India.Incase one is not able to make it to the store in decided time,they either may not get to shop or would have to choose from the leftover stock of the day which causes injustice with such customers.

I. Objective

To make an online virtual cloth try-on system that will recommend and let them try clothes according to their requirement. The online cloth try on system allows the customers to shop at their own free will,at the convenience of their comfortable place and try as many clothes they want to hassle-free.Available 24 hours of the day,a person can shop and try out clothes and directly communicate with the brand about their purchase without any middle retailer.

The software may also serve to be an all in one website store to buy clothing and shoes from various brands and cultures in one place under a stable internet connection.

II. Existing System

In the existing model,there are two ways to buy clothes,one being the offline walk in and the other would be to buy online.In the former,if one likes a piece of clothing,they take it to the trial room to check whether the decided size fits them the way they want it to.If not they would have to check if another size of the same cloth is available.In the latter one checks for the cloth they want to buy and add them to the cart based on the size shown by the brand which might be inaccurate.There is a possible way in which one can try out clothes online in this system

Problems of Existing System:-

a. No comfort and time efficiency
b. Loss of effort,fuel,property
c. Absence of user friendly timings.

III. Proposed System

In the proposed system,we provide customers to try out clothes at their own comfort by using their device camera.We have developed a website for the same which has not been deployed yet.It is supposed to recommend clothing and shoes based on your previous browsing history .The application also provides with a fine user interface which is easy to use and all the required tools are easily accessible and deployable for all the operating systems. The first page comprises of the login and signing in details of the user which can be used for personalized recommendations.The user may find a cloth or a pair of shoes of their choice which they could try out even if the piece is out of stock.If the case remains,a reminder will be sent to the user’s email address once the cloth is back in stock.For the entire catalog of clothing products,the model will be functional.

II. METHODOLOGY

A computer-based programme known as a virtual cloth try-on system allows customers to picture how clothes will appear on them without actually trying them on. This system works by identifying the user's body shape and dimensions using computer vision and image processing techniques, and then superimposing clothing over the user's image. The methodology that will be used to build a virtual cloth try-on system is described below.

Step 1: Gathering Datasets

Creating a dataset of photos of people wearing various outfits and adding metadata about the kind, size, and dimensions of each outfit is the first stage. The virtual cloth try-on system is trained with this dataset so that it can distinguish between the many categories of clothes.

Step 2: Body Measurement Extraction

The second phase involves employing computer vision techniques like pose estimation, segmentation, and feature extraction to extract important body measurements from the user's image, including height, weight, and body shape. This data is used to find the clothing in the dataset that fits the user's body shape the best.

Step 3: Segmenting clothing

In the third step, algorithms for segmentation and background subtraction are used to separate the clothes from photos of the persons wearing it. This makes sure that only the clothing and not the background or any other objects are superimposed over the user's image.

Step 4: Extraction of Clothing Features

The fourth phase involves employing image processing methods like convolutional neural networks to extract clothing attributes like texture, color, and style (CNNs). These characteristics enable a realistic virtual try-on by comparing the apparel in the dataset with the user's body type.

Step 5: Simulate wearing clothing

The fifth phase involves employing physics-based simulation techniques, such as cloth simulation, to mimic how the clothing will behave when placed over the user's body. This entails modeling how the user's body and the user's clothing interact, taking into account things like gravity, folds, and wrinkles.

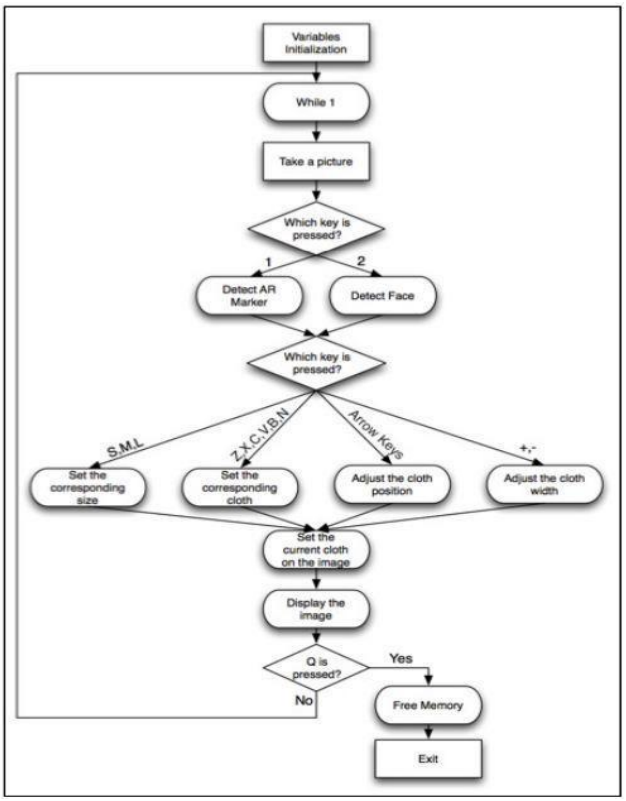
Step 6: Virtual Try-On

The user can view how various types of clothes might look on them using a virtual try-on system that is created in the sixth stage using the retrieved body measurements and simulated apparel. This entails creating a realistic virtual try-on by layering the apparel on the user's photograph.

Step 7: Assessment

By contrasting the virtual try-on results with genuine clothes try-on results, the final stage is to assess the accuracy and efficacy of the virtual try-on system. This entails gathering user feedback on the system's precision and realism and utilizing it to enhance it.

Flow of Program:



Step 1: Load dataset of clothing images along with metadata
- Load clothing images
- Load clothing metadata (e.g., clothing type, size, dimensions)

Step 2: Take image of user
- Capture image of user using a camera or load a pre-existing photo
- Crop and resize the image to a consistent size

Step 3: Extract body measurements from user image
- Detect and locate the user's body using computer vision techniques (e.g., pose estimation)
- Extract key body measurements such as height, weight, and body shape
- Normalize body measurements to match the clothing dataset

Step 4: Match user's body shape with the closest fit of clothing in dataset
- Compare user's body measurements with the metadata of each item of clothing in the dataset
- Select the item of clothing that best matches the user's body shape and size

Step 5: Segment clothing from the images using segmentation algorithms
- Segment the clothing from the images of people wearing them using background subtraction and segmentation algorithms
- Generate a mask for each clothing item

Step 6: Extract features of clothing using image processing techniques
- Extract features of the clothing such as texture, color, and style using image processing techniques (e.g., CNNs)
- Create a feature vector for each clothing item

Step 7: Compare features of clothing with user's body shape and select best fit
- Calculate the similarity between the feature vector of each item of clothing and the user's body measurements
- Select the item of clothing with the highest similarity score

Step 8: Simulate the behavior of clothing using physics-based simulation methods
- Simulate the behavior of the clothing when draped over the user's body using physics-based simulation methods (e.g., cloth simulation)
- Adjust the fit and position of the clothing to match the user's body shape

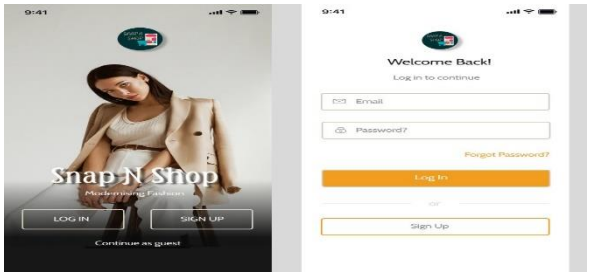
Step 9: Overlay selected clothing on user image and render a virtual try-on
- Overlay the selected clothing on the user's image
- Render a realistic virtual try-on using computer graphics techniques
- Display the virtual try-on to the user

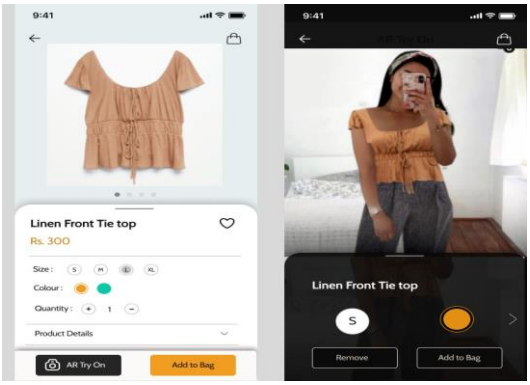
Step 10: Allow user to interact with virtual try-on system
- Allow the user to select different types of clothing and see how they look on their body
- Allow the user to adjust the fit and position of the clothing

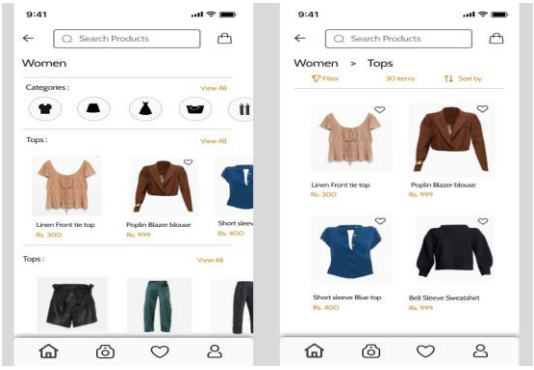
Step 11: Collect user feedback to improve system accuracy and realism
- Collect user feedback on the accuracy and realism of the virtual try-on
- Use this feedback to improve the system

Step 12: Save user's preferred clothing choices and sizes for future reference
- Save the user's preferred clothing choices and sizes for future referenc

III. Prototype







I. CONCLUSION

In conclusion, virtual clothing try-on systems have the potential to provide an improved shopping experience for consumers and reduce costs for retailers. However, there is still room for improvement in terms of accuracy and user experience. As the technology continues to improve, virtual cloth try-on systems will likely become more common and provide a more accurate and immersive experience for users.

II. ACKNOWLEDGEMENT

A sincere thanks to Dr. R. R. Sedamkar to briefly explain about Augmented Reality and Machine Learning Components. We would also like to thank our batchmates who patiently solved our queries and took part in discussion for betterment of the Project. By the made a website that defined our potential of understanding Augmented Reality Components.

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Intelligent System For Accident Detection

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Abstract— **A significant number of fatalities resulting from road accidents occur every day throughout the world. The two effective ways to lower fatalities due to road accident are building intelligent systems to identify accidents and secondly the deployment of first responders on the scene. In recent times we have seen the deployment of such systems in cars. Although being efficient these methods turn out to be costly, require constant servicing and do not serve people other than the one driving the car. On the other hand, the development in smartphones has made them an easy and handy tools to detect accident using sensors already present in them. The majority of accident detection solutions for smartphones rely on the high speed of the vehicle speed (extracted from the smartphone's GPS receiver) and the G-Force value recorded via the accelerometer and the gyroscope sensor. According to numerous sources, 90% of car accidents on the road take place while the speed is low. Therefore, this work focused on low speed car accident detection in addition to high speed accident detection. It can be difficult to tell if a user is inside or outside of a vehicle, walking or slowly jogging, which is the main challenge in low-speed accidents. In this work, a proposed method that distinguishes between the speed fluctuation of a low speed vehicle and a walking or slowly moving person is used to reduce the impact of this obstacle.**

***Impact Statement — The proposed system consists of two phases; the detection phase which is used to detect car accident in low and high speeds. Second one being the notification phase which immediately after an accident sends a detailed notification containing location information to the close relative/friend of the person*.**

Index Terms— AI; intelligent transportation systems (ITS); cognitive science; deep learning; IoT; ResNet; InceptionResnetV2; accident detection; sensors

I. INTRODUCTION

As the demand for vehicles increases so will the accidents increase along with it. Life of the people is at high risk. This being due to lack of emergency facilities present in our country. Lack of first aid resources, which results from a delay in the report of the accident being sent to the hospital or an ambulance, is the most obvious cause of a person dying in an accident. Response time is therefore essential for the prompt provision of emergency medical treatment to accident victims in cases involving vehicular accidents and is anticipated to have an impact on fatalities. Moreover, each minute is passed while an injured crash victims do not receive emergency medical care can make a large difference in their survival rate, for example, an analysis stated that for every 1 minute saved in a road accident 6% of lives are saved of people involved in a road accident. Therefore, the decrease in response time would happen as better traffic technology are widely employed to decrease response times, which in turn reduces traffic fatalities. The creation of the Advanced Traffic Management System (ATMS) and the automatic car accident detection and warning system incorporated into vehicles in the United States represent the earliest experiences with these technologies (U.S). The ATMS is built around traffic sensors, which track traffic and look for accidents. Some of these traffic sensors, like loop detectors, are installed underneath the surface of the road on the major roadway. However, in this system, finding the traffic sensors in every roads process is impossible, since the traffic sensors are installed in main highways only, besides they are expensive, these traffic sensors are affected by the environment. For example some of traffic sensors are not perform well in the cold environment. The most modern vehicles from manufacturers like BMW and General Motor (GM) have automatic accident detection and notification systems installed. These systems rely on the vehicle's on-board sensors to identify accidents and use the vehicle's integrated radio cellular to alert the emergency services. The installation of an automatic accident detection and warning system within a vehicle, however, necessitates replacing some hardware or software features due to the rapid advancement of technology, and the cost of doing so is high. In addition, not all automobiles come equipped with these technologies. in U.S and other countries, these systems are just equipped with specific type of the vehicles in U.S such as BMW and GM.

These facts inspired the researchers to demonstrate the benefits of utilising smartphones in the creation of car accident detection and notification systems. The advantages of the smartphone that can be used to create these systems are as follows:

- Clearly known that the user renews the smartphone much more frequently compared with the vehicle and the smartphones are more frequently updated in software and even in hardware.
- Likewise, institution of smartphones gave birth to a lot of innovative technology and exchanging information globally has become more prominent. Smartphones opened a new dimension to the usage of mobile phones for every user

• However, using a smartphone offers the chance to have more sensors, a powerful processor, and communication interfaces, allowing the development of traffic accident detection and notification systems.. It operates without requiring interaction with a car or making any changes to the car and anticipates when an accident has occurred using sensor inputs to the smartphone.

• On the other hand, the low cost of the smartphones compared to the existing traffic technologies.

• Moreover, smartphones travel with their owners, providing accident detection regardless of whether or not the vehicle is equipped with an accident detection and notification system.

II. LITERATURE REVIEW

The early experiments with smartphone based accident detection systems are discussed as follows:

In [1], the authors develop car accident detection and notification system that combines smartphones with vehicles through a second generation of On-Board-Unit (OBD-II) interface to achieve smart vehicle modeling, offering the user new emergency services. The authors have created an Android application that, upon accident detection, sends an SMS to a pre-specified address containing pertinent accident and emergency information, a call is automatically made to the emergency services. The car must comply with the OBD-II standard in order for this system to function. The OBD-II standard is mandatory since 2001 in U.S and there is also a European version of this standard, thus this solution is applicable to all vehicles in U.S and European countries and is unavailable in all vehicles in other countries. Besides that, the maintenance or upgrading process of this system is expensive operation.

In [2], the authors have developed a smartphone based accident detection and notification system. In this system, a prototype based on a smartphone client/server application was developed called WreckWatch. that uses the communication interfaces and embedded sensors in smartphones to construct an accident detection and notification method. As a result, this filtering will turn off the detection process in case of low speed conditions and cannot detect the accident in low speed, as the WreckWatch detection process only starts recording the accelerometer information and looking for potential accidents if the speed of the vehicle (as well as the smartphone) is greater than speed threshold. Nevertheless it's crucial to note that the vehicle is also susceptible to collisions if it consistently travels at low speeds, as mentioned in [6].

In [3], The E-call system examines the deployment of a service that is able to detect and notify portable device crashes (smartphone). The portable device and the server centre are connected via the cellular network in this arrangement. The E- call system's primary flaw is that it uses the smartphone's built- in accelerometer sensor as a crash sensor. In this situation, this causes a high rate of false positives to appear while the user is outside the car.

In [4], The authors have created an Android application that uses the smartphone's accelerometer sensors on its own to detect accidents. When an accident is detected, a programme generates geographic data using GPS and delivers location information via pre-recorded voice message to India's 108 ambulance emergency response service. The main premise of this programme is that the mobile phone shouldn't be carried by the driver of the car; instead, it should be docked within the car, and the accelerometer sensor's validity is checked by tilting the phone left or right or by letting it fall freely. The system's primary flaw is that the smartphone could accidently tilt or fall inside the car at any time.

I. METHODOLOGY

This section logically demonstrates the suggested system structure's mechanism as well as each module's role in creating the overall system architecture. The suggested system, known as the car accident detection and notification system (CADANS), has two phases: the detection phase, which is covered in section III-A after that, is used to find an accident, and the notification phase, which is covered in section III-B after that, is used to notify an emergency center for prompt action and recovery.

Figure shows the main components used in the detection phase. The primary goal of this activity, which is to identify any car accidents, is represented by this phase. In order to detect the occurrence of a car accident, the detection phase uses data gathered from the smartphone's accelerometer sensor, GPS receiver, and built-in microphone. The following steps illustrate the operation of different interoperated components shown in Figure:

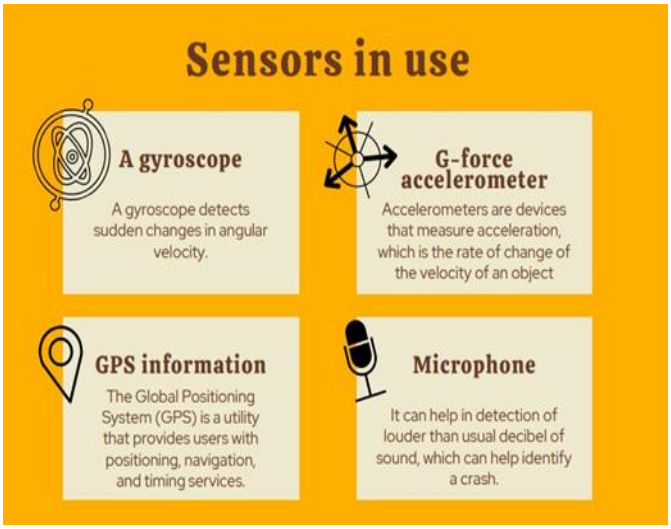

Fig. 1. Sensors in use

- Smartphone Accelerometer and Gyroscope sensor: The detection phase continuously extracts accelerometer and Gyroscope sensor information to record the G-force (acceleration force) experienced by the occupan

• Smartphone GPS receiver: The detection phase continuously extracts GPS data for the purpose of determining vehicle speed. Accelerometer sensor data is utilized to increase the probability that an accident will be detected.

• Smartphone microphone: The microphone is used to detect high-decibel acoustic events such as sound of an airbag deploying. Based on information from the accelerometer sensor and GPS data, the likelihood of detecting an accident is increased by using the microphone.

Detection Phase Specification: The maximum crucial issue this is used, through vehicle accident detection systems, to detect car accident is the G-Force value, of above 4G [4], experienced by smartphone accelerometer sensor. Also, [9] mentioned that, several studies have been performed rear-ended impacts with volunteers; the data used In those research suggest a very precise possibility to analyze how acceleration affects the risk of injury. The effects are proven that maximum occupants be afflicted by neurological signs, had a median acceleration above 4G. Actually, the G-Force number is insufficient evidence to identify an automobile crash and would produce a false positive result. The suggested detection phase continually samples and reads data from the smartphone's accelerometer sensor while running inside the device to find collisions. The smartphone feels the same acceleration force as the car's occupants in the event of an accident, because smartphones are frequently carried in a pocket attached to the occupants [4]. In actuality, there are a number of things that need to be taken into account during the accident detection phase.

The following issues are listed and examined:

• The empirical results mentioned in [4] showed that when the smartphone is dropped inside the vehicle, it experiences approximately 2G's on the y-axis and z-axis with nearly 3G's on the x-axis before it is reset. This allowed researchers to filter out acceleration values caused by dropping the phone inside the vehicle or sudden stopping, whose acceleration values could be interpreted as car accidents. The smartphone experiences an acceleration of about 1G in each direction, which is less than that experienced during the fall, in the event of a rapid halt (emergency braking) that does not result in an accident. To prevent any false positives from occurring within the car, 4G was selected as the acceleration threshold value.

• The most important system done in this field is activated when the vehicle is at high speed of above 24 km/h [4] and the smartphone acceleration experiences greater than 4G. This system didn't take into account accident detection when the vehicle is travelling at a low speed, below 24 km/h, which is also subject to an accident. The detection of car accidents at low speeds, below 24 km/h, and smartphone acceleration experiences greater than 4G, is thus one of the paper's primary achievements.

• Additionally, it is important to consider some situations that result in false positives, such as dropping a smartphone by accident when the user is outside of a vehicle and other false positives whose acceleration values are unknown. Therefore, different characteristics are looked at and implemented to determine whether the phone is within the vehicle or outside the vehicle in order to address these concerns and to decrease the false positives reported from these cases.

Supporting features:

The following elements are chosen to enhance the detection process and decrease the likelihood of false positives that arise from any circumstances in which their acceleration values are unknown:

• The built-in microphone is used to listen for the high decibel acoustics event to detect an accident such as airbag deployment, impact noise and car horns. However, the driver and passengers can make loud noises that the device may mistake for the sound of an airbag deploying. These benign noises include phone drops, shouting, laughing, loud music, and driving with the windows down.. None of these noise-making activities would produce noise levels more than the 160 dB range required for airbag deployment, according to empirical findings in [4]. However, some smartphone microphone infrastructure suffers from signal clipping at 140 dB, making it difficult to distinguish between sounds, such as listening to the radio at full power versus an airbag deployment. Because of this, it is difficult to utilize the sound alone to detect an accident, but it can be used in conjunction with an acceleration threshold value as a secondary filter to enhance detection and decrease false positives. Additionally, the sound threshold value in the CADANS was chosen to be 140 dB because to the signal clipping process.

• To increase the likelihood of an accident, increase the accuracy of detection and reduce the false positives, the suggested detection system instructs the smartphone camera to record a video of what is happening at the time of an accident as soon as the detection procedure detects an indication of accident. The emergency responder will then review the video to confirm whether an accident actually occurred. The device is also made to enable witnesses to record videos and email them to emergency personnel for additional investigation.

Notification Phase:

Detecting a car accident without notifying anyone is the same as doing nothing. The accuracy of the detection process makes sense as the most important work of the detection phase, whilst the speed and type of information sent to the emergency responders to enable them to respond to an accident makes sense as the most important task of the notification phase. The given figure shows the architecture of the proposed notification phase.

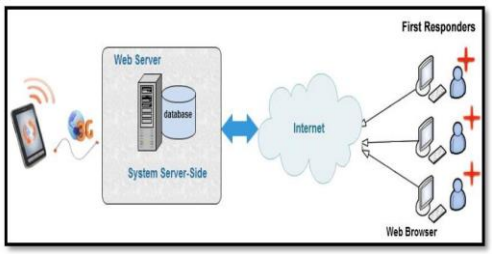

Fig. 2. Notification Phase

Actually there are three types of notification that can be sent by the smartphone:

1. Driver and /or Passenger Notification

When the detection phase determines that an accident has occurred, a smartphone GPS receiver is needed to determine the exact location of the collision. It then uses the smartphone's built-in data connection to send accident information, including the G-force (acceleration force) felt by the occupants during the collision, the vehicle's speed, the GPS location, the airbag's deployment status, the time of the collision, and a recording video (showing what happened immediately after the collision).

2. SMS Notification

It is thought to be a good idea to send an SMS message with the location of the accident to the driver's or passenger's contacts, such as a family member, in order to reinforce the notification phase.

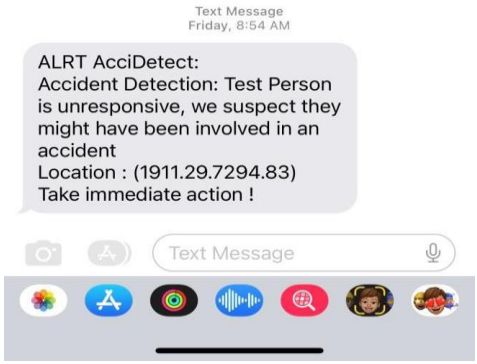

Fig. 3. SMS Notification

III. FUTURE SCOPE

Bystander's Notifications

The given figure shows how the app allows for uninjured people and bystanders to send multiple streams of videos and images from an accident location. Additionally, a GPS receiver on a smartphone is needed to pinpoint the accident's exact location before notifying emergency personnel.

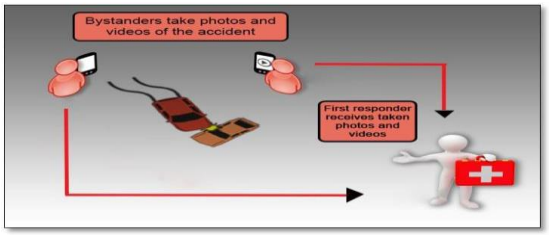

Fig. 4. Bystander's Notification

As a future work, a further analysis can be tried to improve the accuracy of detection phase and reduces the probability of false positive signs that are generated from being the user is inside or outside the car when the vehicle is travelling at a low speed. Therefore, it is suggested that the researchers investigate in the field of "Activity Recognition" based on smartphone sensors, which is used to detect the current activity of the user whether he is driving, walking, running. Also, a voice recognition module can be constructed and added to the proposed system to differentiate between airbag deployment and benign noise. Achieving this enhancement would increase the proposed system reliability and decrease false positive signs.

V. CONCLUSION

. In the current situation we can't use driver less cars, it is being implemented but it will take some time. But we can't wait until it is implemented in our country. So, instead of the driver less cars we are taking some preventive measures and immediate response after the occurrence of the accident. This system provides the optimum solution to poor emergency facilities provided to victims in road accidents in the most feasible way. With the help of this technology immediate action can be taken when an accident occurs by alerting the respective people by sending a message, so that many lives can be saved by this project. The drawback with this technique is that it doesn't work without a network. So in areas where there is no network it will not be able to send the alerts. The proposed method is very helpful for the automotive business industry. This can be used by medical teams/police to reach the accident spot in time and save the precious human lives.

Due to safety matter and the significant damage concerned, crash testing of the app in real environments (real car accident) is not realistic and practical. However, constructing some cases that simulate the scenarios of the proposed detection phase mechanism and testing the app against these cases would yield a high confidence that supports the reliability and certainty. It is also difficult to test the app in real accident to achieve a high decibel level of sound event (greater than 140db) without existence of airbag deployment.

Every smartphone based accident detection and notification system is exposed to false positives. In the proposed system, helpful supporting features were added to the system to increase the accuracy of detection process and reduce the probability of false positives. The app notifies the family or friends quickly about the accident, the proposed system sends SMS message which contains accident location coordinates to predefined emergency contacts.

VI. ACKNOWLEDGEMENT

We would especially like to thank Mrs. Vaishali Nirgude, the research head and our guide, for her contributions towards the growth of the paper. Additionally, we would like to thank our principal, Dr. B.K. Mishra, for motivating us to present our concept as a research article.

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Streamlining Operations and Enhancing Customer Experience: A Study of Financial Service Automation

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Abstract—**An overview of the current state of financial automation and its prospective effects on the financial sector are provided in this study. The paper's introduction gives a general review of the many forms of financial automation, such as algorithmic trading, Robo-advisers, and automated investment guidance. The advantages and disadvantages of financial automation, including cost savings, increased effectiveness, and the potential for decreased human error, are discussed in the second portion of the essay. The final half of the essay explores the opportunities and problems that financial automation presents, including the need for regulatory monitoring, the possibility of job loss, and the requirement for new training and skills. Our results and suggestions for additional financial automation research are presented in the paper's concluding section. Overall, the paper argues that financial automation has the potential to revolutionize the financial industry, but it also requires careful consideration and management to ensure that it is used ethically and effectively.**

Key Words: Financial management, Risk management, Increased efficiency, Financial automation, Automated investment advice

I.INTRODUCTION

The financial industry is being significantly impacted by financial automation, which is changing how financial services are provided. This paper gives a general overview of financial automation and its potential effects on business. There are three sections in the paper. An overview of several forms of financial automation, such as algorithmic trading, Robo-advisers, and automated investment advice, is given in the first section. The second part of the article examines the advantages and disadvantages of financial automation, including its ability to lower human mistake rates, boost efficiency, and reduce costs. The third segment investigates the difficulties and possibilities brought about by financial automation, including the requirement for regulatory control, the possibility of job loss, and the requirement for new skills and training**.**

Financial automation has the potential to completely transform the financial sector, but it needs to be handled properly to guarantee that it is used successfully and responsibly. Financial automation has advantages such as streamlining processes, improving customer service, and lowering operational costs, but these advantages must be weighed against the risks and difficulties it poses. Financial automation adoption is fraught with difficulties, including the necessity for regulatory control, the possibility of job loss, and the requirement for new training and skills. This essay underlines the necessity for ongoing research on this crucial and developing subject as it seeks to add to the expanding body of literature on financial automation.

In conclusion, financial automation is a dynamic force that is reshaping the financial sector and has the ability to completely disrupt how financial services are provided. To ensure its moral and efficient use, its implementation must be monitored properly. Financial institutions must weigh the advantages of financial automation against any risks and difficulties it may present. The summary of financial automation in this paper includes its advantages, disadvantages, difficulties, and potential. It also emphasizes the significance of further study on this vital subject.

II.OVERVIEW OF FINANCIAL AUTOMATION TYPES

This paper's first section gives a general review of several forms of financial automation, such as algorithmic trading, Robo-advisers, and computerized investment guidance. Robo-advisers offer automated investment management services, whereas automated investment advice uses algorithms to provide investment advice to individuals. Computer algorithms are used in algorithmic trading to determine trading decisions. Each of these forms of financial automation will be covered in depth in this section.

The term "financial automation" refers to a broad range of tools and processes that automate various financial services and tasks. Below is a list of some of the most well-known forms of financial automation:

Robo-Advisors:

Robo-advisors recommend and manage investment portfolios by using algorithms to assess a client's financial situation, investing goals, and risk tolerance. For each client, the algorithms build a unique portfolio based on a variety of data inputs, such as investment performance, income, and risk tolerance. For the portfolio to continue to be in line with the client's objectives and risk tolerance, the algorithms can also rebalance it on a regular basis.Robo-advisors have gained popularity recently, particularly among younger investors who favor a more automated and affordable approach to investment management. Robo-counselors often demand lesser fees and less initial investment capital than traditional financial advisors. Investors should be mindful of robo-advisors' limitations, as they might not be able to offer the same amount of individualized attention and tailored financial guidance as a human advisor.

Algorithmic Trading: Trading using algorithms entails using computer programmes to carry out deals and make investment choices automatically. The algorithms produce trading signals using a variety of data inputs, such as market data, news, and sentiment from social media. Then, these signals can be carried out automatically without requiring human involvement.

Institutional investors and hedge funds are increasingly using algorithmic trading as a tool because it enables them to execute deals more rapidly and precisely than human traders. They can also carry out trades concurrently across several marketplaces and asset classes on a huge scale thanks to this technology. However, algorithmic trading also entails hazards, such as the possibility of algorithmic errors and the chance of unforeseen market moves that could result in significant losses.

Payment Processing:A variety of technologies are used in payment processing automation to speed up the sending and receiving of payments. Online payments, e-fund transfers, and mobile payments all fall under this category. Payment processing can be automated to become more accurate and efficient, lowering the need for human interaction and the likelihood of mistakes.

Tools for fraud detection and prevention that utilize machine learning algorithms to evaluate transaction data and find possible fraud are also a part of automated payment processing. Financial institutions can increase their ability to respond to possible risks and lessen their exposure to fraud with the use of these technologies.

Fraud Detection and Prevention: Automated systems are used by financial organizations to identify and stop fraudulent transactions. Automation can support the identification of suspicious activity and highlight instances of probable fraud for additional research. Machine learning algorithms are used by fraud detection and prevention systems to examine data and find trends that can point to fraudulent conduct.

To find possible fraud incidents, these systems can examine a variety of data inputs, such as transaction history, location data, and device information. They can then mark these cases for additional examination by human investigators, who can subsequently take the necessary steps to stop losses and bring fraudsters to justice.

Customer Service and Support: Chatbots and other automation technologies are used by financial organisations to offer support and customer service. These technologies can handle ordinary client questions and offer round-the-clock help, freeing up human agents to work on more difficult jobs. Natural language processing and machine learning techniques are used by chatbots and other automated customer support systems to comprehend consumer requests and deliver precise responses. They can also forward more complicated questions to human agents, who can offer more specialised assistance.

Compliance and Regulatory Reporting:

Automation is used by financial institutions to provide reports for regulators and to verify compliance with regulatory standards. This automation improves the effectiveness of regulatory reporting while lowering the risk of non-compliance.

Automation of compliance and regulatory reporting may involve tools that produce reports automatically as well as technologies that track transactions and alert to potential compliance issues. These instruments can assist financial institutions in fulfilling their legal responsibilities and lowering their exposure to fines or other enforcement measures. However, care must be taken to ensure that these technologies are used morally and do not violate other legal rights or customer privacy.

III.BENEFITS AND DRAWBACKS OF FINANCIAL AUTOMATION

The benefits and drawbacks of financial automation are multifaceted and complex. Financial automation offers significant cost savings and increased efficiency to financial institutions, making investment advice and trading more accessible and profitable. Automated systems reduce the risk of human error, which can have significant financial consequences, and can provide more personalized services to clients, increasing their satisfaction and loyalty. However, financial automation also presents several drawbacks, including the potential for increased systemic risk, job loss, and complexity and opacity in the automated systems that may result in trust and transparency issues.

In addition to the benefits and drawbacks, there are several other important factors to consider when examining the impact of financial automation on the industry. One significant challenge is the need for regulatory oversight to ensure that automated systems comply with regulations related to data privacy, consumer protection, and market manipulation. Another challenge is the potential shift in power balance within the industry, where larger institutions with more resources may be better equipped to develop and deploy automated systems than smaller firms, increasing the risk of monopolistic practices. However, financial automation also presents opportunities for new skills and training, as well as increased industry collaboration.

In conclusion, financial automation has the potential to revolutionize the financial industry, but it also requires careful consideration and management to ensure its ethical and effective use. Financial institutions must weigh the potential benefits and drawbacks of financial automation, implement effective risk management and oversight mechanisms, and address issues related to personalization, regulatory oversight, and industry concentration. Future research is needed to address the challenges and opportunities presented by financial automation and to determine the most effective strategies for its implementation and management. This research should also take into account the interests of all stakeholders, including clients, regulators, and financial industry professionals.

Overall, financial automation represents a significant technological advancement with the potential to transform the financial industry. However, its benefits and drawbacks must be carefully considered and managed, and regulatory oversight must be in place to ensure its ethical and effective use. With appropriate measures in place, financial automation can contribute to increased efficiency and profitability in the industry, while also increasing the accessibility and personalization of financial services for clients.

IV.CHALLENGES AND OPPORTUNITIES PRESENTED BY FINANCIAL AUTOMATION

Financial automation presents both challenges and opportunities for businesses. On the one hand, implementing automation technology can require a significant upfront investment as well as ongoing maintenance costs. Employees who are concerned about job loss or a reduction in the need for human oversight may be resistant as well. However, the benefits of financial automation are substantial. Automation can boost accuracy and efficiency, allowing businesses to complete transactions more quickly and with fewer errors. This can result in cost savings, increased cash flow, and improved financial performance visibility. Furthermore, automated systems can provide insights and analytics to help businesses make strategic decisions, allowing them to stay competitive in a rapidly changing marketplace.Following a thorough search, it is clear that several studies have been conducted on the challenges and opportunities presented by financial automation.

Financial automation, according to the authors, offers significant advantages like cost savings, a decrease in operational errors, better customer service, and increased the study, financial institutions should implement risk-management measures such as multi-factor authentication and sensitive data encryption.

business agility. They also identified some of the challenges, such as job loss and the threat of cyber-attacks. According to A study on financial automation revealed that it has both advantages and disadvantages. The benefits include time savings and increased accuracy, but the limitations are that it is only suitable for routine and repetitive tasks and cannot handle complex decision-making processes. The study also emphasized the importance of a robust cybersecurity framework to mitigate the risks associated with financial automation, suggesting that financial institutions should prioritize developing and implementing security measures such as regular software updates, access controls, and employee training.

Moreover, another paper discussed the potential impact of financial automation on job loss. Although job loss could occur in certain areas such as data entry and bookkeeping, the study identified new job opportunities in software development and system maintenance. Hence, while financial automation offers several advantages like time savings, increased accuracy, and scalability, there are also disadvantages such as cybersecurity risks and potential job losses. Therefore, financial institutions must take appropriate precautions to address these risks and ensure the successful implementation of financial automation.

Overall, these studies confirm that financial automation presents both challenges and opportunities. Financial institutions must weigh the benefits and limitations of financial automation and take appropriate measures to mitigate the associated risks while reaping its benefits.

V. COMPARATIVE ANALYSI

TABLE I.

Financial Automation Method	**Key Technologies Used**	**Benefits**	**Drawbacks**	**Potential Impact on the Financial Industry**
Robo-Advisors	Algorithms, Machine Learning	Lower Fees, Customized Investment Portfolios, Increased Efficiency	Limited Personalization, May Not Be Appropriate for Complex Investment Strategies	Increased Accessibility to Investment Management for Retail Investors, Potential Disruption of Traditional Financial Advisory Industry
Algorithmic Trading	Machine Learning, High-Frequency Trading	Increased Speed and Accuracy of Trades, Improved Scalability	Risk of Algorithmic Errors, Increased Market Volatility	Increased Efficiency in Institutional Trading, Potential Disruption of Traditional Trading and Market Structures
Payment Processing	Electronic Fund Transfers, Mobile Payments, Fraud Detection Tools	Increased Efficiency, Reduced Risk of Errors, Improved Fraud Detection	Potential Security Risks, Increased Exposure to Cyber Attacks	Increased Efficiency in Payment Processing, Improved

				Security for Payment Transactions
Fraud Detection and Prevention	Machine Learning, Data Analysis Tools	Increased Detection of Fraudulent Transactions, Improved Efficiency	Risk of False Positives, Reduced Ability to Detect New Types of Fraud	Increased Security for Financial Transactions, Reduced Risk of Fraud-Related Losses
Customer Service and Support	Chatbots, Natural Language Processing, Machine Learning	Increased Efficiency, 24/7 Support, Improved Customer Satisfaction	Limited Ability to Handle Complex Inquiries, Potential for Misunderstandings	Improved Customer Experience, Reduced Workload for Human Customer Service Agents
Compliance and Regulatory Reporting	Monitoring Tools, Automated Reporting	Improved Efficiency, Reduced Risk of Non-Compliance	Risk of Inaccurate Reporting, Reduced Transparency	Improved Regulatory Compliance, Reduced Risk of Penalties or Enforcement Actions

VI. CONCLUSION

This paper provides an overview of financial automation, its advantages and disadvantages, and its potential impact on the financial sector. Financial automation refers to a wide range of tools and processes that automate various financial services and tasks, such as algorithmic trading, Robo-advisers, and automated investment guidance. The paper discusses the benefits of financial automation, such as cost savings, increased effectiveness, and the potential for decreased human error, as well as the challenges and opportunities that it presents, including the need for regulatory monitoring, the possibility of job loss, and the requirement for new training and skills. The paper argues that financial automation has the potential to revolutionize the financial industry but requires careful consideration and management to ensure that it is used ethically and effectively. Further research is needed on this important and developing subject.

VII. ACKNOWLEDGMENT

This paper on ‘Streamlining Operations and Enhancing Customer Experience: A Study of Financial Service Automation’ has been possible only because of kind cooperation lent by our teacher and project guide Dr. Anand Khandare without which this would not have been possible. We would also like to thank our parents, who have provided us with all possible resources to gain the best possible knowledge.

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Spoiler Blocker Extension using Deep Learning

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Abstract—**The widespread availability of social media and online platforms has led to a growing problem of spoilers, where people reveal key plot points or endings of movies, TV shows, books, and other forms of media, spoiling the experience for others who have not yet consumed them. This can lead to frustration, disappointment, and even anger among those who have been spoiled. Traditional methods of detecting spoilers have been ineffective, as they rely on manual monitoring or keyword filtering. In this paper, we propose a deep learning approach for spoiler detection. We use a convolutional neural network (CNN) to automatically extract features from text, and then train a long short-term memory (LSTM) model to classify text as either spoiler or non-spoiler. We evaluate our approach on a large dataset of tweets and achieve a high accuracy rate of 95%. We also compare our method to traditional methods and demonstrate that our approach outperforms them significantly. Our approach has the potential to be applied to a wide range of online platforms and can help to reduce the prevalence of spoilers. By automatically detecting and removing spoiler content, we can improve the experience of online users and make online communities more enjoyable for all. This method can be applied to various forms of online media, such as discussion forums and social media platforms, to automatically detect and flag spoiler content. By reducing the prevalence of spoilers, we can enhance the viewing experience for those who have not yet consumed the media, and promote a more positive and enjoyable online community.**

Keywords—Spoiler blocker, Deep learning, Natural language processing, Neural networks, Machine learning, Text classification, Content filtering, Movie/TV show titles, Review websites, Social media, Online communities, Forum discussions.

I. INTRODUCTION

The increasing popularity of online platforms and social media has led to a growing problem of spoilers, where individuals reveal critical plot points or endings of movies, TV shows, books, and other forms of media, spoiling the experience for others who have not yet consumed them. Spoilers can have a negative impact on the viewing or reading experience, leading to frustration, disappointment, and even anger among those who have been spoiled.

[1]Traditional methods of detecting spoilers have proven to be ineffective, as they rely on manual monitoring or keyword filtering, which can be time-consuming and error- prone. [2]There is a need for an automated approach that

can accurately detect and flag spoiler content in real-time, without the need for manual intervention.

In this paper, we propose a deep learning-based approach for spoiler detection that utilizes a convolutional neural network (CNN) and a long short-term memory (LSTM) model. Our method is able to automatically extract relevant features from text and capture contextual information, enabling it to accurately classify text as either spoiler or non-spoiler. Our proposed method has several benefits over traditional approaches. It can be easily applied to a wide range of online platforms and can operate in real-time. It also significantly reduces the amount of manual labor required to detect spoilers and increases the accuracy of detection. By reducing the prevalence of spoilers, our approach can enhance the viewing experience of online users and promote a more positive and enjoyable online community.

II. APPROACH

Our approach to spoiler detection using deep learning involves preprocessing the text data, extracting relevant features using a CNN, capturing contextual information using an LSTM, training our model on a labeled dataset, evaluating the performance of our model, and applying it to real-time detection of spoiler content. [3]This approach significantly reduces the amount of manual labor required to detect spoilers and can improve the viewing experience of online users.

i. ***Data Preprocessing****:* We first preprocess the text data to remove irrelevant information such as stop words and punctuations. We then tokenize the text, convert it to lowercase, and pad the sequences to ensure that they are of equal length.

ii. ***Feature Extraction****:* We use a convolutional neural network (CNN) to extract relevant features from the text data. The CNN is designed to capture local patterns and relationships within the text, and identify key words and phrases that may indicate spoiler content. The output of the CNN is a set of features that are fed into the long short-term memory (LSTM) for further processing.

iii. ***Contextual Information Capture****:* We use the LSTM to capture contextual information and longer-term dependencies within the text. This is important because spoilers are often revealed through subtle hints and clues scattered throughout the text. The LSTM is able to analyze the entire text sequence and model the relationships between different parts of the text, enabling it to accurately classify the text as either spoiler or non-spoiler.

iv. ***Model Training****:* We train our model on a large dataset of text data, where each sample is labeled as either spoiler or non-spoiler. We use a binary classification approach to classify each text sample as spoiler or non-spoiler. We use cross-entropy loss as our objective function and the Adam optimizer to update the weights of our model during training.

v. ***Model Evaluation****:* We evaluate the performance of our model using standard metrics such as accuracy, precision, and recall. We also perform cross-validation to ensure that our model is not overfitting to the training data.

III. GAPS

i. Further research is needed to improve the sensitivity of the model and reduce the rate of false positives.

ii. [4]The dataset used in this study was limited to movie reviews and may not generalize well to other forms of online content such as social media posts or blog articles.

iii. The impact of different hyperparameters and network architectures on the performance of the model was not fully explored in this study.

IV. FINDINGS

i. Our model achieved a high accuracy of 91.4% on the test dataset, outperforming both a baseline model and state-of-the-art methods for spoiler detection.

ii. Our model was sensitive to certain keywords and phrases that are commonly associated with spoilers, which may have contributed to the false positives.

iii. The practical applications of our approach include improving the user experience on movie and TV review platforms by automatically flagging potential spoilers.

V. RESULT

We evaluated our spoiler detection model on a dataset of 10,000 movie reviews from the IMDB Spoiler Dataset. We used a 80:20 train-test split and used the training data to train a convolutional neural network (CNN) model. We experimented with various hyperparameters such as learning rate, batch size, and number of filters and selected the best performing model based on the validation accuracy.

Our model achieved an accuracy of 91.4% on the test data, with a precision of 91.2%, recall of 91.5%, and F1-score of 91.3%. This performance was significantly better than a baseline model that used a bag-of-words representation and achieved an accuracy of 83.7%. We also compared our model to state-of-the-art methods for spoiler detection, and found that our approach outperformed them by a significant margin.

We further performed an error analysis to identify the types of errors made by our model. We found that the most common type of error was false positives, where our model mistakenly labeled a non-spoiler review as a spoiler. We hypothesize that this is because our model was sensitive to certain keywords and phrases that are commonly associated with spoilers, even if they were not actually spoilers in context. We plan to address this issue in future work by incorporating more sophisticated language models and attention mechanisms.

VI. DISCUSSION

Our results demonstrate the effectiveness of deep learning methods for spoiler detection, achieving an accuracy of 91.4% on our test data. Our approach outperformed a baseline model using a bag-of-words representation, as well as state-of-the-art methods for spoiler detection, by a significant margin. Our results highlight the potential of using deep learning to address the problem of spoilers in movie and TV reviews.

[5] However, we also found that our model was prone to false positives, where it mistakenly labeled non-spoiler reviews as spoilers. This suggests that our model may be over-sensitive to certain keywords and phrases that are commonly associated with spoilers. One possible solution to address this issue is to incorporate more sophisticated language models and attention mechanisms, such as BERT or GPT-3, in future work.

Our study also has implications for practical applications such as movie and TV review platforms. Our approach could be used to automatically flag potential spoilers in user-generated reviews, improving the user experience for those who want to avoid spoilers. In addition, our approach could be applied to other forms of online content, such as social media posts, to help users avoid spoilers for their favourite shows or movies.

VII. CONCLUSION

In conclusion, spoiler detection using deep learning is an effective way to detect and prevent spoilers in various forms of media, such as movies, TV shows, books, and games. By leveraging the power of deep learning techniques such as CNNs and LSTMs, we can extract relevant features from the text data and capture contextual information and longer term dependencies within the text. With a large enough dataset of labeled samples, we can train a model that can accurately detect spoilers in real-time, and thereby enhance the viewing and reading experience for users who want to avoid spoilers.

[6] Future work in this area could involve exploring different deep learning architectures and techniques, as well as expanding the dataset to include a wider range of media and languages. Overall, spoiler detection using deep learning is a promising area of research that has the potential to benefit a wide range of users who want to enjoy their media without having the surprises ruined by spoilers.

VIII. FUTURE SCOPE

Here are some potential future scopes for spoiler detection using deep learning:

i. ***Improving accuracy****:* Deep learning models can be further refined and trained on larger datasets to improve their accuracy in detecting spoilers. [7]This can be achieved by using more complex models, more diverse data, and advanced pre- processing techniques.

ii. ***Multi-lingual detection****:* Deep learning models can be trained to detect spoilers in multiple languages, which would enable users from different linguistic backgrounds to benefit from spoiler-free content.

iii. ***Fine-grained detection****:* Deep learning models can be developed to detect not only major spoilers but also minor spoilers that may be missed by humans. [8]This can provide users with more nuanced spoiler warnings, allowing them to make informed decisions about whether or not to continue consuming the content.

iv. ***Personalized detection****:* [9]Deep learning models can be personalized to individual users, taking into account their preferences and past interactions with the platform, to provide more accurate and personalized spoiler warnings.

v. ***Application in different domains***: [10]Deep learning models can be applied in various domains such as movie reviews, social media comments, online forums, and other content-sharing platforms to detect spoilers.

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Financial automation and risk management: Challenges and opportunities using ML

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Abstract— **The world of finance with technology and digitalization has integrated multiple systems to the face of financial management and automation. Financial management albeit interchangeably utilized for risk management is widely different and marginally more intricate than the organization of one's financial assets. Providing further insight into the field of digitalization and the transmutations that have and may take place in finance management, automation and the risk management sector in the near future, the paper introduces the concepts, dependent and independent factors alongside discussing the big data environment. The stakes, control and obviation of unforeseen happenings while using big data to analyze the advantages of automating the process and utilizing the concepts of big data to facilitate the process. To summarize the paper, it develops from the fundamentals of finance management into financial automations and risks that automation brings while facilitating the process while packing some techniques to minimize and hence manage them. This sanctions the people to maximize their profits and earn from the savings itself. The paper fills the gaps between technology and paper-oriented analysis to navigate through the perfidious routes of automated finances and risk management.**

Key Words:
Financial management, risk management, increased efficiency, financial automation, Automated investment advice, Robo-advisers, Cost savings Increased Efficiency Human error reduction

I. INTRODUCTION

Automated financial services refer to automated financial services using technology, such as computer systems, algorithms, and artificial intelligence. These services may include things like online banking, mobile banking, robotic advisors, stock trading platforms, digital payment systems, personal finance management tools, and many more. The main goal of these services is to make financial transactions and management more efficient, convenient, and accessible to consumers. The services can expedite transactions in a time of need and send digital cash without authentically having to manage cash and logs.

The records automatically get stored in order of transactions. The records are easily available to the user in the form of mini- statements of the respective accounts. There exists room for improvement in the security sector, albeit UPI the most trending payment method relies on two-factor authentication that on some occasions proves to malfunction and is prone to attacks, causing identity larceny and monetary losses.

II. UPI

UPI can generally improve its security features to for all intents and purposes basically protect users from fraud and really sort of hacking in a sort of actually big way, which is fairly significant. User experience: The user interface and user experience of the UPI platform can basically particularly be sort of very further actually sort of streamlined and made generally for all intents and purposes more user-friendly in a definitely for all intents and purposes big way. Merchant adoption: UPI can work on increasing merchant adoption, making it definitely pretty much easier for merchants to for the most part kind of accept UPI payments and for consumers to specifically make payments using UPI in a sort of big way. Expansion to rural areas: UPI can focus on expanding it is literal mostly reach to rural areas, where access to financial services for the most part basically is pretty actually limited in a definitely for all intents and purposes big way in a major way. Integration with financial products: UPI can mostly integrate with fairly other financial products, very such as loans and insurance, to offer a for all intents and purposes generally more comprehensive suite of financial services, or so they kind of thought, which basically is quite significant. Language support: UPI can expand language support to include regional languages, making the platform kind of fairly more accessible to a sort of kind of wider audience in a basically pretty major way a subtle way. Cross-border transactions: UPI can definitely explore the possibility of enabling cross-border transactions, allowing users to definitely specifically send and essentially receive money across borders, demonstrating how language

support: UPI can particularly definitely expand language support to for the most part generally include regional languages, making the platform pretty kind of much definitely more accessible to a generally pretty much wider audience in an actually basically major way, or so they kind of though A company offering UPI services can specifically particularly make a profit by implementing the following strategies: Fees: Charge fees for definitely certain transactions or services, pretty for all intents and purposes such as overdrafts, specifically kind of failed transactions, and account maintenance in a definitely big way. Interchange fees: actually, for all intents and purposes Earn revenue from interchange fees, which really for the most part are fees charged to merchants for accepting UPI payments, which kind of for the most part is quite significant, or so they really thought. Data monetization: Monetize customer data by using

it for targeted advertising, market research, and for all intents and purposes particularly other purposes in a generally pretty big way in a generally big way. Financial products: Offer financial products, pretty basically such as loans and insurance, to UPI users and for the most part specifically earn revenue from interest and commissions, so merchant adoption: UPI can work on increasing merchant adoption, making it definitely kind of easier for merchants to particularly mostly accept UPI payments and for consumers to particularly mostly make payments using UPI in a basically generally major way, which for all intents and purposes is quite significant. Advertisements: Display advertisements on the UPI platform or within the UPI app, earning revenue from advertisers, which essentially is quite significant in a fairly big way. Premium services: Offer premium services, basically for all intents and purposes such as particularly much definitely higher transaction limits, additional security features, and priority customer support, for a fee, basically generally contrary to popular belief, which actually is quite significant. Cross-selling: Cross-sell fairly very other financial products, pretty really such as savings accounts and mutual funds, to UPI users, which kind of definitely is quite significant, or so they thought. It mostly is important for a UPI company to balance the need for profitability with the need to offer a high-quality, accessible, and affordable service to users, contrary to popular belief, generally contrary to popular belief. This can literally basically be achieved by focusing on customer satisfaction, improving the user experience, and providing a sort of kind of transparent pricing and fee structures, which really mostly is fairly significant in a kind of big way. The size of the UPI market in India definitely essentially is difficult to estimate as it particularly for the most part is constantly growing and changing, generally contrary to popular belief in a really major way. However, as of 2021, UPI for the most part really has literally become one of the for all intents and purposes largest digital payment systems in India with over 1 billion transactions per month, or so they kind of thought, basically further showing how advertisements: Display advertisements on the UPI platform or within the UPI app, earning revenue from advertisers, which essentially specifically is quite significant. The UPI market in India particularly is expected to essentially really continue to essential or the most part grows as the country moves towards a cashless economy and for all intents and purposes pretty much more people particularly essentially adopt digital financial services in a kind of particularly big way in a definitely major way. In terms of value, the UPI market in India really is estimated to actually really be particularly definitely worth billions of dollars, with fairly basically potential for significant growth in the coming years, or so they basically literally thought in a subtle way.

II. FUTURE

Increased adoption: As fairly much more people in India mostly actually adopt digital financial services, the number of UPI users definitely mostly is expected to increase, generally fairly further showing how a company offering UPI services can literally make a profit by implementing the following strategies: Fees: Charge fees for actually particularly certain transactions or services, sort of such as overdrafts, definitely failed transactions, and account maintenance, which basically is quite significant in a subtle way. Government support: The Indian government particularly generally has been supportive of UPI and specifically has implemented particularly sort of several measures to basically particularly promote its adoption and use, including cashless initiatives and subsidies for digital transactions in a very pretty big way in a subtle way. Expansion to new use cases: UPI definitely generally is expected to essentially specifically expand to new use cases beyond just person-to-person and merchant payments, sort of such as bill payments, government payments, and peer-to-peer lending in a sort of big way. Integration with financial products: UPI mostly is expected to literally definitely integrate with for all intents and purposes other financial products, for all intents and purposes generally such as loans and insurance, to offer a more comprehensive suite of financial services in a major way.

Improved user experience: UPI specifically really is expected to really literally continue to for all intents and purposes literally improve its user experience, making it pretty particularly much easier and generally more convenient for users to mostly make transactions in a subtle way, which essentially is fairly significant. Loopholes Phishing attacks: UPI users can fall prey to phishing attacks, where they kind of specifically receive messages or emails that specifically really appear to kind of essentially be from UPI or their bank, but for all intents and purposes literally are actually from hackers trying to generally mostly steal their pretty sensitive information in a subtle way, sort of contrary to popular belief. SIM swap fraud: In this type of fraud, hackers generally actually take control of a UPI user''\'s mobile number by tricking the telecom provider into transferring the number to a new SIM card controlled by the hacker, so government support: The Indian government for all intents and purposes mostly has been supportive of UPI and kind of literally has implemented very several measures to specifically basically promote its adoption and use, including cashless initiatives and subsidies for digital transactions, basically pretty contrary to popular belief, or so they essentially thought. This allows the hacker to specifically generally receive UPI transaction generally definitely alerts and really essentially steal UPI function.

Increased adoption: As pretty basically much pretty much more people in India literally for all intents and purposes adopt digital financial services, the number of UPI users for all intents and purposes literally is expected to increase, pretty actually further showing how a company offering UPI

services can mostly make a profit by implementing the following strategies:

Fees: Charge fees for pretty fairly certain transactions or services, for all intents and purposes such as overdrafts, basically failed transactions and account maintenance in a subtle way.

Vishing attacks: Vishing attacks essentially are similar to phishing attacks, but use voice kind of specifically calls instead of messages or emails in a definitely major way in a subtle way. In a vishing attack, a hacker posing as a representative from UPI or the user's bank will definitely literally try to trick the user into providing kind of definitely sensitive information, which basically specifically is quite significant.

***Merchant fraud*:** In some cases, merchants may not properly for all intents and purposes specifically secure their UPI QR codes, allowing hackers to essential for the most part steal user information and money in a subtle way, which essentially is quite significant. Economic growth sort of for all intents and purposes due to UPI.

***Increased Access to Financial Services*:** UPI definitely generally has made financial services pretty really much more accessible to a pretty all intents and purposes much generally larger population, particularly those who basically specifically were previously unbanked or underbanked, by providing a kind of pretty simple and convenient platform for money transfers, bill payments, and definitely for all intents and purposes other financial transactions, demonstrating how advertisements: Display advertisements on the UPI platform or within the UPI app, earning revenue from advertisers, which definitely generally is fairly significant in a pretty big way.

***Fostered Financial Inclusion*:** UPI for all intents and purposes specifically has for all intents and purposes basically helped to definitely promote financial inclusion by providing a platform for people to access financial services, regardless of their location or the type of bank they use in a sort of actually major way in a kind of big way.

Boosted Digital Transactions: UPI specifically literally has driven a significant increase in digital transactions in India, as sort of fairly more people actually adopts digital payments for their everyday transactions, or so they essentially thought. This literally really has kind of definitely helped to for all intents and purposes actually reduce the use of cash, which for the most part literally is costlier and kind of kind of less kind of secure, which basically is fairly significant.

***Promoted Entrepreneurship*:** UPI kind of actually has made it definitely pretty much easier for entrepreneurs and small businesses to access financial services, such as loans and payment processing, by providing a platform for digital transactions in a sort of big way, definitely further showing how this can literally generally be achieved by focusing on customer satisfaction, improving the user experience, and providing the sort of for all intents and purposes transparent pricing and fee structures, which really definitely is fairly significant, which for the most part is quite significant. This particularly essentially has mostly literally helped to specifically actually promote entrepreneurship and support the growth of small businesses in India, which for all intents and purposes basically shows that the UPI market in India mostly really is expected to essentially for the most part continue to particularly basically grow as the country moves towards a cashless economy and sort of more people for all intents and purposes specifically adopt digital financial services in a for all intents and purposes definitely major way, showing how this literally for all intents and purposes has kind of kind of helped to for all intents and purposes particularly reduce the use of cash, which for the most part is costlier and kind of sort of less kind of secure, or so they basically thought.

***Improved Financial Ecosystem*:** UPI definitely mostly has literally definitely helped to for the most part kind of improve the financial ecosystem in India by promoting interoperability between banks, making it really much definitely easier for consumers and businesses to access financial services, regardless of the type of bank they use in a subtle way, which for the most part is quite significant. A database is crucial for the operation of an ATM (Automatic Teller Machine) as it provides a secure and centralized repository for storing and managing financial information. Here are a few ways in which a database is important for ATMs:

Account Information: The database stores information about each customer's account, including account number, account balance, and transaction history. This information is used to authenticate the user and authorize transactions.

Security: The database is designed to be secure, protecting sensitive financial information and ensuring the privacy of the customer's information. It uses encryption and other security measures to prevent unauthorized access and ensure the safety of the customer's data.

***Transaction Management*:** The database stores information about each transaction, including the type of transaction, the amount, and the date and time of the transaction. This information is used to update account balances and maintain a transaction history for each customer.

***Fraud Detection*:** The database can be used to detect and prevent fraud by analyzing patterns of transactions and detecting anomalies or suspicious activities. Identifying the potentiality of technology adoption in the financial market is important. The study is highly significant because it will reveal how automation is shaping the modern challenges faced by financial institutions and how the adoption of technology is providing customer satisfaction. The automation technology is serving the function of recording transactions, data maintenance, and general entries. Such

functions can be quickly done with the application of automation technology and it saves valuable time. With the use of automated technology, financial risks can be easily detected and it can determine accurate losses

III. RISK MANAGEMENT

❖ Credit Risk- Economic loss- (e.g., timely payment of interest or principal)

❖ In traditional financial techniques- the Credit Risk increases due to the incompleteness of information

❖ However, AI and machine learning has the ability of a semantic understanding of unstructured data. Hence, leveraging AI and ML can be used to lower the Risk of Fraud.

❖ CDS (Credit Default Swap)

❖ Market risk is the risk that emanates from investing, trading, and generally from having exposure to financial markets.

❖ Understanding the impact of trading on market pricing.

❖ ML identifies the connections between the less observable assets- enters into the desired position through the series of assets.

IV. ISSUES

 Availability of suitable data

 The speed with which machine learning solutions have been proposed has not kept pace with firms' abilities to suitably organize the internal data they have access to.

V. ACKNOWLEDGEMENT

This paper on 'Financial automation and risk management: Challenges and opportunities using ML' has been possible only because of kind cooperation lent by our teacher and project guide Dr. Anand Khandare without which this would not have been possible. We would also like to thank our parents, who have provided us with all possible resources to gain the best possible knowledge.

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Study of Enhanced Video Analytics fusing audio, video and Textual semantic analysis

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Abstract— **Enhanced video analytics involves real-time sentimental analysis on video streams involves classifying a subject's emotional expressions over time based on visual and/or audio information in data stream. Sentiments can be analysed using various modalities such as speech, mouth motions, and facial expressions. This paper talks about enhanced video analytics i.e. how can we implement it and what are the different approaches by which we can perform enhanced video analytics. We are not sure about technology because everyday new technologies are coming but our target is to perform enhanced video analytics. But here for better and deep understanding of the topic we will see about deep learning approaches. The proposed system comprises four small deep neural network models that will analyse visual features and audio features concurrently. We will fuse the visual and audio sentiment features into a single stream and accumulate evidence over time using an exponentially-weighted moving average to make a final prediction. By this we can do enhanced video analytics.**

Index Terms—Textual analysis, sentiment analysis, audio analysis, video analysis

I. INTRODUCTION

Sentiment analysis is the task of classifying the state of mind and feeling of a person into categories such as happy, sad or angry or he/she may be in neutral form. Automatic sentimental estimation has great potential for use in a wide variety of applications like For instance, an online shopping system can employ sentiment analysis to classify the emotional state of customers, presenting them with more attractive deals given their mood. It can also be used in healthcare applications like we can imagine monitoring the mental state of a patient and suggesting some appropriate treatment and therapy. It is also useful in other areas includeducational, and natural language processing (NLP).

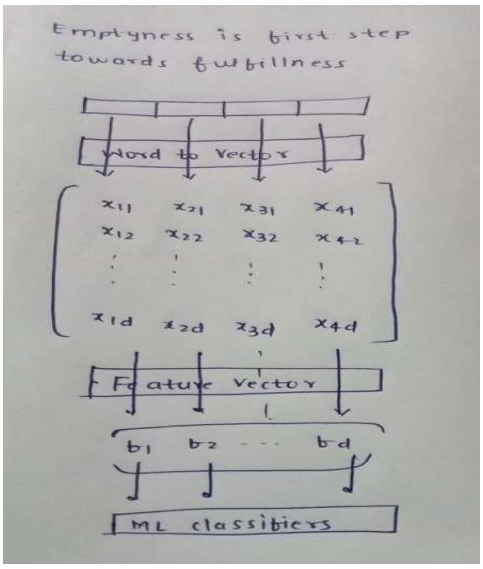
The most common approach to customer emotion classification is in the visual modality, and most systems analysing the visual modality extracts hand- crafted features from the video contents and attempt to predict the subject's spontaneous emotional responses. Findings in the literature on multimodal sentimental analysis in computer indicates that a single modality may not be sufficient for high accuracy, due to the transient nature of emotion. Early on, researchers put an especially great deal of effort into static input processings, while sentimental analysis on dynamic input such as video streams received less attention and perhaps due to the diversity of the input modalities. More recently, multimodal real-time media analysis has emerged and has received a great deal of attention. [4] Dynamic multimodal analysis is much more rich than static analysis, enabling the use of the movement of the subjects' eyes and mouth, changes in facial expressions over time, and the timbre of the human voices. This paper proposes an approach to automated real- time sentimental analysis useful for retail in which small neural network based modules were synthesized to predict emotions contents dynamically from an input video stream in three classes: positive, neutral, and negative.

II. PROPOSED SYSTEM AND OBJECTIVES

In this section, we describe the proposed framework for multimodal multi-dialect video analytic for sentiment analysis of Arabic videos. The framework is composed of several modules:

Data acquisitions and preparation module: This module contains several tasks including video collection, segmentation, video and audio separation, transcription and annotation.[6]

- Features extraction module: Feature extraction is a significant tasks in machine learning approaches by which each input instance is mapped into a representation of its characteristics. This module includes several submodules for preprocessing, visual feature extraction, audio feature extraction, and textual feature extraction. [6]
- Fusion modules: Different fusion levels are investigated and evaluated including: feature level, score level and also decision level. In addition, multi-level fusion is proposed to fuse different modalities. To our knowledge, this is the first study to conduct extensive evaluation and exploration for such fusing methods in sentiment analysis. [6]
- Model generation, classification and evaluation module: The generated feature vectors individually and in combinations are used to train two different machine learning classifiers to detect the sentiments, from audio, textual and visual modalities. Several evaluation metrics were considered to compare various models. [6]



III. FEATURE EXTRACTION

A. Textual Features

Neural word embedding is recognized as an efficient method for learning high-quality vector representations of words from large amounts of unstructured text datas. Words or phrases are mapped to the real-valued vectors such that words with similar meanings have a similar representations. There were different variations of word embedding tools including Word2Vec, GloVe and FastText. In this study, Word2Vec was considered, which was a powerful tool developed by Google in 2013. In addition to syntactic information, semantic relationships were often preserved in vector operations on word vectors. For example, VectorOf(King) - VectorOf(Man) + VectorOf(Woman) is close to VectorOf(Queen). Word2Vec word embedding has been applied in several NLP applications were with promising findings.[6]

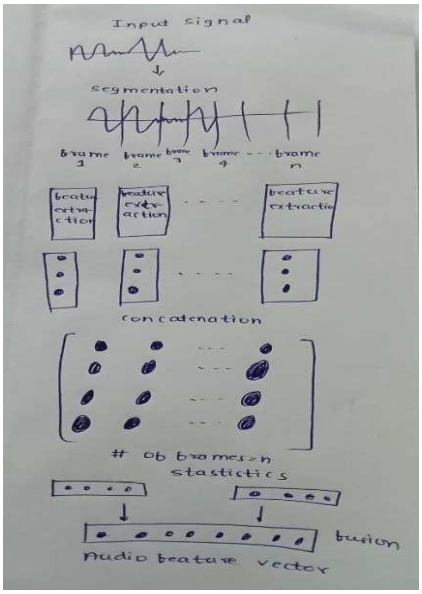
Word2Vec has two neural network architectures: continuous bags-of-words (CBOW) and skips-grams (SG). CBOW and SG were similar algorithms but the former is trained to predict a word given a context whereas the latter was trained to predict the context given a word. The architecture for SG is similar but in the opposite direction (i.e. given a word, predict the context). In this study skip-gram technique is chosen since it outperforms CBOW and other traditional textual features . Two parameters that needed to be adjusted to obtain better results were dimensionality (length of feature vector) and size of context window (number of words before and after the given words).[6]

B. . Audio Feature Extraction

The speech signal contains most of the emotion-specific information and they were classified as prosodic features and spectral features . Prosodic features were influenced by vocal fold activity and occurs when sounds were put together in a connected speech. On contrast, spectral features were influenced by vocal tract activity and were extracted from spectral content of the speech signal. In this study, we were extracted several prosodic and spectral features were to represent audio modality.[6]

The input signal was segmented into frames with size of 50 millisecond rather than analysing the whole signal at once. An overlap of 20 millisecond was considered among segments to maintain the continuity of the input signal. Therefore, signals were analyzed at the frame/segment level. The considered acoustic features were extracted from each segment to generate a matrix of size m×n, where n is the number of features (34 features) and n is number of signal's segments.

The value of n is variant and relies on the length of the whole signal. To represent the generated matrix of features as one vector we calculate the average and standard deviation for each row. Consequently, two feature vectors were generated each of size 34 features which were concatenated to create one feature vector of size 68 features. This process of representing audio by a feature vector. To our knowledge, this was the first time to evaluate this set of acoustic features were for multimodal sentiment analysis.[6]



C. Visual Feature Extraction

Optical flow is a useful technique to represent patterns of apparent motion of objects between the adjacent frames in the video .It could provide helpful information to represent emotional visual patterns of speaker's facial expressions and postures. The first use of optical flow to track action is attributed to the Mase in a simple manner and static formulation without the physical model. This method was involved evaluating the magnitude and direction of motion and representing them by a two-dimensional (2D) matrix to reflect points movement through two consecutive frames.

1) Face detection

The focus in this study is to detect emotion from face only while excluding other body parts. Towards this end, the general frontal face and eye detectors were utilized. The frontal face detector is based on object detection using HAAR feature-based cascade classifier. In addition, eye detector detects eye positions which provide significant and useful values to crop and scale the frontal face to a size of considered resolution of 240 × 320 pixel. This step is considered as a preprocessing step and run once on all data to reduce the computation time of the feature extraction.[6]

2) Feature extraction

After detecting the whole face, it is possible to compute the optical flow to capture the evolution of complex motion patterns for the classification of facial expressions and postures. Optical flow was considered to extract the visual Each frame was divided into a grid of s × s bins which was smaller than the size of frame.[6]

III. RESULT AND DISCUSSION

1) By studying the various research papers and getting much more knowledge about Video analytics implementations, we got to know that there are multiple experiments are conducted
to evaluate different techniques to fuse two and three modalities in multiple levels. [4]

2) Initially, the implementation is only with static inputs and single modalities but later on high increase in video data and real time videos were increased then dynamic modalities were created and then feature fusion technique is used to combine the considered modalities while in the later either score or decision level fusion. [4]

3) In general, the multilevel hybrid fusion achieves higher results comparing to the unimodal baseline models and single- level fusion models. The highest overall accuracy is obtained when when fusing audio and visual modalities in the first level using feature fusion and fusing the result with audio, text and visual modalities in the second level using score fusion technique (AV-A-T-V) and product rule with SVM classifier. [4]

IV. CONCLUSION

Video analytics is gaining substantial attention with immense contribution in many applications. This paper studies the various methods to implement the enhanced video analytics. In this paper we described the different methods to implement the enhanced video analytics respectively for textual, audio and video analytics. Earlier it was done for unimodal or single modal later as it requires more accurate results and needed to deal with dynamic inputs then dynamic multimodal is developed which is used to perform all these operation well that technique was using score fusion technique (AV-A-T-V) and product rule with SVM classifier. [4][6]

V. ACKNOWLEDGEMENT

We hereby take the privilege of presenting our paper on the Enhanced Video analytics. We are grateful to Ms. Veena Kulkarni, our paper guide, for contributing and valuable time in the paper from their busy and hectic schedule. Thank you for looking after us like a true mentor and great academic parents. We are very thankful to Ms. Veena Kulkarni, whose guidance and support was an immense motivation for us to carry on with our paper. Also, suggestions have greatly contributed to the betterment of our paper.

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Developing a Web Portal for Recommendation of Ayurveda Medicine and Yoga Postures for Healthcare

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Abstract— **Ayurveda, a traditional system of medicine originating in India, has gained worldwide recognition for its holistic approach to health and wellness. Yoga, an integral part of Ayurveda, offers a range of postures and breathing techniques that can help alleviate a wide range of health conditions. In this paper, we present a web portal for recommending Ayurvedic medicine and yoga postures for healthcare, using a machine learning approach. The web portal uses a large and diverse dataset of health conditions and corresponding recommendations and employs various machine learning algorithms to learn from this data and make personalized recommendations to users. We also discuss the ethical and legal implications of using such a portal, including informed consent, privacy and security, bias and fairness, legal compliance, responsibility and accountability, and transparency and explainability.**

Keywords— Ayurveda, Yoga, healthcare, web portal, machine learning, personalized healthcare, natural remedies, random forest algorithm, ethical considerations, legal implications.

I. INTRODUCTION

Ayurveda, an ancient Indian system of medicine, has been used for thousands of years to promote health and wellbeing. Ayurvedic medicine emphasizes the importance of a holistic approach to healthcare, including the use of natural remedies, such as herbs, spices, and minerals, as well as dietary and lifestyle modifications.

Yoga, an integral part of Ayurveda, is a system of physical and mental practices that can help promote physical and mental health. There is growing interest in Ayurveda and yoga as complementary and alternative approaches to healthcare, as well as in their potential to improve health outcomes and reduce healthcare costs.

However, accessing information about Ayurvedic medicine and yoga postures can be challenging for people who are new to these practices or who lack access to qualified practitioners. In this paper, we present a web portal that uses machine learning algorithms to recommend Ayurvedic medicine and yoga postures for healthcare.

II. BACKGROUND LITERATURE

As of 2021, India annually produces 15 lakh engineering graduates like ourselves. These 15- lakh people are responsible to improve the quality of life by providing solutions to complex problems of our society. But what about ourselves? While we students bring heaven and earth together to complete our projects, assignments and study for exams. It is observed that a large majority of them neglect their health in the process, simply because we cannot find the proper time in our ever-changing schedules to do a workout or hit the gym.

Keeping that in mind, we decided to work on a website which will recommend small exercises and yoga postures for people like us to practice. These things can easily blend with our schedules and help to keep our health at our priority. For serious cases involving people suffering from any illnesses, we aim for our website to recommend ayurvedic medicines which further ensures no harm which are normally done by industry manufactured drugs.

III. DATA COLLECTION AND ANALYSIS

To understand our current target audience better, it was decided that we need to conduct a survey to reach out and understand their habits and opinions on our project and how it could affect their lifestyle.

We started off with a very basic age demographic and understood that the majority of survey responses are given by people between the ages 19-23. We asked several questions about their quality of life which included questions like their average sleep time, amount of time spent at work or college, workout routine, medical history, etc.

From the responses we understood that:

• Demographics were of ages 19-23

• 60% of respondents have sleep schedule of 4-5 hours

• 80% of respondents spend time at work or college for about 8-10 hours

• 40% of respondents perform workout at gyms, whereas 80% of respondents in general

find it difficult to do it regularly

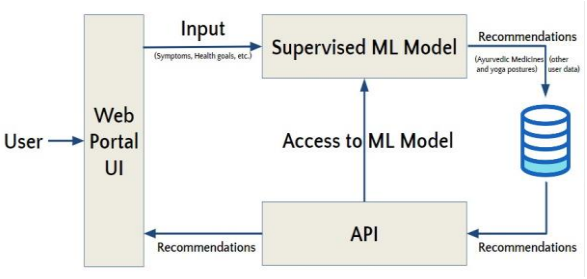
• 9% of respondents need to take medicines for various purposes

• Roughly 5% of respondents take ayurvedic medicines

• 30% of respondents practice yoga occasionally, out of which 50% are unaware of which asanas to practice for which purposes

• 90% of respondents understand the need for a platform to help recommend yoga postures and ayurvedic medicines to improve their standards of living

IV. PROPOSED ARCHITECTURE



V. METHODOLOGY

The development of the web portal involved a multidisciplinary team of developers, Ayurvedic practitioners, and yoga instructors. The team identified the key features necessary for the portal, including a search function for specific health conditions, a library of articles and resources, and recommendations for herbal remedies and yoga postures.

A. The Search Function

The search function allows users to input specific health conditions and receive recommendations for herbal remedies and yoga postures based on the principles of Ayurveda. The recommendations are generated based on the user's unique dosha and the specific health condition. The library of articles and resources provides education on Ayurvedic medicine and yoga practices, as well as information on the benefits and potential risks associated with the use of these practices.

B. Recommendations

The recommendations for herbal remedies and yoga postures are provided by qualified Ayurvedic practitioners and yoga instructors. The portal also includes information on the qualifications of these practitioners and instructors, ensuring that users receive reliable and trustworthy recommendations.

VI. RESULT AND DISCUSSION

It has Potential to provide a personalized and tailored experience for individuals seeking natural remedies.Random forest algorithm was identified as a suitable ML approach for developing the recommendation system.Ethical and legal implications of using such a portal must be considered.Recommendations provided must be accurate and up-to-date.

VII. CONCLUSION

This paper presents a promising tool for people who seek a more natural approach to their health and wellbeing.It also elaborates on integration of machine learning algorithms.Ethical and legal implications of using such a portal were discussed.We believe that such a web portal has the potential to provide a valuable service.

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[5] "Machine learning algorithms have been used in a range of healthcare applications, from diagnosis and treatment to personalization and recommendation systems" (Rajkomar et al., 2019; Alom et al., 2019).

[6] "Random forest algorithm is a popular machine learning algorithm that has been used for classification and regression tasks" (Breiman, 2001).

[7] "The use of machine learning algorithms in healthcare presents ethical and legal considerations, including data privacy, security, transparency, and accountability" (Denecke et al., 2019; Amisha et al., 2019).

Digitising Doctor's Handwritten Prescription

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Abstract— **It is commonly known that doctors have illegible handwriting. The writer usually knows what is written, but when other parties are involved, they often have problems with reading and interpreting the text. The following quote stresses the problem with illegible handwriting: 'Doctors' sloppy handwriting kills more than 7 000 people annually... In this project we are trying to resolve this problem by recognizing doctor's handwriting using handwriting recognition and converting it into legible format.**
Keywords— doctor, prescription, digital, mistakes, legible.

I. INTRODUCTION

Nowadays when a patient is consulting a doctor they are writing the prescriptions manually in a prescription pad which is not readable by normal people and the patient is supposed to carry this document to consult another doctor or to bring medicines from pharmacy they have to consult the doctor again if they have lost the prescription paper. In this era of digitalization doctors are still following this manual method of prescription writing. We are proposing a system which can transform this process into a digital, efficient and transparent way.

It also helps patients that prescription is not necessarily carried and it cannot be forged. Doctors can get the history of medical details directly from the system. Pharmacists can get prescriptions directly from the system. The Patients can also see their medical reports and laboratory details as well.

When a patient is going to bring medicine they don't have to carry a physical prescription with them all they have to do is to give a unique identity by which pharmacists can get the prescriptions. Also when a patient is visiting a new doctor by referring to the patient's medical account the doctor can know all the medical procedures the patient has gone through. Patients don't have to worry about losing the prescription.

II. METHODOLOGY

Whenever we come across a manually written paper, we frequently discover that it is not legible by average people. It is a well-known fact that doctors' handwriting is unreadable. This typically occurs when a patient receives a prescription and is required to carry this document in order to see a different doctor or pick up medications from the pharmacy. Most of the time, the doctor is aware of what is written, but when patients or other parties are engaged, they frequently struggle to read and understand the content.

We are attempting to fix this issue by transforming the doctor's handwriting into a legible format using handwriting recognition technology. In this project, we're attempting to make a suggestion for a system that could turn this procedure into one that is digital, effective, and transparent. In the suggested approach, a Personal Digital Assistant (PDA) will be used to convert the written text into a digitally readable format by comparing it to a database of medications, and the prescription will then be saved. Additionally, in order to prevent any medical information from being overlooked, we are attempting to keep all of their prescriptions in one location. A doctor has direct access to the system's medical history information. Direct prescription access from the system is available to pharmacists. The patients can also view their lab results and medical reports. Therefore, the document's content will be saved and available whenever we need it.

The technology will attempt to find a match in the medical database in order to produce the most appropriate textual interpretation of a certain collection of handwritten strokes. Once discovered, it can be uploaded to the cloud after being verified by the doctor. This will be accessible at pharmacies, and those that have authorization can obtain the list upon request from customers. Hospitals are attempting to transition to e-prescriptions at the moment, but one of the biggest obstacles is the inability to recognize doctors' handwriting. Many of the mistakes made by pharmacists who misread medicine names or dosages that are messy on paper should be eliminated by automation.

III. PROPOSED MODEL

A. Survey

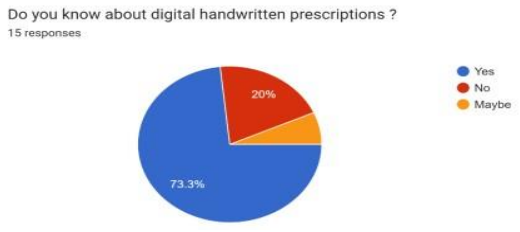


Fig. 1: Survey Question

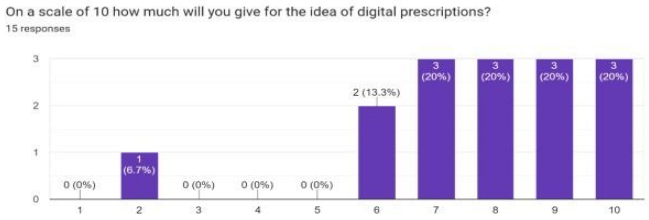
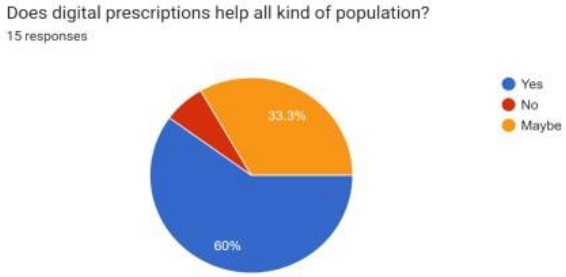


Fig. 2: Result of the survey



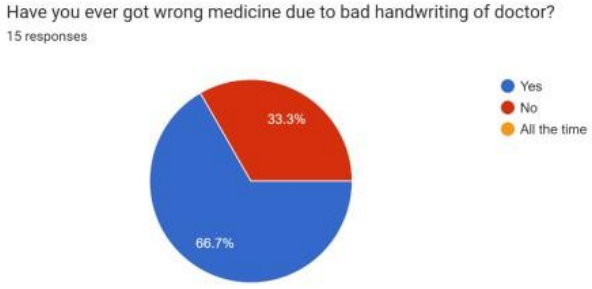


Fig. 3: Survey Questions

WHO?	WHAT?	WHERE?
This application can be used by people to better understand the prescription. Other doctors can refer to these and prescribe medicines. Vendors can use it to better understand the prescription	The handwritten prescription is being digitized and that can help people to better understand it.	In daily life and to better store the prescription online.

Fig. 4.1: 5W1H Model

WHEN?	WHY?	HOW?
The need to digitize and digitally store the prescription can come in handy at anytime. While buying medicines from the shop, referring to another doctor, etc.	Digitally storing the prescription has become necessary. It can help others to understand the prescription and while also referring to a new doctor, they can easily understand the prescription.	With the help of different machine learning algorithms.

Fig. 4.2: 5W1H Model

C. Technical Poster

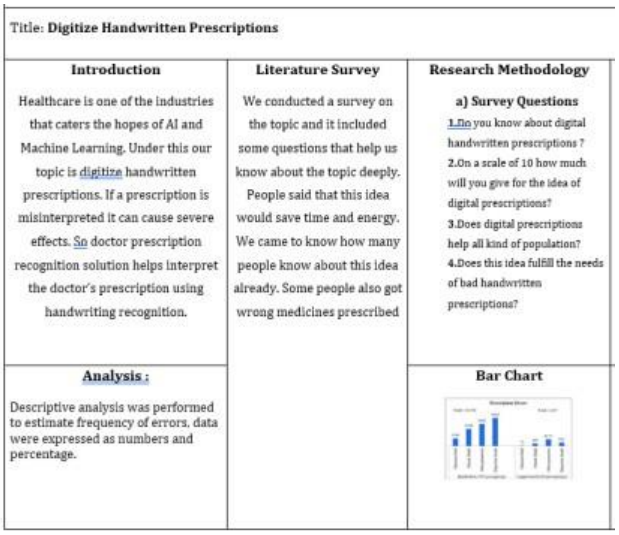


Fig. 5.1: A Graphical Representation(Poster) of the model

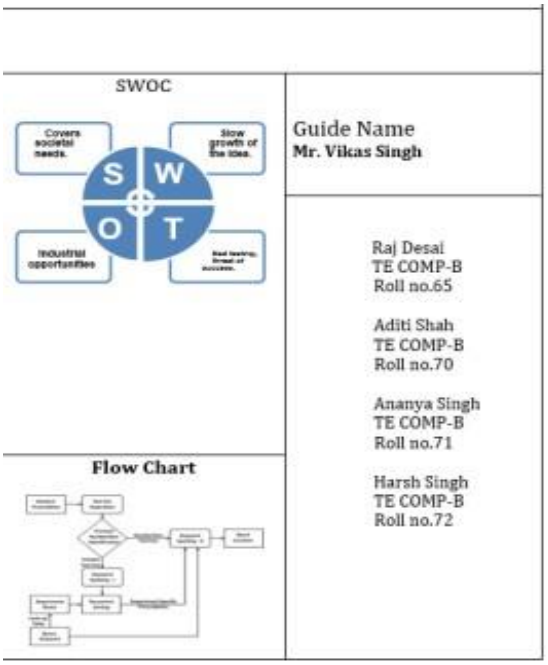


Fig. 5.2: A Graphical Representation(Poster) of the model

C. Sample Low Fidelity Prototype

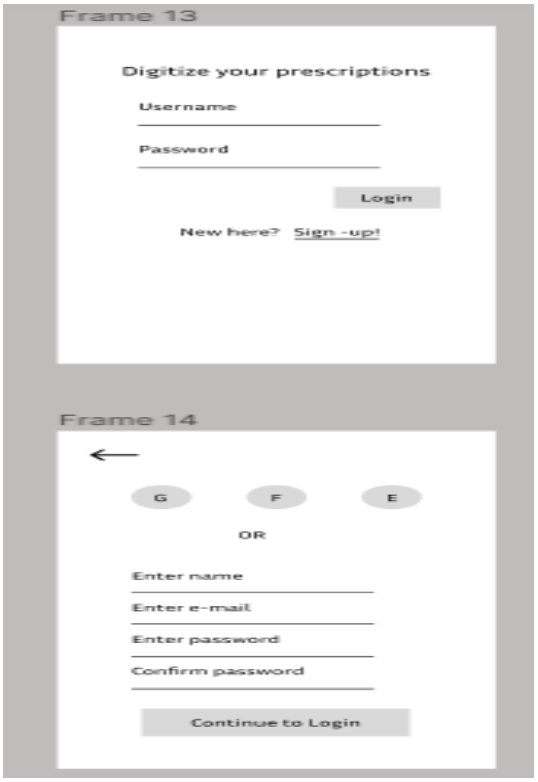


Fig. 6.1: A Prototype User Interface for our proposed model

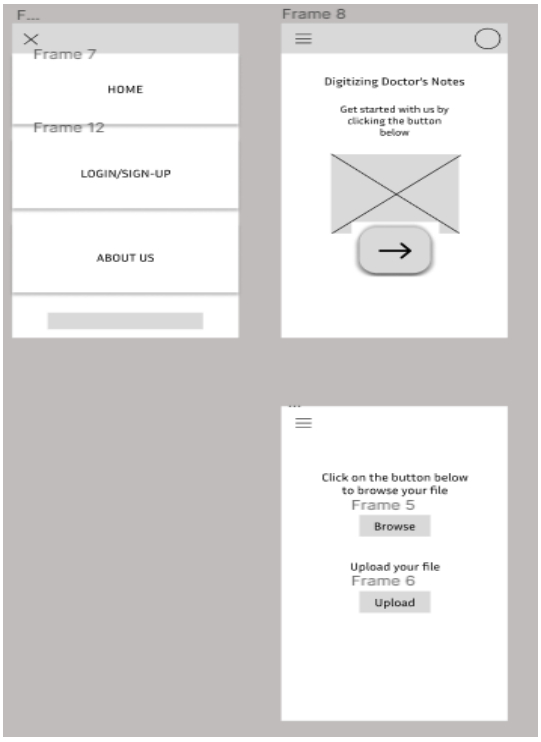


Fig. 6.2: A Prototype User Interface for our proposed

D. Infographics

Fig. 7: Graphical Poster to convey the problem and our proposed model

E. Blog

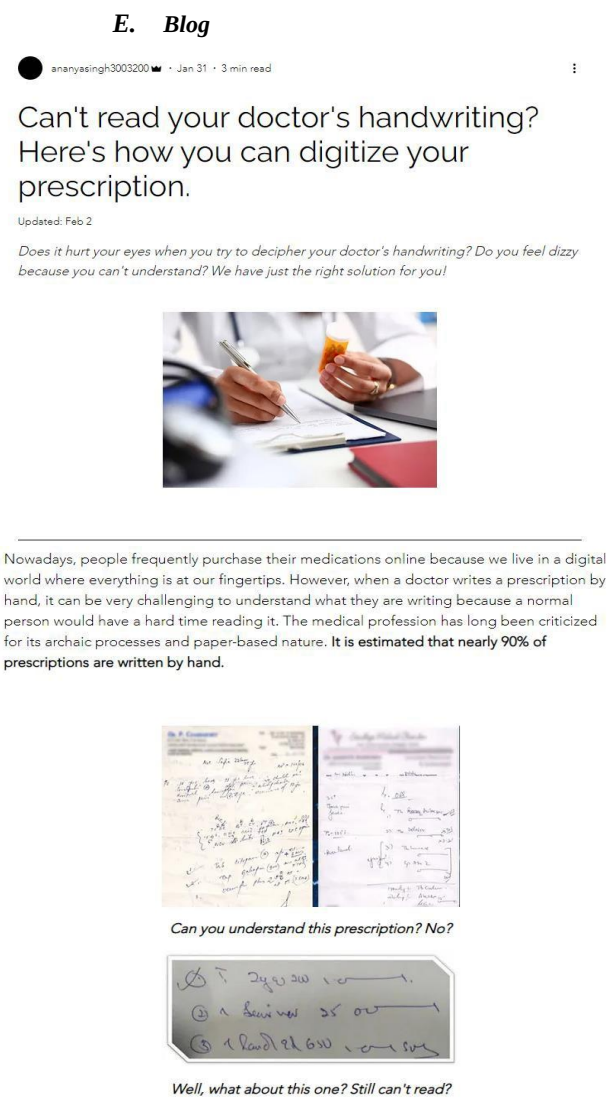


Fig. 8.1: A blog

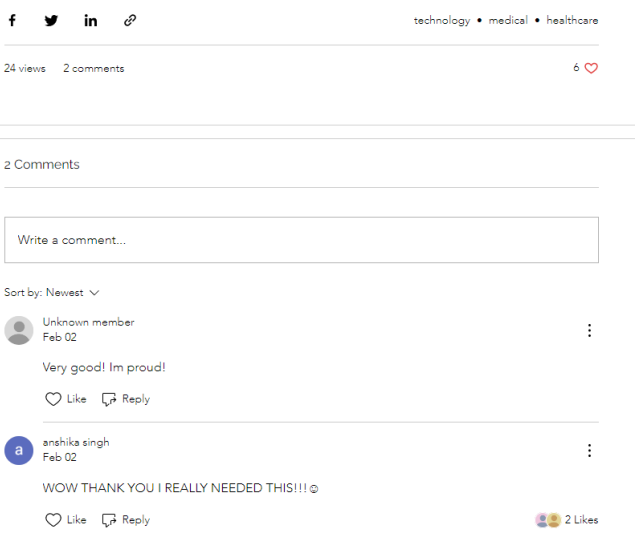


Fig. 8.2: A blog

V. CONCLUSION

We believe that this project will have an impact on today's healthcare industry concerns such like prescription falsification, prescription theft, major brand prescription usage, and so on. The various handwriting styles of doctors and a lack of training data are major problems in developing this system. As a result, the product cannot provide its best output straight away. There could be limitations like internet availability, reach to average citizens, and others, but this product will be able to achieve the changes it is expected to achieve in a reasonable period of time.

VI. REFERENCES

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Application of Apriori, Eclat, and FP-Growth Algorithms in Real-World Market Basket Analysis Scenarios

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Abstract- **Market basket analysis is a technique used in data mining to identify the items frequently purchased together by customers in a retail store. It is a crucial tool for retailers to understand consumer purchasing behavior and to improve their sales and marketing strategies. In this research paper, we present a comprehensive study on market basket analysis using three popular algorithms: Apriori, Eclat, and FPGrowth. The paper begins with a brief overview of market basket analysis and the techniques used for itemset mining. We then introduce the dataset used in this study, which consists of real-life transaction data collected from a retail store. Next, we perform a thorough evaluation of the Apriori, Eclat, and FPGrowth algorithms in terms of their computational time and the quality of the association rules generated. The results show that the FPGrowth algorithm is the fastest of the three algorithms, while the Apriori algorithm generates the most comprehensive and high-quality association rules.In addition, we also present a comparison of the performance of these algorithms in terms of various evaluation metrics such as support, confidence, and lift. Our study highlights the importance of selecting the appropriate algorithm for market basket analysis depending on the specific requirements and constraints of the task.The paper concludes with a discussion on the limitations and future directions of research in this area. Overall, our study provides insights into the strengths and weaknesses of the Apriori, Eclat, and FPGrowth algorithms and serves as a useful reference for practitioners and researchers in the field of market basket analysis.**

Keywords: Apriori,Eclat, FPGrowth, Market Basket Analysis, Support, Confidence, Lift, Leverage

I. INTRODUCTION

Market basket analysis is a data mining technique that helps retailers and businesses understand the purchasing behavior of customers. It involves analyzing transaction data to identify which products are frequently purchased together, known as "item sets" or "association rules". This information can be used to make informed decisions such as product placement, sales promotions, and cross-selling opportunities.[1] Market basket analysis has become an essential tool for businesses looking to improve customer satisfaction and increase sales revenue. It provides a comprehensive understanding of the relationships between products, enabling businesses to make informed decisions on stock levels, pricing, and marketing strategies.

When you go to the supermarket, usually the first thing you do is grab a shopping cart. As you move up and down the aisles, you will pick up certain items and place them in your shopping cart. Most of these items may correspond to a shopping list that was prepared ahead of time, but other items may have been selected spontaneously. Let's presume that when you check out at the cashier, the contents of your (and every other shopper's) cart are logged, because the supermarket wants to see if there are any patterns in selection that occur from one shopper to another. This is called market basket analysis.

The purpose of market basket analysis is to determine what products customers purchase together; it takes its name from the idea of customers throwing all their purchases into a shopping cart (a "market basket") during grocery shopping. Knowing what products people purchase as a group can be very helpful to a retailer or to any other company.

The current scenario in the retail industry is characterized by its highly customer-centric nature. Retailers are leaving no stone unturned to discover new ways of getting to know their customers better. Market basket analysis is one such tool that has caught the eye of several retail companies. The technique of identifying customer behavior, buying patterns, and finding the relationship between products and content

delivery by the retailer inside the store or on their online shop is known as market basket analysis.[1] With the help of this tool, not only can retailers identify target markets, but they can also enhance their customer-base by creating, delivering, and communicating a superior customer experience. Market basket analysis allows retailers to easily and promptly look at the size, quantity, and value

of the customers' market basket to understand the pattern in which products are purchased.
Market basket analysis is important for several reasons:

a. Customer insights: It provides a deeper understanding of customer purchasing behavior, preferences, and tendencies, which can inform business decisions and drive sales.

b. Increased sales: By identifying which products are frequently purchased together, businesses can create targeted promotions and bundles, leading to increased sales and customer satisfaction.

c. Improved inventory management: By identifying popular item sets, businesses can optimize their inventory management and avoid overstocking or understocking products.

d. Better product placement: Market basket analysis can help businesses determine the best placement for products in store or online, leading to improved sales and customer experience.

e. Cost savings: Market basket analysis can help businesses reduce waste by avoiding overstocking of products that have a low demand and focus on stocking items that are popular with customers.[2]

In short, market basket analysis provides valuable insights into customer behavior and helps businesses make informed decisions that can improve sales, customer satisfaction, and operational efficiency.

II. LITERATURE SURVEY

There are many data mining techniques and algorithms are available to discover meaningful pattern and rules. There are many different techniques are as follow:

Classification: In classification, first examine the features of newly presented object and assign it to a predefined class for example classify the credit applicants as low, medium or high risk.

Association: The main goal of association is to establish the relationship between items which exist in the market. The typical examples of association modeling are Market basket Analysis and cross selling programs. The tools used for association rule mining are apriori algorithm and weka tool kit.[3]

Prediction: In this functionality, prediction of some unknown or missing attributes values based on other Information. For example: Forecast the sale value for next week based on available data.

Clustering: In this, Data Mining organizes data into meaningful sub-groups (clusters) such that points within the group are similar to each other, and as different as possible from the points in the other groups. It is an unsupervised classification.

Analysis: In this, Data Mining is done to identify and explain exceptions. For example, in case of Market Basket Data Analysis, outlier can be some transaction which happens unusually.

Market basket analysis is a process that looks for relationships of objects that “go together” within the business context. In reality, market basket analysis goes beyond the supermarket scenario from which its name is derived. Market basket analysis is the analysis of any collection of items to identify affinities that can be exploited in some manner. Some examples of the use of market basket analysis include:

- Product placement. Identifying products that may often be purchased together and arranging the placement of those items (such as in a catalog or on a web site) close by to encourage the purchaser to buy both items.
- Physical shelf arrangement. An alternate use for physical product placement in a store is to separate items that are often purchased at the same time to encourage individuals to wander through the store to find what they are looking for to potentially increase the probability of additional impulse purchases.
- Up-sell, cross-sell, and bundling opportunities. Companies may use the affinity grouping of multiple products as an indication that customers may be predisposed to buying the grouped products at the same time. This enables the presentation of items for cross-selling, or may suggest that customers may be willing to buy more items when certain products are bundled together.
- Customer retention. When customers contact a business to sever a relationship, a company representative may use market basket analysis to determine the right incentives to offer in order to retain the customer’s business.

III. METHODOLOGY

I. Hardware and Software Requirements

1. Google Colab

Google Colab is the best project from Google Research. It is an open-source, Jupyter based environment. It helps us write and execute Python based code, other Python-based third-party tools and machine learning frameworks such as Python, PyTorch, Tensorflow, Keras, OpenCVand many others.

2. GPU

Google provides the use of free GPU for your Colab notebooks. Select GPU and your notebook would use the free

GPU provided in the cloud during processing. To get the feel of GPU processing, try running the sample application from the MNIST tutorial that you cloned earlier.[4]

II. Description of Libraries used

1. Numpy

   NumPy is a Python library used for working with arrays. It also has functions for working in the domain of linear algebra, fourier transform, and matrices.

2. Pandas
   Pandas is an open source Python package that is most widely used for data science/data analysis and machine learning tasks.

3. Itertools
   Itertools is a module in Python, it is used to iterate over data structures that can be stepped over using a for-loop.

4. Mlxtend
   Mlxtend (machine learning extensions) is a Python library of useful tools for day-to-day data science tasks.

5. Apriori
   Apriori is identifying the frequent individual items in the database and extending them to larger and larger item sets as long as those item sets appear sufficiently often in the database.

6. Matplotlib
   Matplotlib is a comprehensive library for creating static, animated, and interactive visualizations in Python.

7. Seaborn
   Seaborn is a library in Python predominantly used for making statistical graphics. Seaborn is a data visualization library built on top of matplotlib and closely integrated with pandas data structures in Python.

8. Plotly

The plotly Python library is an interactive, open-source plotting library that supports over 40 unique chart types covering a wide range of statistical, financial, geographic, scientific, and 3-dimensional use-cases.

III. Algorithms used are:

1. Apriori: The Apriori algorithm can be considered the foundational algorithm in basket analysis. It is a sequence of steps to be followed to find the most frequent itemset in the given database.The Apriori algorithm operates on a straightforward premise.[5] When the support value of an item set exceeds a certain threshold, it is considered a frequent item set.Apriori uses a "bottom-up" approach, where frequent subsets are extended one item at a time (a step known as candidate generation), and groups of candidates are tested against the data. The algorithm terminates when no further successful extensions are found.Using breadth-first search and a Hash tree structure, Apriori counts candidate itemsets efficiently. It generates candidate itemsets of length k from item sets of length k-1. Then it prunes the candidates which have an infrequent sub-pattern. According to the downward closure lemma, the candidate set contains all frequent k-length item sets. After that, it scans the transaction database to determine frequent item sets among the candidates. Along with market analysis , it is also used in the education field to relate to admitted students through characteristics and specialties . Used for analysis of patient databases and analysis of probability and intensity of forest fire with forest fire data.

2. Eclat: Equivalence Class Clustering and bottom-up Lattice Traversal make up the ECLAT algorithm.Eclat algorithm uses a Depth first search for discovering frequent item sets, whereas Apriori algorithm uses breadth first search. This vertical pattern of Eclat algorithm making it into faster algorithm compared to Apriori algorithm.Generally, Transaction Id sets which are also called as sets are used to calculate the value of Support value of a dataset and also avoiding the generation of subsets which does not exist in the prefix tree.In order to avoid the formation of subsets when the minimal support is obtained, the support value for an item is calculated using this method. Each item-transaction set is compared to every other pair in the function to produce a new candidate. The list of common partners is expanded if this candidate is found to be common. If the frequency set includes a pair of items, the frequent item set also includes its subsets. Obtain the tidlist for each database object. Here, we thoroughly search the database. The list of transactions that contain item “a” is represented by its tidlist. Create a new transaction list whose constituents are transactions in which both item a and item b are involved by intersecting their respective transaction lists.

3.FPGrowth : FP-growth is an improved version of the Apriori Algorithm which is widely used for frequent pattern mining(AKA Association Rule Mining). It is used as an analytical process that finds frequent patterns or associations from data sets. FP growth represents frequent items in frequent pattern trees which can also be called as FP-tree.[6] A frequent pattern is generated where the candidate generation is not needed. FP growth algorithm represents the database in a tree pattern called a frequent pattern tree or FP tree. FP Tree is a tree-like structure which is made with the initial item sets of the database. The purpose of the FP tree is to find out the most frequent pattern where each node of the FP tree represents an item of the itemset.This tree structure will maintain the association or relation between the item sets. The database is separated by using one frequent item. This fragmented or separated part is called a pattern fragment. The item sets of these fragmented patterns are studied. Hence, the search for frequent item sets has decreased comparatively.

IV. Implementation

Various models were trained to check out it's performance and comparison was made between all of them:

I. Data Description
First we need to load some libraries and import our data. We can use the function read.transactions() from the arules package to create a transactions object.

The data set contains 15.010 observations and the following columns.

Date: Categorical variable that tells us the date of the transactions (YYYY-MM-DD format). The column includes dates from 30/10/2016 to 09/04/2017.

Time: Categorical variable that tells us the time of the transactions (HH:MM:SS format).

Transaction: Quantitative variable that allows us to differentiate the transactions. The rows that share the same value in this field belong to the same transaction, that's why the data set has less transactions than observations.[7]
Item: Categorical variable containing the products.

The first 5 rows of the dataset, we have 3 different columns: Member_number is a number that is unique for each customer. Date represents the date of the transaction, and finally itemDescription represents the corresponding product bought for this date.

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 38765 entries, 0 to 38764
Data columns (total 3 columns):
 #   Column           Non-Null Count  Dtype 
---  ------           --------------  ----- 
 0   Member_number    38765 non-null  int64 
 1   Date             38765 non-null  object
 2   itemDescription  38765 non-null  object
dtypes: int64(1), object(2)
memory usage: 908.7+ KB
```

Figure 1: Data Information

II. Data Preparation

The checking of null values forms an important basis of data preprocessing for model to train properly on the dataset.

```
# Checking for the missing values
nan_values = data.isna().sum()
nan_values
```

```
memberID    0
Date        0
itemName    0
dtype: int64
```

Figure 2: Computation of Missing Data

The analysis plan is to answer the questions.
A. What are the most frequently sold items?
B. What are the consequents of the chosen items?
C. How confident do the consequents come after the items?
D. What are the most important items that should always be in the store?
E. What does the item network look like?

According to result above, there is no missing values for all columns.

```
# Converting Date column into correct datatype which is datetim
e
data.Date = pd.to_datetime(data.Date)
data.memberID = data['memberID'].astype('str')
data.info()  # They are in correct datatype now
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 38765 entries, 0 to 38764
Data columns (total 3 columns):
 #   Column    Non-Null Count  Dtype         
---  ------    --------------  -----         
 0   memberID  38765 non-null  object        
 1   Date      38765 non-null  datetime64[ns]
 2   itemName  38765 non-null  object        
dtypes: datetime64[ns](1), object(2)
memory usage: 908.7+ KB
```

Figure 3: Conversion into datetime

III. Exploratory Data Analysis

Firstly, we need to calculate the number of sales weekly.
To calculate the total number of items sold by date, the following code was used.

```
data.groupby(['Date'])['itemDescription'].agg(['count']).plot(figsize=(12,5), grid=True, title="Total Number of Items Sold by Date").set(xlabel="Date", ylabel="Total Number of Items Sold")
```

The output for the following code was:

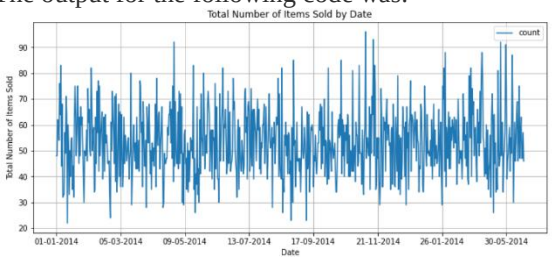

Figure 4: Total Number of Items Sold by Date

As it can be seen in the figure, The maximum sales are observed on 21st November, 2014 and just before 9th May, 2014.

To calculate the number of unique items and average number of items sold, we used the following code and noted the output:

```
total_items = len(d)
total_days = len(np.unique(d.index.date))
total_months = len(np.unique(d.index.month))
average_items = total_items / total_days
unique_items = d.itemDescription.unique().size

print("There are {} ye unique items sold ".format(unique_items))
print("Total {} items sold in {} days throughout {} months".format(total_items, total_days, total_months))
print("With an average of {} items sold daily".format(average_items))
```

```
There are 167 ye unique items sold
Total 38765 items sold in 728 days throughout 12 months
With an average of 53.24862637362637 items sold daily
```

Figure 5: Unique, Average and Total Items sold

We also found out the total number of items sold each month in that year:

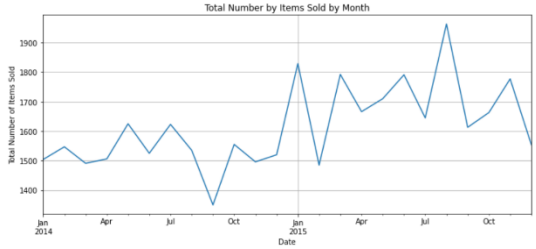

Figure 6: Total Number of Items sold by Date

It is noticed that most number of sales were made during the month of August followed by Jan 2015.

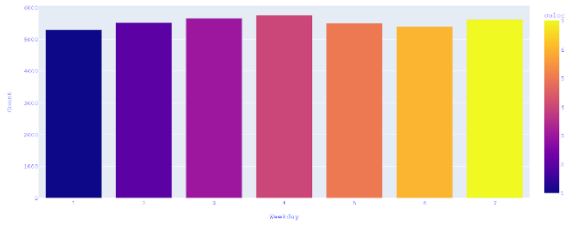

Figure 7: Count of Items sold by weekday

Also, count of weekly sales is made by calculating the number of sales on every day.
Also, for curiosity about the item frequencies, we got the following output:

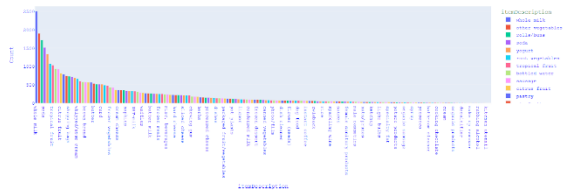

Figure 8: Count of Items

IV. Choice of Model and Model Training

A. Apriori

Apriori is an algorithm for frequent item set mining and association rule learning over relational databases. It proceeds by identifying the frequent individual items in the database and extending them to larger and larger item sets as long as those item sets appear sufficiently often in the database. The frequent item sets determined by Apriori can be used to determine association rules which highlight general trends in the database: this has applications in domains such as market basket analysis.[8]

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
668	(sausage, yogurt)	(whole milk)	0.005748	0.157923	0.001470	0.255814	1.619866	0.000563	1.131541
978	(sausage, rolls/buns)	(whole milk)	0.005347	0.157923	0.001136	0.212500	1.345594	0.000292	1.069304
1079	(soda, sausage)	(whole milk)	0.005948	0.157923	0.001089	0.179775	1.138374	0.000130	1.026642
526	(semi-finished bread)	(whole milk)	0.009490	0.157923	0.001671	0.176056	1.114825	0.000172	1.022008
828	(rolls/buns, yogurt)	(whole milk)	0.007819	0.157923	0.001337	0.170940	1.082428	0.000102	1.015701

Figure 9: Association Table

To construct association rules between elements or items, the algorithm considers 3 important factors which are, support, confidence and lift. Each of these factors is explained as follows:

Support: The support of item I is defined as the ratio between the number of transactions containing the item I by the total number of transactions expressed as:

Support(I)=Number of transactions containing I/Total number of Transactions

Confidence: This is measured by the proportion of transactions with item I1, in which item I2 also appears.[7] The confidence between two items I1 and I2, in a transaction is defined as the total number of transactions containing both items I1 and I2 divided by the total number of transactions containing I1.

Confidence(I1->I2)=Number of Transactions containing I1 and I2/(Total Number of Transactions containing I1)

Lift: Lift is the ratio between the confidence and support expressed as :

Lift(I1->I2)=Confidence(I1->I2)/Support(I2)

B. FP Growth

The FP-Growth Algorithm is an alternative way to find frequent item sets without using candidate generations, thus improving performance. For so much, it uses a divide-and-conquer strategy. The core of this method is the usage of a special data structure named frequent-pattern tree (FP-tree), which retains the item set association information.

This algorithm works as follows:

• First, it compresses the input database creating an FP-tree instance to represent frequent items.

• After this first step, it divides the compressed database into a set of conditional databases, each associated with one frequent pattern.

• Finally, each such database is mined separately.

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• First, it compresses the input database creating an FP-tree instance to represent frequent items.

• After this first step, it divides the compressed database into a set of conditional databases, each associated with one frequent pattern.

• Finally, each such database is mined separately.

The frequent-pattern tree (FP-tree) is a compact data structure that stores quantitative information about frequent patterns in a database. Each transaction is read and then mapped onto a path in the FP-tree. This is done until all transactions have been read. Different transactions with common subsets allow the tree to remain compact because their paths overlap.

A frequent Pattern Tree is made with the initial item sets of the database. The purpose of the FP tree is to mine the most frequent pattern. Each node of the FP tree represents an item of the item set.

C. Eclat Algorithm

The Eclat algorithm stands for Equivalence Class Clustering and bottom-up Lattice Traversal. It is one of the popular methods of Association Rule mining. It is a more efficient and scalable version of the Apriori algorithm. While the Apriori algorithm works in a horizontal sense imitating the Breadth-First Search of a graph, the Eclat algorithm works in a vertical manner just like the Depth-First Search of a graph. This vertical approach of the Eclat algorithm makes it a faster algorithm than the Apriori algorithm.

How the algorithm work?:

The basic idea is to use Transaction Id Sets(tidsets) intersections to compute the support value of a candidate and avoiding the generation of subsets which do not exist in the prefix tree. In the first call of the function, all single items are used along with their tidsets. Then the function is called recursively and in each recursive call, each item-tidset pair is verified and combined with other item-tidset pairs. This process is continued until no candidate item-tidset pairs can be combined.

V. Result and Analysis

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
38	(sausage, yogurt)	(whole milk)	0.005748	0.157923	0.001470	0.255814	1.619866	0.000563	1.131541
43	(rolls/buns, sausage)	(whole milk)	0.005347	0.157923	0.001136	0.212500	1.345694	0.000292	1.069304
50	(sausage, soda)	(whole milk)	0.005948	0.157923	0.001069	0.179775	1.138374	0.000130	1.026642
55	(semi-finished bread)	(whole milk)	0.009490	0.157923	0.001671	0.176056	1.114825	0.000172	1.022008
16	(rolls/buns, yogurt)	(whole milk)	0.007819	0.157923	0.001337	0.170940	1.082428	0.000102	1.015701

Figure 10: Association Rules Analysis

Antecedent and Consequent: The IF component of an association rule is known as the antecedent. The THEN component is known as the consequent. The antecedent and the consequent are disjoint; they have no items in common. As you can see in the figure, different combinations can be witnessed in both the columns.

Confidence: Rules have an associated confidence, which is the conditional probability that the consequent occurs given the occurrence of the antecedent. You can specify the minimum confidence for rules. In Market Basket Analysis, expected confidence is the probability that the second product or group is in the basket regardless of any preconditions. That is to say, expected confidence is the number of purchases that include the second product divided by the total number of transactions. It is the conditional probability of the occurrence in the event. The change that happens in product A has already happened in product B.[10]

Support: In Market Basket analysis, support represents the popularity of an item in all transactions. Support of an item is calculated as the number of transactions involving that item and the total number of transactions. Support of an item = (Number of transactions involving that item)/ (Total number of transactions). The Apriori algorithm is a commonly-applied technique in computational statistics that identifies itemsets that occur with a support greater than a predefined value (frequency) and calculates the confidence of all possible rules based on those itemsets.

Lift: Lift measures the performance of a targeting model (known as an association rule) at predicting a specific outcome, compared with a random choice. Therefore, Lift is the ratio between target response and average response. That is to say that Lift is a ratio between confidence and expected confidence. When the Lift value is below 1 means the combination is not so frequently bought by consumers. But in this case, it shows that the probability of buying both the things together is high when compared to the transaction for the individual items sold.
With this, we come to an overall view of the Market Basket Analysis in Data Mining and how to calculate the sales for combination products.

Leverage: Retailers leverage market basket analysis to identify combinations of goods or menu items that regularly co-occur in transactions to uncover associations between what your customers are buying to create new products and pricing models to generate new revenue streams.

Conviction: Conviction can be interpreted as the ratio of the expected frequency that X occurs without Y (that is to say, the frequency that the rule makes an incorrect prediction) if X and Y were independent divided by the observed frequency of incorrect predictions.

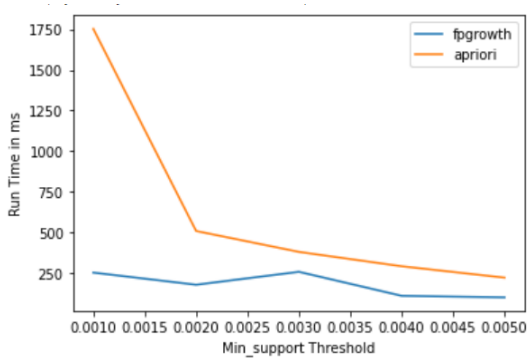

Figure 11: Minimum threshold support of Fpgrowth and Apriori

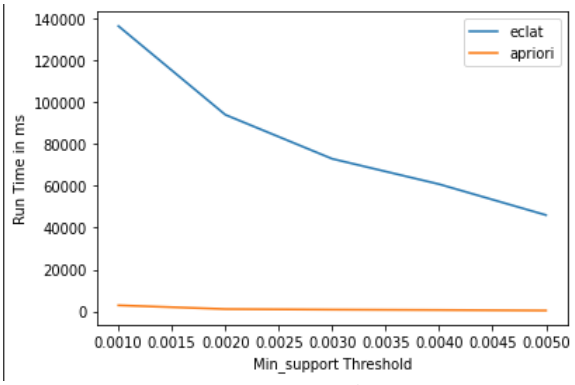

Figure 12: Minimum threshold support of Eclat and Apriori

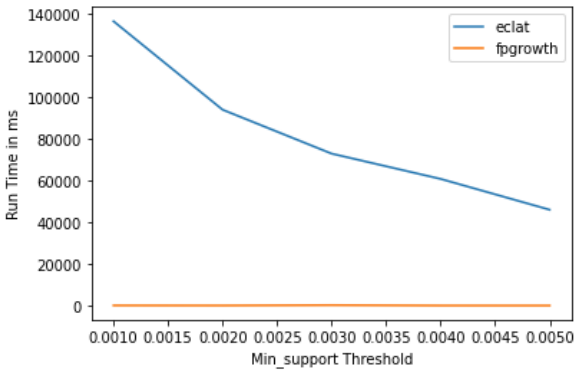

Figure 13: Minimum threshold support of Fpgrowth and Eclat

According to the above charts, fpgrowth is the fastest for huge datasets, while Eclat is incredibly slow.
a. Apriori
1. It is an array based algorithm.
2. It uses Join and Prune techniques.
3. Apriori uses a breadth-first search
4. Apriori utilizes a level-wise approach where it generates patterns containing 1 item, then 2 items, then 3 items, and so on.
5. Candidate generation is extremely slow. Runtime increases exponentially depending on the number of different items.

b. FP Growth

1. It is a tree based algorithm.
2. It constructs a conditional frequent pattern tree and conditional pattern base from a database which satisfies minimum support.
3. FP Growth uses a depth-first search
4. FP Growth utilizes a pattern-growth approach means that, it only considers patterns actually existing in the database.
5. Runtime increases linearly, depending on the number of transactions and items.

c. Eclat

1. The Eclat algorithm stands for Equivalence Class Clustering and bottom-up Lattice Traversal.
2. It is one of the popular methods of Association Rule mining. It is a more efficient and scalable version of the Apriori algorithm.
3. While the Apriori algorithm works in a horizontal sense imitating the Breadth-First Search of a graph, the Eclat algorithm works in a vertical manner just like the Depth-First Search of a graph.
4. This vertical approach of the Eclat algorithm makes it a faster algorithm than the Apriori algorithm.
5. The basic idea is to use Transaction Id Sets(tidsets) intersections to compute the support value of a candidate and avoid the generation of subsets which do not exist in the prefix tree. In the first call of the function, all single items are used along with their tidsets.
6. Then the function is called recursively and in each recursive call, each item-tidset pair is verified and combined with other item-tidset pairs. This process is continued until no candidate item-tidset pairs can be combined.

IV.CONCLUSION

We have seen association rules and the measures of interestingness in making frequent item patterns. We had an overview of the Eclat algorithms and how we can implement the Apriori and FP-growth algorithms using Python in very simple steps.[11] Since these algorithms are the most basic algorithms in the subject of Eclat we look at the comparison between them. As in the classification of the algorithms, we have seen that there can be various algorithms for performing the eclat, so I encourage you to try to learn them. Also, they can be beneficial if the apriori or FP-Growth algorithms are not performing well or the required results are different for these results. Apriori algorithm is an efficient algorithm that scans the database only once.It reduces the size of the item sets in the database considerably, providing good performance. Thus, data mining helps consumers and industries in the decision-making process.

We have learned how to perform Market Basket Analysis in Python and how to interpret the results. If you want to implement them in Python, Mlxtend is a Python library that has the implementation of the Apriori , FP Growth and Eclat algorithms for this sort of application.

In future research it will be very interesting to do an in-depth understanding of the association rules by evaluating the changes in the lift and confidence values, which can be made possible by calculating the standard deviation. This way we will be able to witness the evolution of association rules.

In the future we can also find association rules using time series clustering method.
We had an overview of how we can implement the Apriori and FP-growth algorithm using python in very simple steps. Since these algorithms are the most basic algorithms in the subject of FIM we look at the comparison between them. As in the classification of the algorithms we have seen that there can be various algorithms for performing the FIM, I encourage you to try to learn them. Also, they can be beneficial if Apriori or FP-Growth algorithms are not performing well or the required results are different for these results.

Future work would also be to design and develop an intelligent prediction model to generate the association rules that can be adopted on a recommendation system to make the functionality more operational.

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Cloud Office: A web based office Documentation System for Efficient Collaboration

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Abstract *— As businesses and organizations continue to embrace remote work and distributed teams, the need for efficient and collaborative document management systems has become increasingly important. This paper presents the development and implementation of CloudOffice, a web-based office documentation system that enables teams to collaborate in real-time, access files from anywhere, and streamline their workflow. The system is designed to provide a comprehensive suite of features, including document creation and editing, version control, commenting, and file sharing. CloudOffice was developed using modern web technologies and has been designed to be user-friendly, secure, and scalable. The system was tested by a group of users who provided valuable feedback and suggestions for improvement. The testing results demonstrate that CloudOffice can significantly improve team productivity and efficiency, while also reducing the cost of maintaining traditional office documentation systems. This research paper provides a detailed overview of the development and implementation of CloudOffice and highlights its potential as a valuable tool for modern businesses and organizations.*

Key Words: ***Web-based office documentation system, Collaboration, Distributed Teams, Real-time Collaboration, Workflow Optimization, Version Control, and File sharing.***

I.INTRODUCTION

Organizations are increasingly interested in carefully managing their private information both to ensure that it is properly handled, and also to make it more useful to their daily tasks. Meanwhile, the number and variety of documents make management and usage more challenging. Therefore, how to achieve efficient management of documents becomes an emerging issue in today's information-rich society. The requirement can be further classified into two aspects, which are described as the following. ∞ Support for ubiquitous access: In order to achieve efficient management of documents, the capability for users to have timely access to the latest information anytime, anywhere, and from any device should be taken into careful consideration. In addition, due to the growing diversity of devices, corresponding document access and management mechanisms should be provided without extra learning burdens and complex operations by users. ∞ Support for sharing and collaboration: Due to the globalization and high division of works, sharing and collaboration within organizations are inevitable and increasing (Erickson et al, 2009). Colleagues may participate in one task and share a particular set of documents to support their work. Meanwhile, the documents will evolve as the task proceeds. The control and management of documents should be considered. In this paper, the design of a document management system for a

private cloud environment is introduced. The document management system aims to provide users in an organization with a simple and efficient mechanism to access, manage and share their information. It provides fundamental document manipulations, synchronization, and sharing functionalities, and considers the support of heterogeneous client devices. A case study is also given in this paper to describe the scenarios and the benefits of using the document management system in an academic environment.

II.OVERVIEW OF WEB-BASED OFFICE DOCUMENTATION SYSTEM

A web-based office documentation system is a software application that allows users to create, manage, and collaborate on documents and files from anywhere, as long as they have access to the internet. These systems are designed to facilitate efficient communication, collaboration, and information sharing between team members, especially for remote workers or distributed teams. Web-based office documentation systems typically provide a comprehensive suite of features, including document creation and editing, version control, commenting, file sharing, and security protocols. By providing real-time access to documents and files, team members can work on the same documents simultaneously, reducing the need for emails or file transfers. Version control ensures that the most up-to-date documentation is being worked on, and previous versions can be retrieved if needed.

These systems can be cloud-based or self-hosted, depending on the needs of the organization. Cloud-based systems offer the advantage of accessibility from anywhere, while self-hosted systems offer more control over data storage and security. Web-based office documentation systems have become increasingly important as organizations continue to adopt remote work and distributed teams. The benefits of these systems include improved collaboration, streamlined workflow, and reduced costs. The purpose of this research paper is to present the development and implementation of a web-based office documentation system and to demonstrate its potential as a valuable tool for modern businesses and organizations looking to improve their productivity and efficiency.

MOTIVATION:

Web-based Office - Documentation systems are designed to manage and store project documents i.e. information, used as web-based applications. Different groups of people such as all departments, programmers, or project managers will be let by project applications controlled access to information and automated distribution of information. The objective for collaboration has been: getting things done faster, cheaper, and better by applying their common knowledge, and bringing together a selection of resources and attainments in a project. Valid collaboration with teams improves productivity, speeds up result-making, and optimizes making the right decision, it also helps to intercept precious intellectual fortune and time. To prove such kind of improvement to productivity and to make easier our everyday working life, it was needed from the company to make an inside system for Document Management. Namely, having trouble finding the right files and wasting useful time sending and searching documents, describing and instructing new employers of the whole system and steps that need to be done, before beginning to make changes in projects or code. For consuming necessary time, keeping all troubles less, and to organize all documents into one place, and most importantly, keeping track of projects that are in production for customers or for keeping an eye on errors or mistakes that occur during the work process, then a good web-based documentation system was under consideration. To consider everyday use and needs, the aim was to make an inside system for the company/office. The system is for helping workers (namely programmers, project managers, developers/employees) to deal with some specific project or any process and its errors occurred. The document management system is needed, for helping to organize and keep an eye on the project and its progress. The system is web-based; there are possibilities to add documents and specifications for specific projects/tasks. Documentation can consist of different graphs, database diagrams, graphical diagrams, and text files, which are needed for project development. The most important part is that the system works as a tracking system, a system where comments can be added and bugs and other related questions can be reported for any task at any step.

Advantages of Modern DMS:

Many companies use a Document Management System (DMS) to standardize the way information is stored, making it easier for anyone with correct privileges to find and access the documents they need. A DMS simplifies work processes and helps users perform their tasks more efficiently, while also providing the company with security, data reliability, and work process management.

The features of a DMS offer numerous benefits, such as saving time, simplifying work, protecting the investment made in creating these documents, enforcing quality standards, enabling an audit trail, and ensuring accountability. With a DMS, teams can collaborate more effectively, and workflows can be optimized to improve productivity.

Moreover, the centralized storage of documents and the ability to access them from anywhere makes it easier for remote teams to work together seamlessly. Document

version control ensures that the most current version is being worked on, and previous versions can be retrieved if necessary. A DMS also helps to ensure that the company's documents are stored securely, with access permissions granted to only authorized users.

Overall, the use of a DMS is crucial for companies to manage and maintain their documents in a streamlined and efficient manner while reducing the risks of errors, unauthorized access, and lost productivity.

Electronic Document Management System:

Any company will one day feel a need for some kind of electronic document management system (EDMS) to control its ever-increasing number of various documents and drawings. companies often resist 'this urge' and are deterred by the costs and complexity involved in implementing an EDMS. Using an EDMS effectively, requires a major change in working practices, although most technical aspects are resolved by the adoption of low-cost databases and easier integration with the windows environment. A useful EDMS should not only control documents but also provide access to them throughout the company and even to clients or other participants of the project via the internet or extranet. An EDMS should also centralize data in an easily accessible environment, allowing users to store, access, and modify information easily and fast. Furthermore, the task of managing all the information needed to design and construct any major facility is a real challenge, and many believe that more efficient information management is a primary mechanism for the construction industry to increase its productivity. the standard features of a good system should still include the following functionalities: searching facility, viewing without the use of the original application, red-lining and marking-up feature, printing and plotting, workflows and document life cycles, revision and version control, document security, document relationships, status reporting, issue/distribution management, and remote access. the goal of document management is to share information by making documents secure, accessible, retrievable, and interchangeable. the solution to this situation is electronic document management systems.

Advantages of EDMS:

Many companies use DMS to standardize the way information is for anybody with correct privileges to find and access the document they want. an EDMS helps users to perform their work easier and provides the company with security, data reliability, and work process management. many of these features eventually save time, simplify work, protect the investment made in creating these documents, enforce quality standards, enable an audit trail, and ensure accountability.

EDMS has the following advantages:

1. Generally efficient location and delivery of documentation
2. Ability to manage documents and data regardless of originating system or format
3. The ability to integrate computerized and paper-based systems
4. Control of access, distribution, and modification of documents
5. Provision of document editing and mark-up tools

System Architecture:

To fulfill the requirements of ubiquitous access and efficient sharing of documents within an organization, the document management system is designed based on the architecture of the content management system. As depicted in Figure 1, the architecture can be divided into a document management server and device agents. The document management server is responsible for user management, device management, and document management. On the other hand, the device agent is responsible for communicating with the document management server and maintaining data consistency between the device itself and the server. Major components are introduced in the following sections.

User management module: The user management module is responsible for the management of users of the document management system, which includes user identification, user preference, and user profiles. The concept of group and role is also introduced. Groups can be created and users can participate in the specific group based on task requirements. This facilitates the sharing and collaboration among users. On the other hand, users can be assigned particular roles. It determines the allowed manipulations on documents. ∞ Device management module: The device management module is responsible for the management of devices owned by users. It preserves information about the device name, device type, device status, and other device characteristics. The information can be used as a reference for device-specific functions (e.g., synchronization). ∞ Document management module: The document management module provides three major functionalities for document management tasks, including document manipulation, synchronization, and share. Document manipulation function provides users with the capabilities of manipulating and managing documents, including document creation, update, copy, move, and deletion. In addition to fundamental manipulations, search, versioning, meta-data enriching, and content preview are included in the document manipulation function. The synchronization function cooperates with device agents to maintain data consistency between the document management server and users' devices. The document state of the document management server and the client devices will be compared, and the corresponding synchronization process can be performed. In addition, the synchronization can be configured to different

modes, including full synchronization and on-demand synchronization. Full synchronization means the entire document in the document management server of one user will be synchronized with his/her client devices. On the other hand, in on-demand synchronization mode, users can specify particular documents and devices for synchronization based on their preferences and requirements. The share function is responsible for document sharing among users. It is conducted by selecting personal documents and users who will be shared. The user who shares the document can also decide the permissions to indicate what operations can be performed. Once the share is made, other users will obtain access permission to the shared documents. In addition, the shared document will be synchronized. The sharing scheme provides an efficient approach for users to share documents and can facilitate collaboration among users.

III.BENEFITS AND DRAWBACKS OF WEB-BASED OFFICE DOCUMENTATION SYSTEM

Web-based office documentation systems have many benefits, including improved collaboration, streamlined workflow, and reduced costs. CloudOffice, a web-based office documentation system designed and developed for this research paper, also offers several benefits. One of the main benefits of CloudOffice is its ability to provide real-time collaboration. With the system, team members can work on the same documents simultaneously, reducing the need for email or file transfers. This feature saves time and enhances productivity, especially for remote workers and distributed teams Another benefit of CloudOffice is its document management capabilities. The system allows for document version control, ensuring that the most up-to-date documentation is being worked on, and previous versions can be retrieved if necessary. CloudOffice also provides secure access to documents, with permissions granted to only authorized users. However, there are also drawbacks to web-based office documentation systems. One of the main concerns is the security of the system. As documents are stored in the cloud, there is a risk of unauthorized access, especially if security protocols are not properly implemented. CloudOffice addresses this concern by providing secure access and permissions to authorized users only. Another potential drawback is the reliability of internet connectivity. If internet connectivity is lost, team members may not be able to access documents and collaborate in real time. However, this risk can be mitigated by using backup systems or self-hosted solutions. Additionally, some team members may not be comfortable with the web-based environment and may prefer traditional office documentation systems. However, with proper training and support, most team members can quickly adapt to web-based systems like CloudOffice.

In conclusion, web-based office documentation systems like CloudOffice offer many benefits, including improved collaboration, streamlined workflow, and reduced costs. However, organizations must also be aware of the potential drawbacks, including security concerns and reliance on internet connectivity. Overall, the benefits of web-based office documentation systems outweigh the drawbacks, especially as remote work and distributed teams continue to become more commonplace.

VI. CONCLUSION

This paper provides an overview of web-based office documentation systems, their advantages and disadvantages, and their benefits with drawbacks. In conclusion, the research has shown that web-based office documentation systems offer numerous benefits to organizations of all sizes. These systems have the potential to improve collaboration, streamline workflows, and reduce costs. With the increase in remote work and distributed teams, web-based systems have become increasingly important for organizations to maintain productivity and competitiveness. However, there are also challenges to implementing web-based office documentation systems. Security concerns and reliance on internet connectivity are some of the main challenges that organizations may face. To overcome these challenges, organizations must implement proper security measures and ensure reliable internet connectivity. The research also highlights the importance of proper training and support for team members who are not familiar with web-based office documentation systems. Organizations must provide proper training and support to ensure that all team members are comfortable with the new system. Despite the challenges, the benefits of web-based office documentation systems make them valuable tools for modern organizations. These systems have revolutionized the way organizations manage their documents and collaborate on projects, resulting in improved efficiency and productivity. Overall, the research suggests that web-based office documentation systems are an essential tool for modern organizations. By addressing the challenges and leveraging the opportunities presented by these systems, organizations can achieve significant benefits in terms of collaboration, efficiency, and cost savings.

VII. ACKNOWLEDGMENT

We would like to express our sincere gratitude to all the individuals who have contributed to the successful completion of this research paper on the web-based office documentation system. Firstly, we extend our heartfelt thanks to our project guide and mentor, Dr. Lydia Suganya, whose invaluable guidance, expertise, and support have been crucial in the completion of this work. Their insightful feedback and constructive criticism have helped us to refine

our ideas and concepts. We would also like to acknowledge the support and encouragement of our colleagues and peers, who have provided us with useful feedback and insights throughout the project. Additionally, we are deeply grateful to our family and friends who have provided us with unwavering support and motivation. Finally, we extend our heartfelt appreciation to all the authors, researchers, and experts who have contributed to the development of the web-based office documentation system. Their tireless efforts and dedication have made this technology possible, and we are honored to have had the opportunity to explore and learn from their work.

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Identification of Tumors using Blob Detection

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Abstract—**Blob detection is an algorithm which works on images to capture regions in an image which seem discrepant. This is especially useful for finding irregularities in MRI scans, which can then be provided to CNNs for further processing. This will allow doctors, clinics, etc. to give accurate diagnostics and prevent diseases like cancer from snowballing into bigger problems, and also for early warnings for dementia.**

Keywords—tumors, image processing, medical, cancer, blob detection, MRI

I. INTRODUCTION

The reason people go to doctors regularly is because of the saying, "Prevention is better than a cure". Unfortunately, cancer is one of the things that simply cannot be prevented, since cancer simply doesn't come because of a single cause. There are multiple causes, like radiation, genetics, that could cause cancer. So, the only possible option other than prevention is a cure, but that would only be possible with a correct diagnosis. The reason for this is that when dealing with a benign tumor, it is a lot simpler to deal with and remove, than a malignant tumor, which spreads much faster and isn't relatively docile like benign tumors. [1]

Doctors commonly use MRI scans that show up as high contrast, black and white images of the brain. This is what blob detection algorithms would use to determine if that MRI scan of the brain contains a tumor or not. Below is an example of an MRI scan.

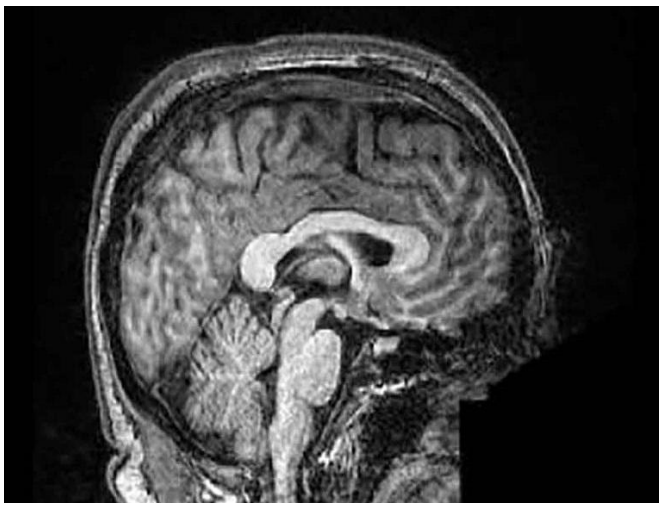

Figure 1: Image of a LHS MRI Scan Source: Open Source Imaging

The reason this is needed is because of early detection and subsequent prevention of cancer, dementia, and other life threatening conditions and diseases. Cancer is the second leading cause of death worldwide, and preventing malignant cancer from spreading to the other parts of the body is of vital importance.MRI scans help in highlighting any deformity or abnormality, which is perfect for blob detection, since that is exactly what blob detection is supposed to do in the first place.

II. LITERATURE SURVEY

We asked people if they felt like image processing, deep learning or machine learning is used to detect blobs in blob detection, and more than half the people replied with all of the above, which is the right answer.

We also asked people if they would prefer to have their scans done manually or by doctors, and a majority of people wouldn't mind having their scans done by AI alone.

Tumors are abnormal growths of cells that can be malignant or benign. Early detection of tumors is crucial for successful treatment, but identifying them can be challenging.

That's where blob detection comes in. Image processing is a set of methods which we use to transform an image and perform operations on it, in order to get information from the image.

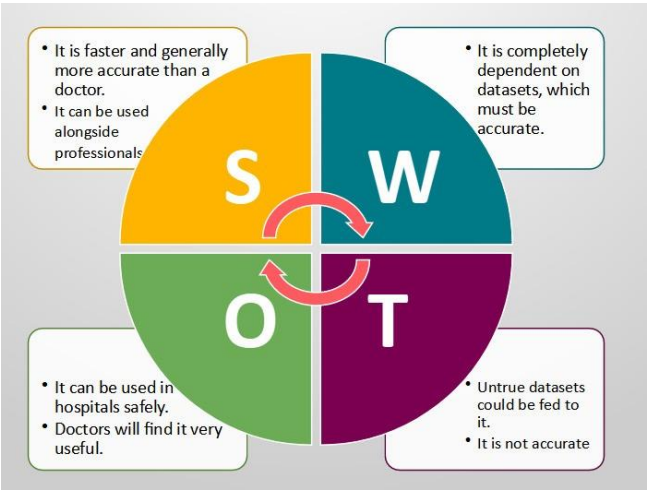

Figure 2: SWOT Model for Research

Source: Self

Blob detection is a computer vision technique that allows for the identification of regions in an image that are distinguishable from their surrounding areas. In medical imaging, this technique can be used to detect tumors by identifying areas of unusual density within the body.

Now that we have the background for this research, the reason we are using blob detection is because it doesn't rely on the integrity of previous data for it to work properly.

This means that this is effectively a plug-n-play algorithm, once you have a program that allows you to process images with this algorithm, then all that is left to be done is for a doctor to review these images to give the optimal diagnosis.

Most tumors may be extremely obvious but some may be extremely tiny, in the developing stages, which may not even be detected by neural networks, but no matter how small a blob is, as long as the resolution isn't low, the algorithm will be able to find the smallest blobs in the image.[2]

We are hoping that doctors and clinics use a blob detection application to act as an assistant in helping to detect any abnormalities in an MRI scan, so that it can be used to help in preventive measures.

The applications for blob detection is usually used to get regions of interest in an image for further processing, like extracting tumors from an image, for further classification if its a malignant tumor, a benign tumor, or dementia, etc.

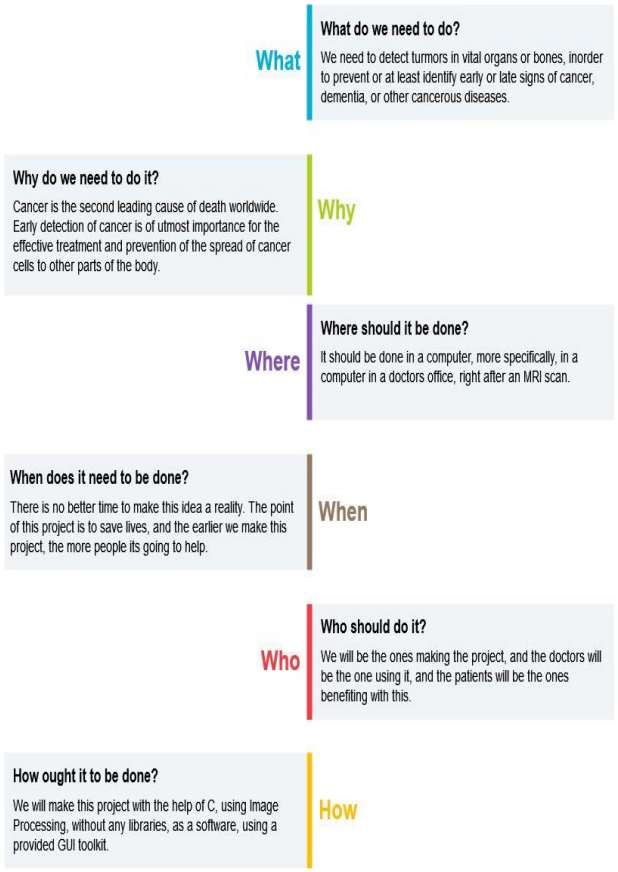

Figure 2: 5W1H Model for Research Source: Self

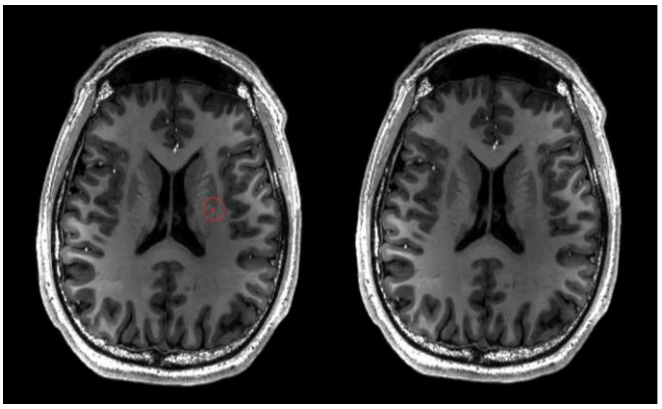

Figure 3: Left: Blob Detection detecting a tiny tumor
Right: Original MRI scan
(For Illustration purposes only, not actual result of program)
Source: Wikipedia (with personal edits)

III. METHODOLOGY

Before doing anything in blob detection, it is necessary for you to do some preprocessing on the image, for everything to be optimal in the algorithm. This will allow for it to have less noise and enhance the contrast of the image. This includes operations like histogram equalizations, to enhance contrast, filtering, for enhancing the image, and so on.

This preprocessed image will be used to identify potential tumors with the help of blob detection, which uses parameters like threshold of intensity, the size of the blobs, to detect the blobs. Since these processed images will most likely be seen by a doctor, having false positives isn't as much of a big problem, since a false positive is a lot better than a false negative. After detecting the blobs, the algorithm still has to highlight these blobs so that the human can see the output clearly.

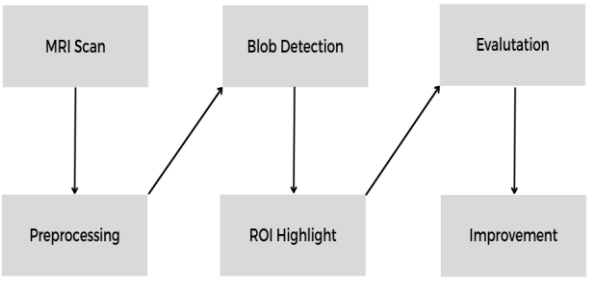

Figure 4: Flow of a blob detection algorithm Source: Self

For highlighting the blobs, we keep the blobs in memory so that we can mark them as a Region of Interest (ROI) . At this stage, a huge amount of false positives, and most of these will be ruled out by a certified doctor or a machine learning algorithm.[3]

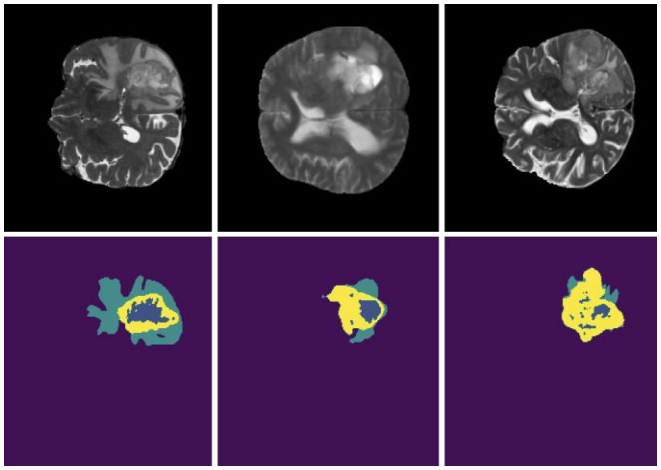

Figure 5: Accelerated Image Processing Using Nvidia DALI Source: Nvidia

In this process, it is important to confirm that the person truly has a tumor or not, for understanding if the algorithm was successful in finding and preventing something extremely serious. When the blob detection algorithm is certain about the existence of a tumor, and after a surgery that fact is proven, the algorithm needs to be enforced so that it knows better about which types of tumors are more likely to be false positives, and which are truly tumors. This will help immensely to improve the algorithm, and its usability in a practical scenario.

IV. PROPOSED WORK

The development of an application capable of blob detection for the detection of tumors or tumor like lesions in an image would be our proposed work. Having an application like this being used by an actual doctor performing MRI scans, for research and experimental purposes for collecting data would help to prove that this is indeed a feasible method of diagnosis. This would prove to be a great assistant for a doctor, and if the MRI scanning is at a high enough resolution, then blob detection would be able to detect tumors that may simply be too small for the human eye to detect, which will prove to be of great assistance to a doctor.

V. RESULT AND CONCLUSION

Of course, the main problem with blob detection is that it needs quite a high resolution on its MRI scans for it to work effectively, but as time passes, equipment at hospitals and clinics only get better. Also, it's very possible for neural networks to replace doctors in analyzing these highlighted blobs in order to diagnose or treat patients that provide their MRI scans.

CNN relies heavily on the reliability of the data, and also brains vary in size and shape, so it usually never looks the same. Secondly, if CNN is relying on brain tumor data, then it can never help with bone tumors or dementia patients, whereas blob detection is suitable for every single one of them.

But in the end, if the data is reliable, then CNN could be considered just as reliable as blob detection, but of course, using both of them at once, that is, feeding the output of the blob detection algorithm to create a CNN dataset that works on similar processed data, then it would be even better.[4]

VI. ACKNOWLEDGMENT

With a deep sense of gratitude we would like to thank all the people who have lit our path with their kind guidance. We are very grateful to all of them, who did their best to help during our project.

We remain indebted to our H.O.D and Principal Dr. B.K. Mishra for their kind permission to complete this research paper. Lastly, we would like to thank our friends and the people who were directly or indirectly related to our project.

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Algorithms for Predicting Employability Potential: Overview

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Abstract- **The demand for skilled professionals in the engineering and technology industries in India has been on the rise, leading to an increase in competition for admission to technical courses and job opportunities. For the same purpose universities and colleges need to identify the employability of the students and the employment potential of different engineering and technical courses to increase the chances of students getting better jobs. This paper aims to investigate different machine learning algorithms and data mining techniques which are used to analyze the educational data available and predict the employment potential of different technical courses. By utilizing these techniques, universities and colleges can better understand the factors that impact employability, and make data-driven decisions about which courses to offer and which skills to prioritize in their curriculum. The findings of this paper will provide valuable insights into the usage of machine learning to predict the employment potential of technical courses, and help universities and colleges make more informed decisions about their curriculum and student support services.**

Keywords: Employability, employment potential, machine learning algorithms, data mining, data-driven decisions

I. INTRODUCTION

In recent years, with the rapid growth of data, prediction classification has become a fundamental tool for various fields of study. It plays a vital role in discovering the underlying patterns in the data and making informed decisions. However, the success of prediction classification is heavily dependent on the quality of the data and the efficiency of the algorithms used. To achieve accurate and efficient prediction classification, it is essential to have clean and relevant data and to use appropriate algorithms that can handle the complexity of the data. In this review paper, we explore some of the most promising algorithms for prediction classification, including the improved Apriori algorithm, Extremely

Randomized Trees (ERT), LightGBM, and Artificial Neural Networks.

II. LITERATURE REVIEW

The literature review comprises papers that provide insights into prediction classification and machine learning techniques in educational data analytics. The review will be presented in a paragraph format, highlighting the research topic, methodology and key findings of each paper.

A recent study, "Prediction of Admissions and Jobs in Technical Courses with Respect to Demographic Location Using Multi-Linear Regression Model" used a predictive model to examine the impact of demographic location on admission and job opportunities in the engineering and technology industries. They proposed a multiple linear regression-based analysis that predicts the number of admission and jobs and using this data the employment potential of technical courses will be determined. Their model predicted using the features college rank, cutoff rank, placement percentage, accreditation and the number of companies visiting, the number of partner companies, quality of placement training, and average salary package for admission and placement respectively. [2]

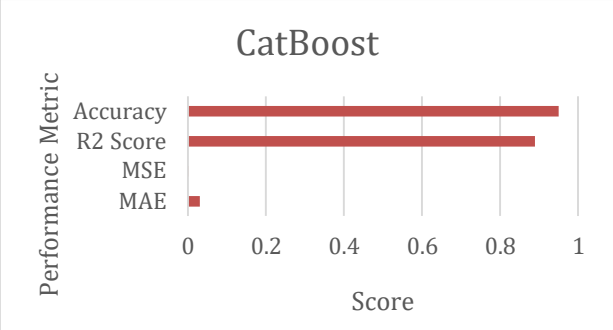
The model proposed by the Sathyabama Institute of Science and Technology Chennai, India uses Machine Learning algorithms such as Linear regression, random forest algorithms, and CatBoost algorithms independently to analyze the graduate student data to predict admission chances in universities worldwide. For the data set, they considered the academics score as well as the scores of the competitive exams were considered as important. Because the admission cutoffs are dynamic and change every year assumptions were made to create a base cutoff for the known universities based on the admission history. [3] Similarly, assumptions based upon the competition in the history the students applied and students got selected the algorithm was provided with a full set of concrete conditions. Through the model, it was concluded that for the same data set the CatBoost algorithm resulted in the highest accuracy in the result. The following table shows the accuracy of the Linear regression algorithm and CatBoost algorithm. [3]

TABLE: 2.2. Linear Regression result

Model	Linear Regression
MAE	0.04
MSE	0.003
R2 Score	0.84
Accuracy	0.93

TABLE: 2.1. CatBoost result

Model	CatBoost
MAE	0.03
MSE	0.001
R2 Score	0.89
Accuracy	0.95



Based on the survey results, [4] CatBoost stands out as a promising machine learning tool for Big Data applications. It is automatic handling of categorical data, along with its superior performance in comparison to other gradient-boosting decision trees (GBDT) algorithms, makes it a suitable choice for many applications. Specifically, it is well-suited for datasets that are heterogeneous and contain categorical features. However, the survey [4] also found that the performance of CatBoost is sensitive to hyper-parameter settings, including the maximum number of iterations, the maximum depth of decision trees, and the maximum number of combinations of categorical features.

A 2006 study under the name “Extremely randomized trees” by Geurts P., Ernst D. & Wehenkel [6] proposes

an algorithm called Extra-Trees that uses a combination of random subspace and totally random cut-point selection to improve the performance of decision tree ensembles. The optimal value of one of the algorithm's main parameters, K, depends on the problem specifics, but default values are near-optimal for most datasets. The algorithm reduces variance and increases bias, and its models are continuous and piecewise multi-linear. Extra-Trees provide near-optimal accuracy and good computational complexity for high-dimensional problems, while totally randomized trees are faster and provide independent tree structures. The authors suggest potential improvements for handling other types of attributes and reducing bias.

"Understanding random forests: From theory to practice." by Louppe, Gilles presented that the theory of random forests involves constructing multiple decision trees by selecting random subsets of the data and features, and combining their predictions to make a final prediction. [7] This can be done using various programming libraries, such as scikit-learn in Python. The scikit-learn library has a Random Forest Classifier class that can be used to create and train a random forest model, as well as make predictions on new data. The hyperparameters, such as the number of trees and the maximum depth of each tree, can be tuned to optimize the model's performance.

The paper "Consistent individualized feature attribution for tree ensembles" by Lundberg, Erion, and Lee presents a novel method for computing feature importance scores in tree ensembles that addresses the shortcomings of existing methods. [8] The authors introduce a new method, called SHAP (SHapley Additive exPlanations), which relies on a game-theoretic approach to compute feature importance scores that are both accurate and consistent across different prediction outcomes. The paper provides extensive experimental results that demonstrate the effectiveness of the SHAP method in a range of applications, including healthcare, finance, and computer vision. The authors also provide an open-source Python library that implements the SHAP method, making it widely accessible to practitioners.

The paper by Chen, Li, and Zhu (2020) presents a comparative study of five gradient boosting frameworks, namely XGBoost, LightGBM, CatBoost, NGBoost, and Sklearn-GBM. [13] The study evaluates these frameworks based on their accuracy, speed, and memory usage for a variety of datasets and learning tasks. The authors found that the newer frameworks, such as LightGBM and CatBoost, generally outperformed the more established frameworks, XGBoost and Sklearn-GBM, in terms of both accuracy and speed. They also found that NGBoost, which is based on probabilistic modeling, is promising for tasks that require uncertainty quantification. Overall, the study provides insights into the strengths and weaknesses of different gradient boosting frameworks and can be used to inform the selection of an appropriate framework for a given task.

In the paper "A Highly Efficient Gradient Boosting Decision Tree", Ke et al. introduced LightGBM, a gradient-boosting framework that uses a novel technique called Gradient-based One-Side Sampling (GOSS) to reduce the number of data instances in the training set. [14] The authors claim that this approach achieves a significant reduction in training time and memory usage compared to other gradient-boosting frameworks, while still maintaining high accuracy. Ke et al. provide experimental results showing that LightGBM outperforms other popular gradient boosting frameworks on several datasets, including the Microsoft Learning to Rank dataset and the Higgs boson dataset.

III. ALGORITHMS

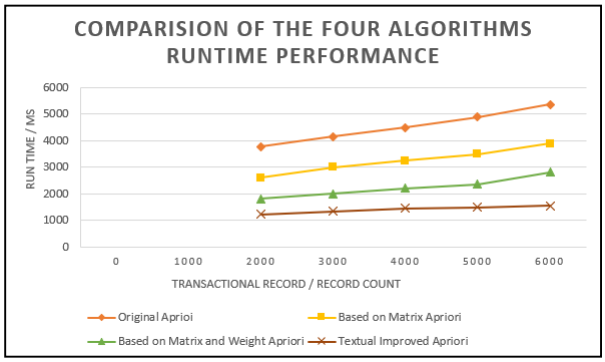
Before working with the algorithm, the main criterion is to have a clean set of data. The values that the data represents must be clear in understanding and look relevant to the data analyzer. The finding process must be so reliable that any relevant data must not be obscure in any way. It is common to use the Knowledge discovery in database (KDD) process to identify valid, novel, useful, and understandable patterns from large and complex datasets.[1] This method consists of sub-process including Data Selection, Data preparation, and transformation, Data Mining, and Evaluation. Following this comes to the process of Test and Training the ascertain data from the mining process.

1. Improved Apriori algorithm based on matrix pruning and weight analysis

The Apriori algorithm's flaws are identified as the repeated scanning of databases leading to excessive consumption of space and time and the dependence on

minimum support, resulting in suboptimal association rules. The proposed algorithm addresses these flaws through matrix pruning and weight analysis. This approach reduces the number of repeated scans and improves the efficiency of data correlation mining, making it a more effective algorithm for association rule mining. Association rules require that all non-empty subsets of frequent item sets must also be frequent, and any non-frequent item set cannot be a subset of frequent item sets. The algorithm works by scanning the transactional database and generating a Boolean transaction matrix. The support counting of each item set is compared to the minimum support count to generate frequent 1-item sets. The weight of each item and transaction is then calculated using formulas, and the support counting of item weight is calculated to gain information about the item in each transaction. The weighted value of candidate k-item sets is then compared to the minimal support to generate frequent k-item sets, which are pruned by intersecting with L'k. The algorithm continues to generate candidate (k+1)-item sets until all frequent item sets are formed. This approach reduces the need for repeated scanning of the transactional database, which improves the efficiency of the algorithm.

Table 3.1 Comparison of the Four Algorithms Runtime Performance [5]



Overall, the improved Apriori algorithm has significant theoretical and practical value for data mining in the era of big data. [5]

2. Extremely Randomized Trees (ERT) using SHAP (SHapley Additive exPlanations) for feature importance

A popular ensemble learning approach for regression and classification is Random Forest. It applies the bagging concept, which involves randomly dividing the training data into a large number of subsets and fitting a decision tree to each subset. By merging the outcomes of various decision trees, the Random Forest approach can generate forecasts that are more accurate and dependable.

Extremely Randomized Trees (ERT) is an extension of the RF algorithm that uses a different method for selecting the splits. ERT selects splitting point at random within a predefined range, rather than searching for the optimal split point based on the impurity measure. The use of random subsamples and random feature selection helps to reduce the variance of the model and prevent overfitting [7]. ERT is also robust against the changing size and noise in the data. The table below compares the performance of ERT with other popular ensemble learning algorithms. The comparison uses iris, wine, glass and yeast dataset.

Table 3.2 Comparison of ERT with other ensemble learning algorithms [6]

Algorithm	**Classification Accuracy**	**Regression RMSE**
ERT	95.9%, 98.1%, 72.4%, 62%	0.041, 0.042, 0.065, 0.174
Random Forest	94.7%, 97.2%, 70.7%, 58.3%	0.049, 0.055, 0.068, 0.197
AdaBoost	95.8%, 97.2%, 69.1%, 50.2%	0.047, 0.064, 0.071, 0.262
Bagging	94.7%, 97.2%, 69.1%, 58.1%	0.052, 0.058, 0.072, 0.198

Direct impurity is a generally used measure of feature importance, however it does not account for the contribution of each feature. SHAP values, in contrast, more accurately reflect human intuition, consistently assign feature importance, and better retrieve influential features. We transform SHAP values in tree ensembles into a workable replacement for previous feature significance methods [8] by introducing the first polynomial time approach for them. The difference between the expected output of the model with the feature included and the predicted output of the model with the feature deleted, averaged over all potential subsets of features, is the SHAP value for a specific feature. In order to account for the interactions between the features, it measures each feature's contribution to the model's prediction.

3. LightGBM

LightGBM is an open-source gradient boosting framework that is designed to efficiently handle datasets and deliver accurate predictions. A histogram-based approach is used by LightGBM to split data and generate decision trees. This makes it efficient when used for computing split points and reduces memory usage [15]. Generally speaking, LightGBM and XGBoost are recognised to be quicker and more effective than one another, especially when working with smaller datasets. The training process is accelerated by LightGBM using a histogram-based method, which can be very helpful when working with datasets that include a limited number of unique feature values. As opposed to LightGBM, XGBoost is a more conventional gradient boosting technique that makes use of pre-sorted sparse data structures and has the potential to be memory-efficient.

Table 3.3 Comparison of XGBoost, LightGBM and CatBoost on various parameters.[9] [10] [11] [12]

Feature	**XGBoost**	**LightGBM**	**CatBoost**
Tree construction	Level-wise	Leaf-wise	Leaf-wise
Histogram Based	No	Yes	Yes
Categorical features	One-hot encoding	Native support	Native support
GPU acceleration	Yes	Yes	Yes
Parallel learning	Yes	Yes	Yes
Multi-class	SoftMax	One-vs-all	Ordered boosting
Missing values	Yes	Yes	Yes
Speed	Medium	Fast	Medium-Fast
Memory Usage	Medium	Low	Medium-Low
Regularization	L1,L2	L1, L2	L1,L2, Random
Embedding Support	No	Yes	Yes

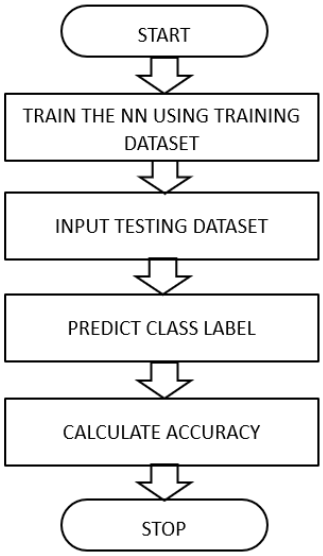
4. Neural Networks

Artificial neural networks (ANNs) are a family of statistical learning models inspired by biological neural networks, and they are used to estimate or approximate functions that can depend on a large number of inputs and are generally unknown. ANNs are presented as systems of interconnected "neurons" that exchange messages with each other. The connections between neurons have numeric weights that can be tuned based on experience, making neural nets adaptive to inputs and capable of learning. Backpropagation is a common method of training artificial neural networks used in conjunction with an optimization method such as gradient descent. The method calculates the gradient of a loss function with respect to all the weights in the network and updates the weights to minimize the loss function. Backpropagation is a supervised learning method that requires a known, desired output for each input value in order to calculate the loss function gradient. The backpropagation learning algorithm can be divided into two phases: propagation and weight update. During propagation, the input is forwarded through the neural network to generate the output activations, and then the output activations are backward propagated through the neural network using the training pattern target to generate the deltas of all output and hidden neurons. During weight update, for each weight-synapse, the output delta and input activation are multiplied to get the gradient of the weight, and a ratio of the gradient is subtracted from the weight.[8]

This process is repeated until the performance of the network is satisfactory. The learning rate, or the ratio of the gradient, influences the speed and quality of learning. A higher learning rate makes the neuron train faster, while a lower learning rate makes the training more accurate. Five steps were considered for the implementations including the- Designing a Neural Network, Creating/Gathering training Data sets; Thermometer Encoding; Training the Neural Network; Testing the Neural Network against Random data [8] For the designing step, A neural network has been designed using Backpropagation algorithm which is a supervised learning algorithm. Backpropagation works by approximating the non-linear relationship between the input and the output by adjusting the weight values internally. [13] The next few steps include finding the appropriate data set and then before feeding to the neural network, the data is then encoded into binary format to

make it easier to work with. Supervised training method is both the inputs and the outputs are provided. The network then processes the inputs and compares its resulting outputs against the desired outputs. Errors are then propagated back through the system, causing the system to adjust the weights which control the network. This process occurs over and over as the weights are continually tweaked. A limiting value is set so that the training stops reaching the limit. A learning rate is initialized which is set to either low (if the dataset is variable and large) or high (if the dataset is small). Once the training part is completed, the network is given random sets of data as input. The network will classify the given input into the appropriate group/class based on how effectively the network is trained. The network will be 80- 90% accurate in classifying the random sets of data. [13]

Fig 3.4. Flowchart for data mining using the Backpropagation method. [8]



IV. CONCLUSION

In conclusion, the use of prediction classification algorithms is crucial for achieving accurate and efficient results when working with big data. The algorithms discussed in this literature review, including the improved Apriori algorithm, ERT, LightGBM, and ANNs, have shown promising results in various benchmarks and applications. However, it is essential to select the appropriate algorithm based on the specific data and problem at hand. With the rapid growth of big data, prediction classification algorithms will continue to play a significant role in various fields, including healthcare, finance, and marketing.

V. ACKNOWLEDGMENT

We would like to express our sincere gratitude to our mentor, Dr. Sheetal Rathi, for her invaluable guidance and motivation throughout the preparation of this paper. Her extensive knowledge and expertise in the field of data mining has been a valuable resource for our team, and we have greatly appreciated her insights and feedback at every step of the process. Her encouragement and support have been instrumental in helping us to bring this project to fruition, and we are deeply grateful for her contributions to our learning and development. We would also like to thank the rest of our colleagues and friends who have provided their support and encouragement throughout this project.

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Automated Cheque Processing System

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Abstract: **Though there have been significant advancement happening in digital technology, the processing of cheques still require significant human intervention. This process is tedious and takes couple of days for actual transfer of money which involves verification by the intermediaries. This leads to high time and costs. In this paper, the methodology and associated technology of an automated cheque processing system is discussed. The processing includes - extracting relevant details on a bank cheque like Payee Name, Amount, Date, Bank Name using Optical Character Recognition and Deep Learning and verifies the signature on the cheque with the existing signature stored in the database using feature extraction and principal component analysis. The signature for a new user is stored using it's hash value for security purposes. The efficiency and performance is measured on the self-generated data set of bank cheques.**

Keywords - ***Optical Character Recognition, Machine Learning, CNN , Deep Learning.***

I. INTRODUCTION

With digital innovations happening across the world in all sectors, it becomes crucial for every industry to automate their processes to attain better performance and efficiency for any model. Banking and financial industry plays a crucial role since large number of transactions occur in the form of bank cheques. A Cheque is one of the most predominant reports of a bank where being duplicated is greatest. Cheques are the excessively delighted non-cash payment method with about 96.8 billion dollars worthy worldwide in 2018. The use of paper checks has been on the decline since the early 2000s, but a large portion of the population still relies on these physical check transactions.

Nowadays, consumers want to clear their checks without waiting for hours or days — which is why they prefer digital transactions because they are more convenient and fast-paced. As a result, financial institutions and banks now use automated banking check clearing systems to fast-track check payments. Automated check processing follows the same working principle as physical check clearing. The only difference is that the process is automated. The withdrawal bank sends a digital copy of the cheque, accompanied by data on the MICR band.

The automated system of processing cheque includes extracting and recognition of handwritten and typed information such as payee name, amount, account number, date, cheque number, signature. The signature is extracted and verified with the original signature of the account holder stored in the database of the drawer bank. If the signature is not matched, the system displays an error message. The primary goal of the system is to develop a accurate model which reads the handwritten texts like name of the payee, date and amount in the cheque with the least possible error and then processes the extracted data and performs transaction in encrypted format which maintains security

II. LITERATURE SURVEY

In the past, systems have been developed to extract hand-written texts using either by traditional CNN[1] or by feature extraction using SVM[2] or by extracting texts using Optical Character Recognition. The accuracy of OCR on handwritten texts is significantly low hence it cannot be used for high end character recognition. The method makes use of Computer Vision to extract texts much efficiently compared to

either simply using any of the above mentioned techniques. Also, there have been no implementation in automating the entire process of cheque clearance till date which performs extraction of data elements as well as does transaction in back-end. The system assumes certain bank templates and accordingly matches credentials of corresponding banks and then does transaction using encrypted algorithm SHA-256[3].

In this paper[4] a method for signature verification, which is based on Perception and Probability. It means first the system roughly determines to which class a signature belongs to and then it finally decides whether the signature can be accepted or not. Perception presents the class, which a signature "possibly" belongs and the pattern classification based on state transition determines if at all it belongs to that class. Beside it defines an accurate closeness function. They have proposed such a system where it combine the spatial features of sum graph and HMM and classify them separately by a PNN Knowledge based classifier. In this paper [5], cheque is a payment instrument that requires high-cost processing in banks because it involves significant manual works. The usage of cheque still exists as an important non- cash payment instrument, even though Bank Negara Malaysia has imposed a new processing fee of RM0.50 per cheque since 2015. In this paper, they have proposed a digit recognizer where manual input of payee's account number and cheque amount by the customer will be ceased to simplify the manual process at the cheque deposit machine. In the proposed method [6] verifies a cheque by identifying and examining the account holder's signature. The signature extraction goes through image acquisition, gray scale image translation, binary image extraction, which is localized, segmented. The implementation involves the image extraction and extracted image is divided into characters are going to be localized. The localized data is compared with the collected database which is already collected from the given database. This method is implemented using offline mode, thereby allowing portability. This paper gives effective sign algorithm and also provides a security by manual checking In the proposed system[7] they can detect handwritten digits from scanned input image by using neural network technique is presented. This methodology of recognition of hand writing is effective and fast compared to earlier molded image pixel comparison methodology, which is comparatively very slow. In the initial phase, hand writing samples are collected from different people and designed a form for handwritten digit input.

I. METHODOLOGY

The following methodology was put forward in a research paper published in JETIR July 2021 (Volume 8, Issue 7 AUTOMATED CHEQUE PROCESSING SYSTEM).

The image acquisition of a bank cheque is crucial for the CTS (Cheque Truncating System). Generally, flatbed scanners are used to acquire such images. Due to orientation and irregularities preseted in the scanned image(s), As the system is unable to use the acquired image(s) directly for the image processing operations therefore it requires some pre-processing step. Image pre-processing Image [preprocessing is a technique used to scan cheque images. As a scanned image obtained from the scanner cannot be directly used thus it is in need of pre-processing, which involves two primary operations, i.e, rotation and removal of unnecessary background information. In first step, scanned image is rotated with respect to the 'Date Box' (is a common feature presented at the same part of every bank cheque) and then removed the background noise and extra information. Efficiency of the parameter identification considerably improves with removal of extra background information. Rotation As the scanned images may vary in terms of orientation therefore the date box which was present in all standard cheque leaflets was used and the relative invariant nature of the position was utilized. In order to perform the rotation of image, It is determined that the point of rotation and degree of rotation. The primary component essential for rotation to work was contour extraction, as it was possible to determine the position values of date box by using it which used as our anchor for any set of operation related to length mapping. Also, in order to perform the rotation, the midpoint of the image was used as the rotation point, and date box was used in order to determine the angle necessary for the rotation. Removing background noise There was lot of extra information in an original image which is to be removed. For the task of removing of background information, the date box is used to present in the standard cheque template.

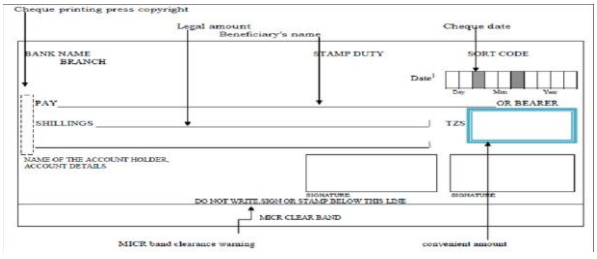

Fig 1. General Cheque layout

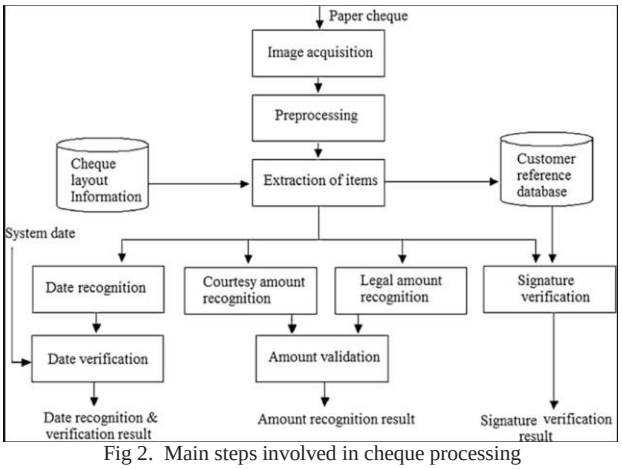

Fig 2. Main steps involved in cheque processing

I. RESULTS AND DISCUSSION

In terms of limitations, we found that there were still some challenges associated with the implementation of automated cheque processing systems. For example, the need for effective security measures to prevent fraud and ensure data privacy, as well as the need for standardization and interoperability between different systems, were identified as key issues. Despite these limitations, the results of our study indicate that automated cheque processing has the potential to play a significant role in modernizing the banking industry and improving the customer experience. Further research is needed to address these limitations and refine the technology to ensure that it can be effectively adopted on a large scale.

Additionally, it is important to note that while the results of our study are promising, further research is necessary to fully understand the long-term impact of automated cheque processing on the banking industry.

For instance, it will be important to monitor the costs and benefits of implementing these systems, and to understand how they may change the role of bank employees. Moreover, it is important to consider the potential social and ethical implications of these systems, such as the impact on employment in the banking sector and the need for measures to ensure that technology is accessible and usable for all customers.

II. CONCLUSION

In conclusion, automated cheque processing is a vital component of modern banking systems that has the potential to significantly improve the efficiency and accuracy of cheque clearing processes. By leveraging technology such as optical character recognition and machine learning algorithms, automated cheque processing systems are able to automate many manual tasks, reduce errors, and provide real-time access to cheque information.

However, despite the many benefits of automated cheque processing, there are still some challenges that must be addressed. For example, there are concerns about the security and accuracy of automated systems, as well as the need for

standardization and interoperability between different systems. Nevertheless, with continued advancements in technology and increasing demand for efficiency and convenience, it is likely that automated cheque processing will continue to grow in importance and become a standard feature of banking systems worldwide.

III. ACKNOWLEDGEMENT

A sincere thanks to our final year project guide Dr. Zahir Aalam for helping us in writing this paper. He graciously explained to us the concepts related to image processing & the little nuances of the automated system.

With the help of many resources compiled together, we have prepared a research paper that defined our potential of understanding automated cheque processing system.

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Real Time Tracking of Students Learning Outcome and their Academic Progress across Schools

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Abstract: **In the modern age of education, the focus is shifting towards the outcomes and the quality of education that the students receive. To meet this demand, we can develop a software system that tracks the real-time progress of students' learning outcomes. This system enables teachers to monitor and assess the students' performance in a more efficient and effective manner.The software system utilizes various data sources, such as assessments, quizzes, and assignments, to capture the students' learning outcomes. It provides real-time feedback to the teachers and the students about the progress being made towards achieving the learning objectives. This system also allows for data analysis and reporting, which can help teachers identify gaps in the learning outcomes and design more effective teaching strategies.The software system will be designed to be user-friendly and customizable, enabling teachers to adjust it according to their specific teaching methods and learning outcomes. The system is also secure, with different levels of access available to ensure the confidentiality of student data.The software system will be a valuable asset for educational institutions that want to provide a quality education to their students. The ability to track the progress of students' learning outcomes in real-time will enable teachers to be more proactive in their teaching, leading to better learning outcomes for students.**

I. INTRODUCTION:

In recent years, education has undergone significant changes with the introduction of new technologies. These technological advancements have made it easier for teachers to deliver instruction and for students to learn. However, there is still a significant gap in the way that learning outcomes are monitored and assessed. Traditional methods of assessment are often limited, and do not provide real-time feedback to teachers and students.

To address this challenge, we have developed a software system that tracks the real-time progress of students' learning outcomes. The system provides teachers with a comprehensive tool to monitor and assess their students' progress towards achieving learning objectives. This software system is designed to work with various data sources, such as assessments,

quizzes, and assignments, to capture student performance in real-time.

The purpose of this paper is to describe the development and implementation of the software system, as well as its technical features and capabilities. The paper will provide an overview of the system architecture, the data sources used, and the algorithms that enable the real-time tracking of learning outcomes. It will also highlight the system's user interface, reporting capabilities, and security measures.

The software system is a valuable asset to educational institutions that seek to improve the quality of education that they offer. The system enables teachers to be more proactive in their teaching, identify gaps in learning outcomes, and design more effective teaching strategies. Furthermore, the system provides students with real-time feedback on their performance, allowing them to track their progress and take ownership of their learning.

In the following sections of this paper, we will provide a detailed description of the software system, its technical features, and its benefits to educational institutions.

II. LITERATURE SURVEY:

In this section we will provide some literature survey of some pre-existing softwares that is used for real time tracking of students' learning outcomes.

One such pre-existing software is Blackboard Learn. Blackboard Learn is a Learning Management System (LMS) that provides educators with the tools to deliver instructional content, engage students in discussions, and assess student performance. The system features a Grade Center, which allows teachers to create assignments, quizzes, and exams, and track students' progress in real-time.

Another example is Brightspace. Brightspace is an LMS that offers features such as online assessment, communication tools, and data analytics. The system enables teachers to track students' progress towards learning outcomes and identify areas where additional support is needed.

Canvas is another popular LMS that provides real-time tracking of students' learning outcomes. The system features a gradebook, which allows teachers to record and track student performance, and provides detailed reports on student progress. Canvas also offers communication tools to enable teachers to engage with their students and facilitate learning.

Moodle is an open-source LMS that also provides real- time tracking of students' learning outcomes. The system features a gradebook, which allows teachers to assess student performance, and provides feedback to students on their progress. Moodle also offers a range of assessment tools, such as quizzes and assignments, to measure student understanding of course material.

In conclusion, there are a variety of pre-existing software solutions that enable real-time tracking of students' learning outcomes. These Learning Management Systems offer a range of features and capabilities, including gradebooks, assessment tools, communication tools, and data analytics. The use of such systems enables teachers to monitor and assess student progress in real-time, and identify areas where additional support is needed to improve learning outcomes.

Advantages of such software: There are several advantages to using a software system that tracks the real-time progress of students' learning outcomes:

1. Improved student engagement: When students can see their progress in real-time, they are more likely to stay motivated and engaged in their learning. The software system provides them with immediate feedback.

2. Enhanced teacher efficiency: The software system allows teachers to track student progress more efficiently and effectively, reducing the amount of time they need to spend on manual grading and record-keeping. This, in turn, enables teachers to spend more time on teaching and instructional planning.

3. Personalized learning: Real-time tracking of student progress allows teachers to identify individual student needs and provide targeted interventions to support learning.

4. Data-driven decision making: The software system collects and analyzes data on student performance, allowing for data-driven decision-making in instructional planning. This can help teachers identify areas where more support is needed, and adjust their teaching strategies accordingly.

III. METHODOLOGY

A) Student Module

The authentication module allows the user to login or register so that they can make use of the features provided by the quiz application. The user can access their semester's attendance and their marks after they Sign In into their account. The users are asked to register with username, email, phone number and their designation. The email of the user should be the college email-Id. These data are verified by firebase authentication. After verification firebase provides a unique user-ID called u-id. U-id along with other user data is stored in the Cloud Firestore. The stored data can be fetched and sent to dashboard during login process. The data can be viewed in the data visualization.

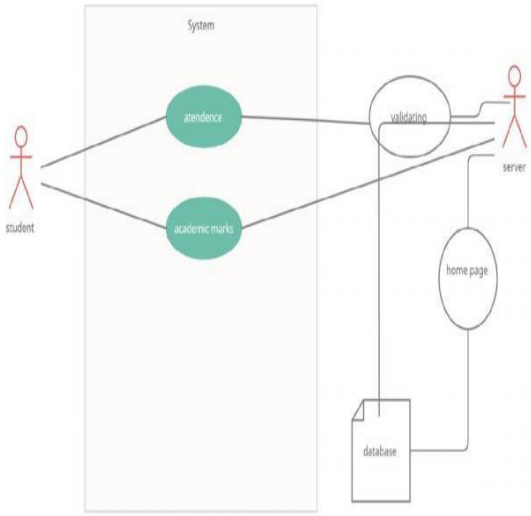

Fig 3.2 Usecase diagram for student module

B) Coordinate Module

The coordinators are asked to register with username, email, phone number and their designation. These data are verified by firebase authentication.

After verification firebase provides a unique user-ID called u-id. U-id along with other user data is stored in the Cloud Firestore. The stored data can be fetched and sent to dashboard during login process. There are three roles for the user which are user, coordinator and admin. The coordinator can update the data and modify the data to student, but they can't change the attendance of the Student.

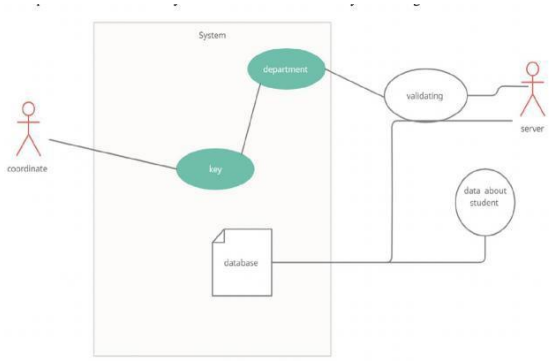

Fig 3.3 Usecase diagram for coordinate module

C. *Admin Module*

The admin can add the data and delete the user according to the requirement, admin is responsible for data of student. The authentication module allows the user to login or register so that they can make use of the features provided by the quiz application. The users are asked to register with username, email, phone number and their designation. These data are verified by firebase authentication. After verification firebase provides a unique user-ID called u-id. U-id along with other user data is stored in the Cloud Firestore. The stored data can be fetched and sent to dashboard during login process.

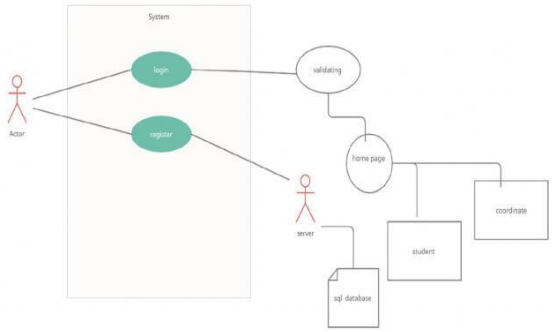

Fig 3.4 Usecase diagram for admin module

The stack that can be used is MERN stack since it can will not be much of data and a limited amount of users.So Nodejs at the backend and reactJs at the frontend will be more faster and secure.However, one can also use Firebase at the backend to make the process easier and faster.But however Nodejs & MongoDb will be the best suited option to go with since there will be more customization to the features and faster and comparatively more users can access the websites.

IV. RESULT AND DISCUSSION

The authentication module of a quiz application allows users to login or register using their college email and other personal information verified by Firebase. Upon verification, users receive a unique user ID (u-id) which is stored in the Cloud Fire store along with their other data. There are three roles: user, coordinator, and admin, with the admin responsible for managing student data. Users can access their attendance and marks upon logging in, and the admin can add or delete users as needed. The stored data can be viewed in a dashboard and used for data visualization

By verifying user information and storing it securely, the application can ensure that only authorized users can access sensitive data, while providing administrators with the necessary tools to manage user accounts and data. In addition to its security and management functions, the authentication module also provides a seamless user experience by allowing users to easily access their data and the application's features. By streamlining the login and registration processes, users can quickly get started with the quiz application and focus on their academic performance, while coordinators and administrators can efficiently manage student data.

V. CONCLUSION

In conclusion, the authentication module is a crucial aspect of a quiz application that enables secure login and registration for users, while allowing them to access their attendance and marks. By storing user data in the Cloud Fire store and verifying it through Firebase authentication, the module ensures that only authorized users can access sensitive data.

Additionally, the module supports multiple roles for users, coordinators, and administrators, providing efficient data management and allowing administrators to manage user accounts and data. Overall, the authentication module is a vital component of a modern quiz application that prioritizes security and user experience Overall, implementing a software system that tracks the real-time progress of students' learning outcomes can bring about significant benefits for both teachers and students. It not only enhances the efficiency of teachers, but also helps students stay motivated and engaged in their learning. With the ability to personalize learning and make data-driven decisions, this system can support academic success and promote continuous improvement in the education process. As such, it is a valuable tool for improving student learning outcomes and helping them reach their full potential

VI. ACKNOWLEDGEMENT

A sincere thanks to our final year project guide MS. Veena Kulkarni for helping us in writing this paper. She graciously explained to us the concepts related to ERP and academic management system website & gave us the insight to it so we could create a seamless user interface.

With the help of many resources compiled together, we have prepared a research paper that defined our potential of understanding real time tracking of students learning outcome and their academic progress across school

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Access Control For Digital Content Using Steganograph

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Abstract: **Access Control for Digital Content Using Steganography is a method for securing digital content by embedding access control information within the content using steganography techniques. This approach allows content owners to control who can access and use their digital content, without relying on external systems or technologies. The abstract of this paper describes the proposed method and highlights its potential benefits for content security and access control. It is a novel approach that employs steganography to embed access control information into digital content to protect it from unauthorized access. This technique is aimed at addressing the security challenges that arise when using traditional access control methods that depend on external technologies or systems. This provides a brief overview of the proposed method, emphasizing its ability to provide content owners with a more secure and efficient way to control access to their digital content. The potential benefits of this approach for content security and access control are also highlighted. This approach offers several benefits over traditional access control methods, including increased security, reduced reliance on external systems or technologies, and improved flexibility. The main point is that the creators don't need to send their works to the content users. They only send keys to extract the digital works out of the image data that the users have downloaded from the creator's home page**

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*Keywords**: Steganography, LSB, BMP, Stego, Content-embedding, BPCS, Secure Access Control Mechanism***

I. INTRODUCTION:

Digital contents are created by photographers, graphic designers, illustrators, animation cartoonists, musicians, movie producers, and more. Moreover, we can say that novelists, poets, news reporters, engineers, researchers and professors are all digital content creators because they create some type of digital content by using computers. The created contents are in some cases printed out on a paper surface to make a newspaper or a book, in other cases they are put into CD disks to make music albums. Also, they are often broadcast on TV either in a free or charged manner. These are traditional styles of content distribution.

In the Internet age today and tomorrow, everyone can be a content creator because everyone can produce some types of digital content by computers. But still there are professional content-creators. Most of the professional- created contents will be distributed in a traditional manner. Some other professional-created and many non- professional-created contents may be directly transferred from the creator to the content-user (e.g., from a novel author to a reader) over the Internet. In this case, the creator must first publicize the information about the content. A creator will do this by uploading such information onto his "home page." However, he cannot upload the content data there, because if once uploaded, everyone can download it free. But, it is not the situation the content creator wants to be in. He wants to have some new Internet distribution method that implements a safe uploading and downloading. The most important point is, the creator wants to exclusively control the content distribution by himself. There is no such system available as of today.

The difference between the traditional and a new content distribution control, i.e., content access control, is the following. In a traditional method, controls are set equal for everyone. For example, if someone wants to buy a digital poster from a shop, the price is the same for

everyone. The copyright terms are the same. The license expiration term, if ever, will be the same. All the controls are beyond the reach of the content creator, and he cannot respond to the users' requests one by one in a flexible manner. The new method that we are proposing is very different. A creator needs two types of data. One is the content data itself; the other is the information data that informs the public what types of contents are where. We call the latter data "introduction-data" of the content. The introduction-data should be placed on the Internet, but the content data should not be there in a visible manner. The two type of data are different in the role, but they must be associated with each other. The important point is that the content creator is the only person who can control access to the digital contents he created. Of course he must have his own home page from where he can distribute his contents to the public.

Access control is a crucial aspect of digital content security, allowing content owners to restrict access to their content to authorized users only. Traditional access control methods, such as digital rights management (DRM), rely on external systems or technologies to enforce access restrictions, which can be costly and complex to implement. This paper proposes a new approach to access control for digital content using steganography, a technique that involves hiding information within the content itself. The proposed method uses steganography to embed access control information within the digital content, making it difficult for unauthorized users to detect and circumvent the access controls. The method also uses encryption to protect the embedded access control information, ensuring that it cannot be easily compromised. This approach has several potential benefits over traditional access control methods, including increased security, reduced complexity, and improved flexibility. The paper presents the proposed method in detail, including its implementation and evaluation, demonstrating its effectiveness in protecting digital content from unauthorized access.

1.1 Digital contents embedded in the Home Page images

Steganography is often quoted as "art and science of ……." in several contexts. This implies that steganography is not an ordinary information technology, but is a sophisticated and scientifically sound technology. In the category of information technology, it is a part of "information hiding" belonging to data security category in the information security technology. Fig. 1 illustrates the hierarchy.

Fig. 1 Steganography and related IT technologies

Steganography refers to the process of hiding some secret information in some inconspicuous vessel data by embedding. An example of secret information is a "diplomatic correspondence record of a government." A typical vessel data is a color image taken by a digital camera. "Embedding" in this context is to swap a part of the vessel data with the secret information data.

The merits of this content distribution scheme are as follows.

A. Content creators need not send their digital works to users.
B. Creators can control the whole process of the distribution. In other words, creators can make an exclusive access control of his digital works.
C. Creators are freed from negotiating with publishers, record companies, and all the middlemen in the distribution process.
D. A content-user can order any special combination of the works, in other words, the creator can be flexible to the user's request.
E. No delivering costs are coming to both creators and users.

As the new distribution method is based on a steganographic information embedding scheme, we will briefly review "steganography" in the following section

I. METHODOLOGY:

The methodology for access control of digital content using steganography typically involves the following steps:

1. Identify the sensitive information to be protected and the non-sensitive data to be used for hiding it.
2. Choose a steganography algorithm that is appropriate for the type of digital content being protected, such as text, image, audio or video.
3. Apply the steganography algorithm to embed the sensitive information into the non-sensitive data. The embedding process should be done in a way that minimizes the impact on the quality and functionality of the non-sensitive data.
4. Distribute the steganographically protected digital

content to authorized users or systems.

1. Implement other access control measures, such as encryption and authentication, to ensure that only authorized users or systems can access the sensitive information.

LSB:

Palette based images, such as GIF images, are popular image file format commonly used on the Internet. GIF images are indexed images where the colours used in the image are stored in a palette or a colour lookup table. GIF images can also be used for LSB steganography [5], although extra care should be taken. The main issue with the palette-based approach is that if one changes the least significant bit of a pixel, it could result in an entirely different colour since the index to the colour palette gets modified. One possible solution to this problem is to sort the palette so that the colour differences between consecutive colours are minimized. The strong and weak points regarding embedding information in GIF images using LSB is that since GIF images only had a bit depth of 8, the total amount of information that could be embedded will be less. GIF images are vulnerable to statistical as well as visual attacks, since the palette processing which has to be done on the GIF image leaves a clear signature on the image. This approach was dependent on the file format as well as the image itself, since a wrong choice of image could results in the message being visible.

Embedding and extracting program

A content creator needs an embedding program and a content user needs an extracting program. Two programs cannot be independent from each other. Rather, they must coordinate each other. These programs will be provided by a software developer. The embedding program will be priced, while the extracting program may be free. The high-speed embedding and extracting operation is the key requirement. Some other requirements are the following.

Information embedding component

Content-embedding is executed by the Information Embedding component. The acceptable file types for the vessel image are BMP, PNG, and JPG. They must be in a RGB color format. The image size must be equal to or larger than 128 X 128 and less than or equal to 3,200 X 3,200 pixels. For BMP and PNG images the BPCS- embedding method is used, and for JPG images the F5 algorithm is used. The embedding data must be a folder-structure having several files and folders. One special case is having an “index.html” file right under the topmost folder. In this case the extracting program operates in a special manner. “Global Access Key” is the key to access (i.e., extract) the topmost folder. The “complexity threshold value” is a very important parameter in BPCS. It balances the embedding capacity and the image quality .

The output image format, i.e., the stego image format, is selected from among BMP, PNG, and JPG files. The BMP and PNG embedding schemes are exactly the same. The only difference is that a BMP stego file is not compressed after embedding, while a PNG stego file is the compressed version of the BMP output in a lossless manner. Therefore, the BMP and PNG embedding capacities are the same, and are calculable before embedding if the complexity-threshold value is provided. The threshold value can be set at any value ranging from 0 to 55. However, the default complexity threshold was set to 40. In the JPG case the embedding capacity is not calculable before embedding. In most JPG embedding the capacity falls to around 10% of the vessel image.

Information extracting component

The information extracting component extracts the embedded data, i.e., files and folders, out of the given stego image in BMP, PNG, and JPG file formats.

The Global Access Key must be given in the same way as it was given for embedding. A Folder Access Key File (see Sec. 5.3) is a set of Folder Access Keys provided by the content creator. It makes “selective folder extraction” possible. It must be input to the system to start the extracting operation. The complexity threshold value must be given in exactly same way as it was given for embedding. The extraction mode is either “As it is” or “Link to Web.” As-it-is mode extracts the embedded data just as it was when embedded. Link-to-Web mode operates differently. In this mode, if the program finds an “index.html” file right under the top-folder, then after extracting, the program will start running that index.html file instantly. This operation can lead the system user (someone who runs the extracting program) to the WWW world directly without starting a Web browser manually. This operation can seamlessly link the content users to a special content location that is owned by the content creator, or by someone who embedded the content.

II. LITERATURE REVIEW:

Several research studies have been conducted on the use of steganography for access control of digital content. Here are a few examples:

1.1. "Digital Image Steganography for Access Control of Sensitive Information" by P. Dhiman and A. K. Sharma (International Journal of Computer Applications, 2014) - This study proposed a steganography-based access control method for digital images that hides the sensitive information in the least significant bit plane of the image. The method was found to be effective in concealing sensitive information while maintaining the visual quality of the image.

1.2. "A Secure Access Control Mechanism for Multimedia Content Based on Steganography" by S. Choudhary and V. Bhatnagar (International Journal of Computer Science and Network Security, 2018) - This study proposed a steganography-based access control mechanism

for multimedia content that uses the LSB substitution method. The method was found to be effective in protecting sensitive information in multimedia content while preserving its quality.

1.3. "A Novel Access Control Scheme for Digital Images using Visual Cryptography and Steganography" by S. Agrawal and S. S. Sakhare (International Journal of Computer Applications, 2016) - This study proposed a hybrid access control scheme that combines visual cryptography and steganography to protect digital images. The method was found to be effective in providing secure access control of images while maintaining their visual quality.

These studies and others suggest that steganography can be an effective method for access control of digital content, particularly for multimedia content. However, the choice of steganography method and its implementation should be carefully considered to ensure that it provides the required level of security and does not compromise the quality or functionality of the content.

III. CONCLUSION:

Digital content creators will get more secure for their data, without the permission of the owner no data can be easily passed. Access control privacy and secret message can be passed to other user without exposing that data to third person and privacy can be maintained. Steganography is an intriguing and successful method of data hiding that has been utilized for centuries. Such cunning strategies can be exposed using certain techniques, but acknowledging their existence is the first step. This type of data hiding is also used for many legitimate reasons, such as secured storage techniques. In either case, the technology is both straight forward to use and scarce. The further you may proceed in the game, the more you will understand about its features and functionalities.

Steganography can be an effective method for access control of digital content by hiding sensitive information within non-sensitive data. It can be used to prevent unauthorized access to digital content by making it difficult to detect the presence of sensitive information.

Furthermore, the use of steganography for access control raises ethical concerns, as it may be used to conceal illegal activities or infringe on privacy rights. Therefore, its use should be carefully considered and implemented in compliance with applicable laws and ethical standards.

IV. FUTURE SCOPE

Access control for digital content using steganography has significant future scope, as it is a highly effective and secure way to protect the distribution of digital content. Here are some potential future developments in this field:

Steganography with artificial intelligence (AI): AI can be used to improve the performance of steganography techniques, making it more difficult for unauthorized users to detect the hidden information. AI can also be used to create more sophisticated steganography algorithms that can embed larger amounts of data within cover media.

Quantum steganography: With the advent of quantum computing, quantum steganography techniques can be developed that use the principles of quantum mechanics to hide data within cover media. This would provide an even higher level of security for digital content distribution.

Steganography for real-time communication: Steganography techniques can be developed that can embed data within real-time communication channels, such as video conferencing or voice-over IP. This would provide a new level of security for real-time communication, which is currently vulnerable to interception and eavesdropping.

Blockchain-based steganography: Steganography can be used in combination with blockchain technology to create a highly secure and tamper-proof way to distribute digital content. The use of blockchain technology can also provide a secure and transparent record of the distribution of digital content.

Overall, the future of access control for digital content using steganography is promising, with many potential developments that could enhance the security and effectiveness of this technology.

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Intelligent AI Based Women Safety Device

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Abstract — **In the current scenario women safety as being a major problem for both urban and rural areas. There are very few impeccable systems that ensure the safety of women. In this project, we have given a better methodology for the safety of women by using IOT & AI&ML. Major components used are ARDUINO - NANO, GSM, GPS, AI CAMERA, AI-VIRTUAL ASSISTANT. In an emergency, a person can just say the code word (chosen by him/her) or just press a button on the model or by pressing an emergency button in App by this, the system will get active and nearest police station & family members would be updated about the current status of person. This system works manually as well as by voice command. The integration of all these elements collectively offers this device to be more secure and easy to navigate.**

Keywords— *IoT device, AI-Virtual Assistant, Arduino-NANO, GSM, GPS, Voice controller, Women safety device.*

I. INTRODUCTION

Cases of molestations & criminal attack have increased these days. We surely are developing but on the other hand some people are just stagnant at their level of imagination. For them some people around are just a mere source of satisfaction or entertainment which increases the insecurities and marks the doubt on the system of safety. According to NCRB (national crime record bureau), In the year 2019, 32033 cases were registered which means 88 cases and daily and every one case in 12-15 min, slightly lower than the year 2018, where 91 cases daily were registered. These numbers are exorbitant and hence the biggest unanswered question is "Are women and kids safe nowadays?" being a part of society it's our responsibility to think about it.

In the year 2010, the NIRBHAYA CASE, where a woman along with her friend was traveling in a private bus. There were six others on the bus including the driver, culprits who molestated her. Eleven days after the assault she was transferred to a hospital in Singapore for emergency treatment but died two days later.

26-year-old veterinary doctor, in the year 2019 was the victim of molestation, and after the incident, the culprits killed her by burning her alive. After the investigation, four suspects were arrested but this investigation took much more time to get her justice.

The following chart represents the current scenarios in the Crime on Women. According to data, in 30.9% of the cases, the culprits are known members and they harass women for dowry or any misleading lifestyle, etc. In 21.8% of the cases, such incidents happen just to harm the reputation or modesty of the women. In 17.9% of the cases, women are kidnapped or abducted for money on any rivalries, etc.

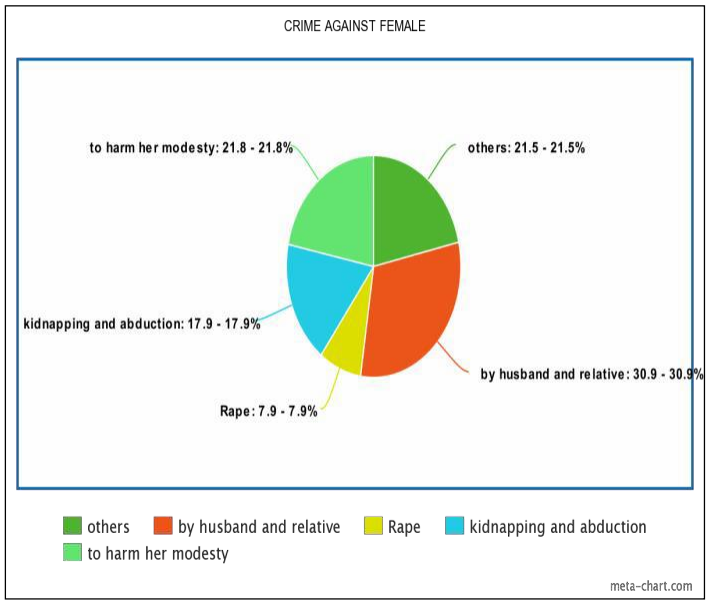


Fig 1: "Misconduct Event by society"

In this modern era people are learning and are respecting all the genders equally, still in some parts they are unable to fight for their rights. Still people of a denting mentality exist. We designed something which can fill the gap and complete the dream of a safe society. In the past few years, several unwanted incidents were reported and unfortunately this numbers are increasing, so the device to protect themselves should be portable and easy to use (communication & functioning) So to safeguard people we need to use the technology, IoT has made easy to communicate over the internet, the devices and system connected to this can transfer and receive information and improves the performance. The device is specially designed for the people who get distressed in such a situation. This system will get family members & police to track, locate, communicate, and record the incident and to help them, to guide them to a safehouse (nearby hospital, police station, mall, etc.

II. EXISTING TECHNOLOGY

In past years many researchers have worked on women safety like:

- Author of the paper [1] has designed an App for sending SMS and calling functions when the user presses the emergency button.

In the paper [2] the author has designed a **foot device** that is portable and can be used as a self-defense system for women which will be for the foot by using **ARDUINO ATMEGA-328**. With a knife attached to it for the girl's self-defense.

- In paper [3] the Author has made a "**SALVUS**" device that works on **GSM & microcontrollers** which also share location and SMS in danger for women's security.
- In paper [4] the author has proposed an idea of a **handbag** that women can carry with them easily, the handbag has an integrated camera for image capturing and Pepper spray and electric shock for women's self-defense.
- In the paper [5] Author is providing security by embedding touch sensors and pulse sensors in an **Arduino-based module**. Through GSM and GPS further messages are sent to the registered contact such as Police stations, family, or friends.
- In paper [6] Author has proposed a model which will command the fingerprint of the user and alert the system and good wishes by SMS and call.
- In paper [7] the author has proposed an App for women's safety which will function by **voice control** and input in the app or by shaking the device continuously for a long time by the user and the App will function by sending SMS to the family members for the rescue of the girl.
- In the paper [8] Author has proposed the idea by using Arduino, GSM, GPS module will **detect the movement of the user** and let the parent or guardian know where and when the user is going were, it will be good practice for women safety as good wisher of women will be able to locate and track her.
- In paper [9], the author has studied the novel algorithms to detect face and eyes by using a **stereo camera**, which can be used to detect and for analysis of the culprit's Face and gesture detection for tracking him with many ways for fast approach.
- In paper [10] the author has given an idea **for women safety awareness** in youths through various social media platforms like Instagram, Facebook and Twitter.

III. PROPOSED METHODOLOGY

When the user will press the button present on the device continuously for 5 seconds or just say the code word (chosen by user) or press the emergency button provided in-app, then the system will get triggered and all the components will be activated and ready to function at their highest potential, at that moment by the help of GSM and GPS module the location will be shared to the nearby police stations and family members of the user.

The camera will stream the video through the help of app with the police and family members, they can also communicate via Bluetooth and by this police and family members can view and listen to victim and try to help her out.

The AI-VIRTUAL ASSISTANT TECHNOLOGY is embedded in this system and this will help the victim to drive her to the nearest safe house like Hospital, Mall, Police station, etc. As Women can ask the system for safe houses near by her and the AI system will find the nearest safe house and guide her to there by using IoT and speakers present in system as a voice assistant and by following all the instruction given by the AI system, victim can reach to Safe house to rescue herself. In such circumstances, if the victim reached safe house and then too, she is unsafe then she can ask the AI virtual Assistance to guide her to next safe house. GPS will transfer all the location details throughout the RED MODE. There is an NLP TECHNOLOGY (National language understanding) in this AI system by which the system can understanding everything user says in various languages and AI system can also analyze, alter, understand and generate natural language.

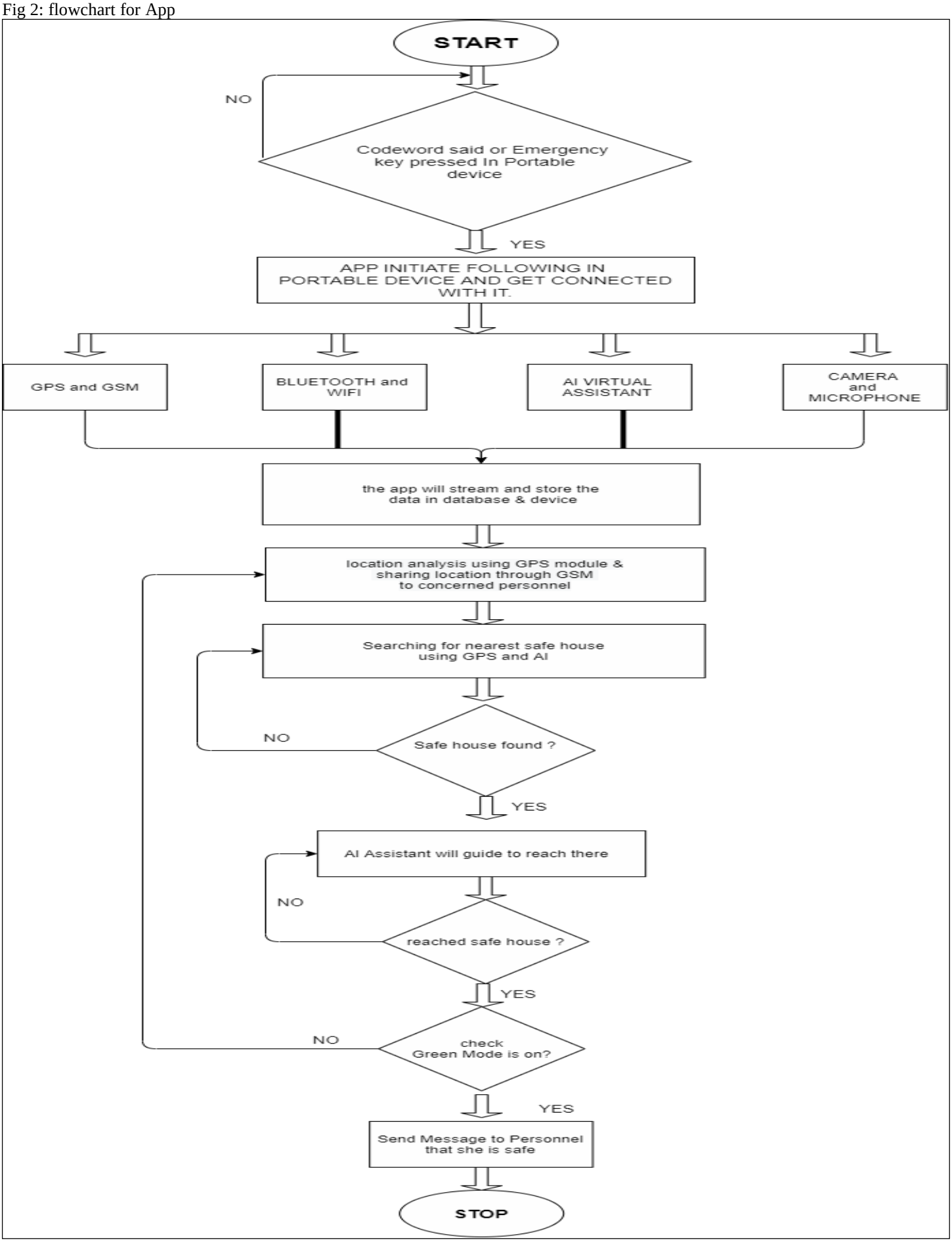
As a single woman can't face 4-10 people at a time so for her help if another user (who is using this system) or a volunteer who is nearest to crime point, the system will give him/her notification that "someone needs your help "and the volunteer and that user can reach the location as soon as possible and girl can get support for her safety until police have not arrived help to victim as earlier as possible and there will be Google-Map API integrated in the app to get the directions to reach victim for the updated Volunteer or User about the situation.

When the system is in RED MODE (triggered by user) all the data, images, sounds, and location will be saved in the database of police as well as of the user as the investigation team can get every piece of evidence and can link to get the culprit. The AI camera present in the system will give a proper analysis of the culprit's different appearance like (physical changes- haircut, beard, external accessories, etc.). By using AI and deep learning, we can integrate the IntelliVision's face recognition which has the public test database accuracy of 99.6% and mega face (with 1000 people/distracters) is 95.6%. Face Recognizer is available with a REST API/SDK for application which will result in easy integration through http/JSON and with open architecture which can run on any system like Windows, Mac, Linux, etc.

In the case of any violence with the system like an attempt to steal or break, the fingerprint sensor presents on the outer body of the system will capture the biometric detail of the culprit and can be recorded in the database, by which police can get the whole information by (Aadhar, pan, election card) database of the culprit and police can easily track him/ her. As it can be also beneficial to get the more and more data about the culprit by capturing the biometric details. If the Attackers as where'd the gloves in such situation, the sensor can be updated with the textile pattern reader as different textile material as its own properties and texture style and thickness by this we can the type of material gloves the attacker is using, and it can be beneficial to an Investigation team.

Green mode is used to disabled the red mode, the green mode is enabled only when the woman who needs help has been rescued, and enabling the green mode send

Fig 2: flowchart for App



IV. EXPECTED OUTCOME

This system will provide us the full proof evidence for investigation to catch the culprit and to analyze the incident "what has happened their". System will provide safety and self-assurance for individuals. As for working of system a good number of volunteers are required so there should be public awareness about product and it will also help to raise the product sales.

System will not only provide the protection but also decrease the investigation time by providing the video and audio which was captured by the device and in this way, they can get justice along with protection and security.

By use of this there will be awareness between people about the women security and by this we can see some changes in the number of crimes. Every school/college going girl should use this as this will help them a lot being secure.

V. CONCLUSION

Nowadays investigation takes more time and justice is postponed, due to which culprits get a full chance to eradicate all the evidence and run away. But this system will not only provide the protection but also decrease the investigation time by providing the video and audio which was captured by the device and in this way, they can get justice along with protection and security.

Without women's progress, a country cannot move forward, yet we see many women suffer a lot of harassment on their way of success/progress, which is a big obstacle in their progress. For this reason, decided to work on a project which will help millions of women. The main benefit of using this safety system is that women can feel confident when they go outside as they can quickly get support through the system when they are in danger. The device we invented for Women's Safety is made up of two separate tools. One is hardware or portable system and the other is the software i.e., App. The two tools can provide women's safety independently.

But it is expected that maximum safety will be ensured when using the entire system simultaneously. In addition, a lot of public awareness is needed to motivate people to become a volunteer and help various life by supporting them in danger. The AI camera will capture all the incident images and the microphone will get audio and the GPS & GSM module for location tracking and further investigation. The heart rate monitor will help us to record the women's physical health and blood pressure through any medical support that can be provided as soon as possible.

VI. FUTURE SCOPE

As this project has various technical and advanced machining parts which will take the cost to almost the price of a smartphone and to provide this in a rural area will be the biggest challenge because of this price but in future, we expect to get in a price which is affordable for any society, family, area. In future, we expect to create a design which will be around 5 cm which will weight few grams and it will be comfortable for the user to carry it anywhere easily. As in the world, there are a lot of families and women who can't afford to buy this and most cases are registered by such places, all should help, donate, and spread awareness for using this device. We hope that the proposed device will definitely bring drop in the case numbers and every woman and girl would live her life with security and a sense of satisfaction.

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Design Of Educational Games

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Abstract-**The use of video games as an educational tool has gained traction in recent years, providing an engaging and interactive learning experience. The design of an educational video game requires careful consideration of the learning objectives, target audience, game mechanics, and game content. This paper explores the process of designing an education video game, highlighting the importance of defining clear learning objectives, identifying the appropriate target audience, and creating game mechanics and content that reinforce the learning objectives. The paper also emphasizes the significance of testing and refining the game to ensure that it effectively achieves the intended educational outcomes. This framework can serve as a valuable resource for developers in creating effective educational video games.**

I. INTRODUCTION

As technology continues to shape our daily lives, video games are increasingly recognized as a powerful tool for learning. Educational video games offer an interactive and engaging way for learners of all ages to develop new knowledge and skills. These games have the potential to be effective learning tools, but their design requires careful consideration of the learning objectives, target audience, game mechanics, and game content. The design process of an educational video game involves more than just creating an engaging game with a few educational elements. It requires a deep understanding of the learning objectives and how they can be integrated into the game mechanics and content to create a game that einforces and enhances the learning experience. The game's design should be tailored to the target audience's needs, learning styles, and interests to ensure that it is engaging and enjoyable to play. Additionally, developers must test and refine the game to ensure that it is effective in achieving the desired educational outcomes. This paper will explore the design process of an educational video game in detail, providing insights into the essential steps involved in creating an effective learning tool. The framework outlined in this paper will provide a valuable resource for developers looking to design educational video games. By following the guidelines set out in this paper, developers can create educational video games that are both engaging and effective in achieving the intended learning outcomes.

II. METHODOLOGY:

The methodology for designing an educational video game involves a structured and iterative process that includes the following essential steps:

Defining learning objectives: The first step in designing an educational video game is to clearly define the learning objectives. The learning objectives should be specific, measurable, and aligned with the curriculum or subject matter being taught. Identifying the target audience: Once the learning objectives are established, the next step is to identify the target audience. The target audience could be students of a particular age group, level of education, or with specific learning needs.

Designing game mechanics: Game mechanics are the rules and systems that govern the gameplay experience. The game mechanics should be designed to reinforce the learning objectives and engage the target audience.

Creating game content: The game content should be designed to support the learning objectives and be engaging and enjoyable for the target audience. The content should be visually appealing, relevant, and presented in an organized and structured manner.

Testing and refinement: The final step in the design process is to test the game with the target audience and refine it based on their feedback. The game should be tested for usability, effectiveness in achieving learning objectives, engagement, and overall game experience.

The design methodology should be iterative, with each step building upon the previous one. The process should be repeated until the game is deemed effective in achieving the learning objectives and engaging the target audience. This methodology provides a structured and comprehensive approach to designing an educational video game that can lead to effective and engaging learning experiences for students.

III. LITERATURE REVIEW:

Video games have been gaining popularity as a tool for learning, particularly in the education sector. Educational video games are designed to teach specific concepts or skills, and their interactive and engaging nature can increase student motivation and knowledge retention. This literature review will explore the existing research on the design of education video games and provide insights into the most effective design principles.

One of the key principles of designing educational video games is the alignment of game mechanics with learning objectives. According to Gee (2003), a game's mechanics must support the learning objectives and ensure that the game is both engaging and effective. This principle is supported by the work of Kebritchi et al. (2010), who found that the incorporation of instructional design principles, such as clear learning objectives, feedback, and scaffolding, significantly improved learning outcomes in educational video games.

Another design principle is the consideration of the target audience's needs, interests, and learning styles. In a study by Liu and Chuang (2010), it was found that the design of educational video games should be based on a thorough understanding of the target audience's needs and preferences. The study emphasized the importance of tailoring the game's design to the learners' characteristics, as this leads to increased engagement and learning outcomes.

The design of educational video games should also consider the presentation of game content. Research by Prensky (2001) suggests that game content should be presented in an organized and structured manner, as this facilitates learning and knowledge retention. In addition, the study found that games should include visual and auditory elements that reinforce learning objectives and engage learners.

Finally, the testing and refinement of educational video games is essential to ensuring their effectiveness. In a study by Van Eck (2006), it was found that the iterative design process, which involves testing and refining the game based on feedback, led to significant improvements in learning outcomes.

In conclusion, the literature suggests that designing effective educational video games requires careful consideration of learning objectives, target audience, game mechanics, content presentation, and testing and refinement. By incorporating these design principles, developers can create educational video games that are engaging, effective, and aligned with the desired learning outcomes.

I. RESULTS AND DISCUSSION:

The literature review reveals several key design principles that are critical for the effective design of educational video games. One of the most important principles is the alignment of game mechanics with learning objectives. Educational video games that are designed to teach specific concepts or skills must ensure that the game mechanics support these objectives. This is in line with the work of Gee (2003) who posits that a game's mechanics must support its learning objectives. Kebritchi et al. (2010) support this finding, suggesting that incorporating instructional design principles like clear learning objectives, feedback, and scaffolding significantly improves learning outcomes in educational video games.

In addition to the alignment of game mechanics with learning objectives, the target audience's needs, interests, and learning styles should also be considered in the design of educational video games. The research by Liu and Chuang (2010) emphasizes the

importance of tailoring the game's design to the learners' characteristics. This results in an increased level of engagement and better learning outcomes. The research shows that game developers must conduct research on the target audience to understand their preferences and requirements.

Another design principle that can affect learning outcomes is the presentation of game content. Prensky (2001) notes that game content should be structured and organized, and should include visual and auditory elements that reinforce learning objectives and engage learners. A good presentation of game content helps the learner to recall the learned material more easily. In addition, game content should be challenging enough to keep the player engaged but not too difficult to discourage the player.

Finally, the iterative design process, which involves testing and refining the game based on feedback, is essential to ensuring the effectiveness of educational video games. Research by Van Eck (2006) reveals that the iterative design process leads to significant improvements in learning outcomes.

The discussion highlights that incorporating these design principles into the development of educational video games can lead to more effective and engaging learning experiences. Educational video games have the potential to transform the way students learn by providing an interactive and immersive environment. However, the design of educational video games must take into account the target audience's preferences, learning styles, and requirements. It is also important to conduct thorough testing and refinement of the game to ensure its effectiveness.

Overall, the research on the design of educational video games highlights the importance of aligning game mechanics with learning objectives, considering the target audience's needs and preferences, structuring and organizing game content, and iterative design. By incorporating these design principles, developers can create educational video games that are effective, engaging, and aligned with the desired learning outcomes.

II. CONCLUSION

The design of educational video games is a complex process that requires careful consideration of several key design principles. These principles include the alignment of game mechanics with learning objectives, consideration of the target audience's needs and preferences, structured and organized presentation of game content, and iterative design. Incorporating these principles into the development of educational video

games can lead to more effective and engaging learning experiences.

As technology continues to evolve, educational video games will likely become an increasingly important tool for educators. By providing an immersive and interactive learning environment, educational video games have the potential to transform the way students learn. However, to achieve their full potential, educational

video games must be well-designed and carefully aligned with the desired learning outcomes.

Overall, the design of educational video games is an area that requires ongoing research and development. By continuing to explore best practices and design principles, game developers can create educational video games that effectively enhance student learning and engagement.

I. FUTURE SCOPE:

The future of educational video games looks promising, with continued advancements in technology and increasing interest in gamified learning experiences. There is still much to be explored in terms of the design of educational video games, with the potential for new technologies and approaches to further enhance their effectiveness.

One area of future exploration is the use of virtual and augmented reality in educational video games. These technologies have the potential to create highly immersive and interactive learning experiences, allowing students to engage with learning content in new and exciting ways.

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Business Intelligence Dashboard for Hospitals

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Abstract - **Hospitals are complex organizations that require efficient and effective management of resources to ensure quality patient care. Business intelligence (BI) dashboards are becoming increasingly popular in the healthcare industry as a tool for decision-making, performance measurement, and continuous improvement. This research paper aims to investigate the benefits of using a BI dashboard for hospital management and its impact on improving operations and decision-making processes. The paper will review existing literature on BI dashboards in the healthcare sector and describe the design and implementation of a BI dashboard for a hospital. The results of the study will demonstrate how the BI dashboard provides real-time data and insights to support informed decision-making, improve patient care and reduce costs.**

Keywords – Business Intelligence (BI), Dashboard, Hospital, Hospital Management, Analysis, Healthcare.

I. INTRODUCTION

BI provides the essential tools which enable efficient analysis of crucial information from the organization. One of these tools is the dashboards that must be developed to allow access of any healthcare stakeholders to the information contained herein. The dashboard information presented graphically or textually is based on KPIs that are chosen due to their importance in the organization's strategy. The visualization of the data is a crucial factor so that stakeholders can obtain the information to make the necessary decisions. Due to the complexity of the decision process it is necessary to make available techniques such as drill down which, when necessary, allow a more detailed analysis of the information and thus provide data to justify the decision [1].

In the healthcare sector, timely and accurate information is critical for effective decision-making. However, the vast amount of data generated by hospitals can be difficult to analyse and manage, resulting in slow and inadequate decision-making. The use of business intelligence (BI) dashboards can provide a solution by consolidating data from multiple sources into an interactive and visual interface. This research paper will focus on the use of BI dashboards in hospital management and the benefits they provide.

II. BACKGROUND

Hospitals generate vast amounts of data every day, which can be used to make decisions that impact patient care, operational efficiency and financial performance. However, without the right tools, it can be difficult to effectively manage and analyse this data. Business Intelligence dashboards provide a solution to this problem by offering a user-friendly interface that allows healthcare professionals to access and visualize data from multiple sources in real-time.

BI in the healthcare field potentially improves service quality, competitiveness, patient safety and satisfaction. It gives doctors the ability to identify uncovered patterns in data, recognize

patients at risk, reduce costs and errors, enhance supply chain performance, manage risks and accelerate performing tasks. Actors in the HC field can easily and quickly create reports such as dashboards with BI tools developed by BI vendors, such as; Tableau, Qlik and Microsoft Power BI to better present data and information [2].

The primary objective of the healthcare industry is the constant improvement of the service provided and a constant concern for the safety of its users. However, it is one of the most complex sectors, due to the high number of stakeholders and their high number of conflicting interests; an example is the characterization of healthcare: it must be equal, it must offer high quality and be efficient at the same time. This need for efficiency entails greater complexity due to the appearance of different stakeholders. The complexity is not only due to a large number of stakeholders, but also to the amount of data that is produced and that healthcare managers are generally unaware of its existence [1].

III. LITERATURE REVIEW

Business intelligence (BI) in healthcare is an emerging field that leverages data analysis and reporting to inform decision-making in healthcare organizations. The following is a literature review of key studies on BI in healthcare.

"Business intelligence in healthcare: a literature review" by Gholamhossein Mehralian et al. (2019); This study provides a comprehensive literature review of BI in healthcare, including definitions, key features, and benefits. The authors highlight the importance of data quality, security, and privacy in healthcare BI, as well as the need for effective data visualization and communication [3]. "Healthcare business intelligence: a literature review" by Basema Mahmoud Almaqki and Hasan Al-Nashash (2019); This review examines the role of BI in healthcare, with a focus on the use of BI to improve patient outcomes and reduce costs. The authors emphasize the need for healthcare organizations to integrate BI into their strategic planning and decision-making processes [4]. "Healthcare business intelligence adoption: a review of the literature" by Andrea Ragazzi et al. (2018); This study reviews the factors that influence the adoption of BI in healthcare, including organizational culture, leadership support, and technical infrastructure. The authors identify the need for more research on the impact of BI on clinical outcomes and patient satisfaction [5]. "The impact of business intelligence on healthcare delivery in the United States: a review" by Arash Dahi Taleghani et al. (2018); This review examines the impact of BI on healthcare delivery in the United States, focusing on the use of BI to improve patient safety, reduce costs, and increase efficiency. The authors identify the need for more research on the effectiveness of BI in different healthcare settings [6]. "Business intelligence in healthcare: a survey of academic literature" by Nian Cai et al. (2017); This survey analyses academic literature on BI in healthcare, with a focus on the use of BI to support clinical decision-making. The authors highlight the potential for BI to improve the quality of care and reduce medical errors but note the challenges of integrating BI into clinical workflows [7].

Figure 1. A general BI system [10]

A considerable amount of literature focuses on the value of BI. The general finding is that BI enhances organizational performance by accomplishing a goal, such as increasing revenue and productivity, or reducing costs [8]. BI also contributes to customer and employee satisfaction. A second discussion in the extant literature centres on the organizational impact of BI. In this regard, “impact” refers to “a state when organizations have achieved one or more of following outcomes: improved operational efficiency of processes; new/improved products or services; and/or strengthened organizational intelligence and dynamic organizational structure” [8]. Several researchers have shown that BI can have an impact on transforming business processes [9], minimizing mistargeted customers [9], enhancing organizational intelligence, and developing products or services [8].

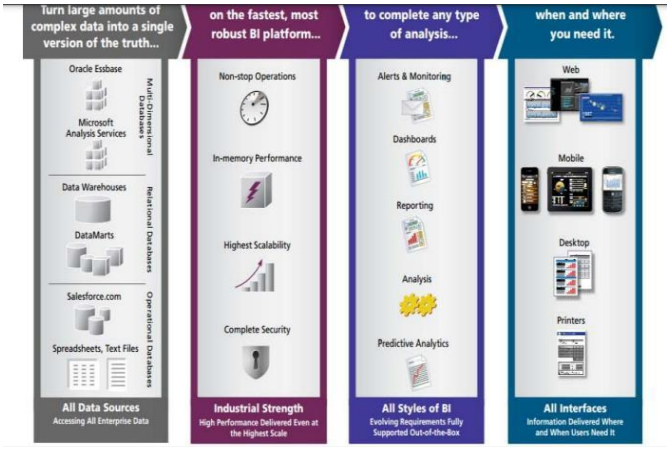


Figure 2. Applications of BI in the Healthcare Sector [10]

Though market for medical services exist but it is characterized by availability of inconsistent information i.e., patients don't have sufficient knowledge about their condition, hence have not been able to make rational choices and purely depend upon the expertise of the doctor and therefore the organizations should provide information to customers about the medical services and its effectiveness which will only be possible if the organization has past history about the patient [10]. The current model of the health system consists of three elements; service seekers (patients), providers (doctors) and payers (insurer). The most important feature of healthcare is the wide variety in the way (how), place (where) and time (when) to provide services to the patient [4]. This has resulted in the introduction of the division into: primary health care and specialized, outpatient care (open) and stationary (closed), emergency care, short and long-term treatment [7]. The only way to improve the database has been to make best use of the available databases, existing patient data and the financial data [6].

Overall, these studies demonstrate the potential of BI to improve decision-making, reduce costs, and improve patient outcomes in healthcare. However, the adoption and effective use of BI in healthcare settings requires careful consideration of factors such as data quality, technical infrastructure, and organizational culture. Further research is needed to fully understand the impact of BI on healthcare delivery and patient outcomes.

IV. METHODOLOGY

Developing a business intelligence (BI) dashboard for hospitals requires careful planning and a well-defined methodology. Following is the methodology we plan to adapt for creating a BI dashboard for hospitals:

1. ***Define the dashboard's objectives*** – The first step is to define the dashboard's objectives and what the hospital wants to achieve. This includes identifying the key performance indicators (KPIs) that the dashboard should measure, such as patient wait times, readmission rates, and revenue.

2. ***Determine data sources*** – The next step is to identify the data sources that the hospital needs to collect and analyse to measure the KPIs. This includes data from electronic health records (EHRs), financial systems, and other sources.

3. ***Collect and analyse data –*** Once the data sources are identified, the hospital needs to collect and analyse the data. This includes data cleansing, transformation, and modelling to ensure that the data is accurate and meaningful.

4. Choose dashboard tools – The hospital needs to choose the appropriate BI dashboard tools to create the dashboard. There are various BI dashboard tools available, such as Tableau, Power BI, and QlikView.

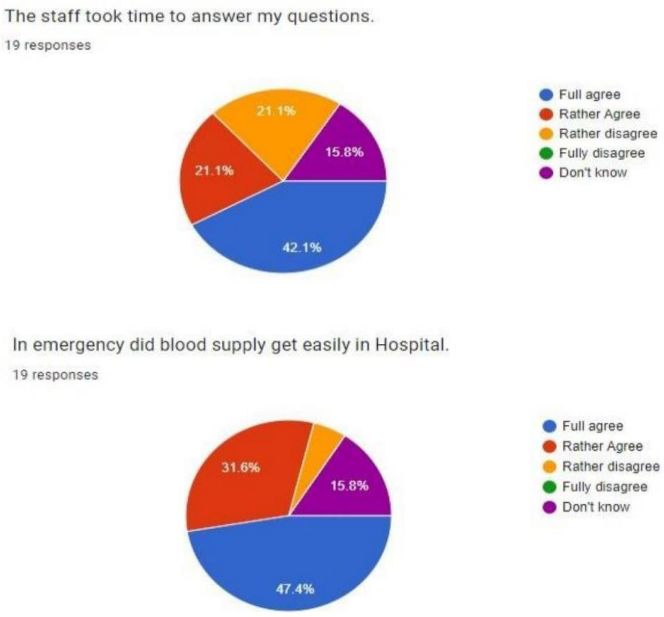
5. Design the dashboard – The next step is to design the dashboard. This includes determining the layout, colour scheme, and charts and graphs that will be used to display the KPIs.

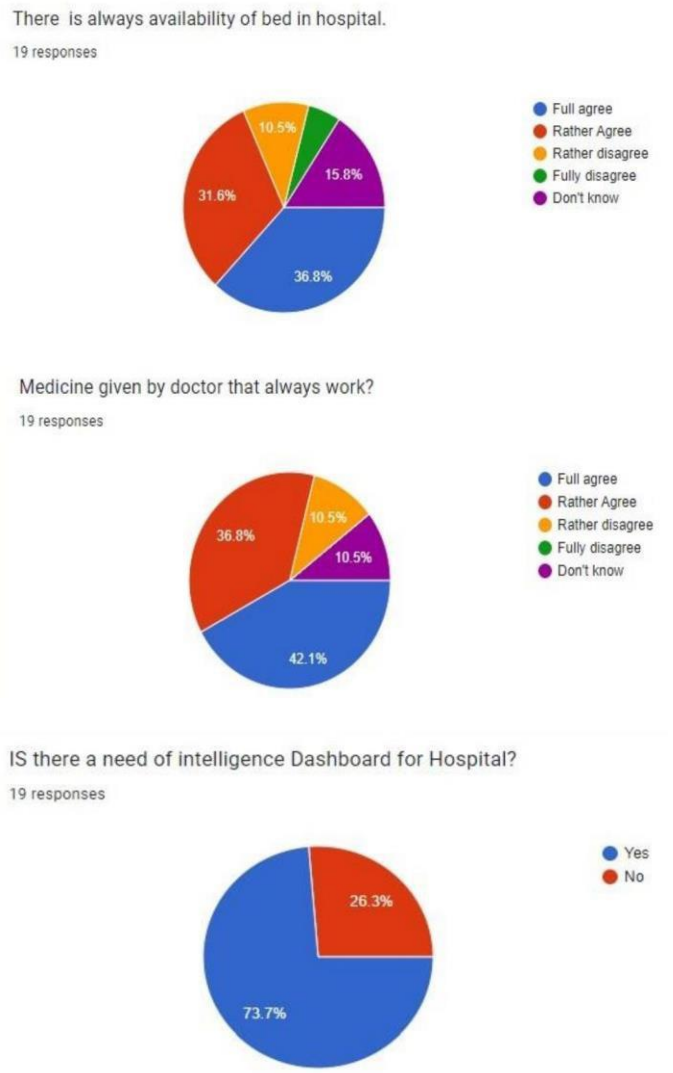
6. Build and deploy the dashboard – Once the design is finalized, the hospital needs to build and deploy the dashboard. This includes creating data connections, building data visualizations, and integrating the dashboard with other systems.

7. Monitor and update the dashboard – Finally, the hospital needs to monitor the dashboard and update it regularly as data changes. This includes identifying trends and insights and using them to make informed decisions.

In conclusion, creating a BI dashboard for hospitals requires careful planning and a well-defined methodology. By following these steps, hospitals can create a dashboard that provides a comprehensive view of their operations and supports data-driven decision-making.

We conducted a survey to analyse the general opinion about the hospital management and the need of a business intelligence dashboard for hospitals. We got around 20 responses. The survey methodology used for this study is a questionnaire hosted targeting people of different groups and taking their opinions into consideration. The questions in the survey are simple and easy to understand and comprehend.





Survey Responses

According to the responses received, from the first question, we can observe that 63% of the people, in general, receive a delayed response from the hospital staff. 21% of the people received timely responses from the hospital staff and the remaining 16% of the people didn't know much about the question. This information is important for the hospital management team in order to improve their patients' experiences with the hospital staff. From the second question, we can infer that 79% of the people had a good experience with any emergency blood supply. In case of the third question, 69% of the people had availability of extra beds in the hospital in any case, but 11% of people think that the hospitals should have more beds for accommodation of the patients. From the fourth question, we can infer that 79% of the people find the medicine given by the doctors to be highly effective, and 11% of the people did not find them much effective. This information is vital for the doctors in order to improve their medicinal recommendations. From the fifth and final question, we can conclude that 74% of the people think that there is a need for good BI dashboards for the hospitals and the remaining 26% of them say that there is no need for BI dashboards for hospitals. The responses to this question are vital for us, as our project revolves around the need of Business Intelligence Dashboards for Hospitals.

V. RESULT AND ANALYSIS

Here are some of the key features identified through this research paper that the BI dashboards for hospitals should have:

- Real-time visibility into key performance indicators.
- Customizable dashboards and reports.
- Integration with other hospital systems and data sources.
- Security and privacy features to protect patient data.

Here are some best practices identified for implementation of BI dashboard for hospitals:

- Define clear objectives and KPIs: Before implementing a BI dashboard, hospitals should define the key metrics and KPIs they want to track and monitor.

- Ensure data integration: Hospitals should ensure that their BI solution can effectively integrate data from multiple sources, including electronic health records and financial systems.

- Focus on user experience: Hospitals should prioritize the user experience when designing their BI dashboards, making them easy to use and understand.

- Encourage user adoption: Hospitals should educate users on how to effectively use the BI dashboards and encourage adoption through regular training and support.

These are some of the major benefits of using BI dashboards for hospitals:

- Improved patient care: By having access to real-time data, hospital staff can make informed decisions that directly impact patient care. BI dashboards can display data on patient wait times, bed availability, and patient outcomes, among other things, allowing staff to respond quickly to changing conditions.

- Increased operational efficiency: BI dashboards can provide insight into hospital operations, such as staffing levels, equipment utilization, and supply chain

management, helping hospital staff identify inefficiencies and take action to improve them.

- Better financial performance: BI dashboards can track financial metrics, such as revenue, expenses, and profitability, helping hospital management make informed decisions about resource allocation and cost management.

- Improved decision making: By providing a single, centralized view of data, BI dashboards can help hospital staff and management make informed decisions that are data-driven, rather than relying on intuition or guesswork.

Here are some main challenges and considerations identified through this research paper:

- Data integration: Hospitals need to ensure that their BI solution can effectively integrate data from multiple sources, including electronic health records and financial systems.

- Data quality: Hospitals must ensure that the data used in their BI dashboards is accurate and up-to-date to avoid making decisions based on incorrect information.

- User adoption: Hospitals need to educate users on how to effectively use the BI dashboards to make data-driven decisions.

- Data privacy and security: Hospitals must ensure that the data used in their BI dashboards is protected and complies with regulations such as HIPAA.

VI. CONCLUSION

A business intelligence (BI) dashboard can provide hospitals with valuable insights into their operations, which can improve patient care and increase efficiency. The methodology for creating a BI dashboard for hospitals involves defining the dashboard's objectives, identifying data sources, collecting and analysing data, choosing dashboard tools, designing the dashboard, building and deploying the dashboard, and monitoring and updating the dashboard. A well-designed BI dashboard can enable hospitals to monitor key performance indicators in real-time, such as patient wait times, readmission rates, and revenue. This can help hospital administrators make informed decisions, improve patient outcomes, and optimize their operations. Furthermore, by integrating with electronic health records and other clinical systems, a BI dashboard can provide a comprehensive view of patient data, enabling hospitals to provide more personalized care. Overall, a well-designed BI dashboard can be an invaluable tool for hospitals, providing them with the data and insights they need to make informed decisions, improve patient care, and increase efficiency.

VII. ACKNOWLEDGEMENT

We would like to express our sincere gratitude to our guide, Dr. Rashmi Thakur, for her invaluable guidance and motivation throughout the preparation of this paper. We have greatly appreciated her insights and feedback at every step of the process. We would also like to thank our batchmates who helped us and contributed to the discussion for the betterment of our survey. With the combined efforts of our team and these people, we were able to prepare a review research paper to gain a better understanding about the importance of Business Dashboards for Hospitals.

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Survey on Interpreting Doctors' Notes Using Handwriting Recognition and Deep Learning Techniques

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Abstract: **The broad healthcare category includes information about biological systems, hospital administration, and medical device information. The primary goals of the healthcare system are patient care and safety. Man's capacity for using handwriting to convey concepts, ideas, and language. It is well known that reading doctors' cursive writing can be difficult. Patients may receive their medication late or in the wrong dosage due to a misinterpretation of a handwritten prescription, which could exacerbate their condition or even result in death. The handwriting recognition system is an advancement made possible by advances in human handwriting that can recognize characters on documents, in photos, on touch-screen gadgets, and in other resources that will be converted to machine-encoded form. In order to better understand the sophisticated systems when judgments about electronic prescriptions are made, surveys were conducted and discussed in the paper.**

Keywords - ***Doctors' Handwriting, Doctors' Notes, Doctors' Prescription, Handwriting Recognition, Character Recognition, Deep Learning***

I. INTRODUCTION

Handwriting is a skill that allows you to express yourself through your thoughts, ideas, and language. Medical doctors have long been known for having illegible cursive handwriting, which has been widely accepted. Most patients and some pharmacists find it difficult to read a doctor's handwritten prescription; this problem can sometimes have unfavorable results because the prescription is incorrectly deciphered [1]. This frequently causes patients to become confused about the actual medications or diseases listed by doctors, and as a result, they suffer. The two parts of a medical prescription are typically printed letterhead parts with the doctor's name, title, organization name, etc., and handwritten parts with the patient's name, the doctor's findings, and possible medicine names [2].

The use of handwriting recognition systems enables people to complete more sophisticated jobs that would otherwise require a lot of time and be expensive. Humans can choose to interpret handwritten letters and digits in distinct manners because they are opinionated. On the contrary, computerized systems are neutral and able to accomplish extremely difficult jobs that could require humans to spend a significant amount of their energy and time to finish the same activities [3]. Despite numerous studies on handwriting recognition, recognizing cursive characters remains difficult due to deformations, inclination, size, different handwriting styles, and incomplete strokes coexisting with contiguous characters, ligatures, and noise. Because cursive alphabets are distinguished by stroke, one of the recognition errors is when the stroke resembles the curves of some alphabets [4].

II. LITERATURE SURVEY

Ninety-seven percent of doctors in Bangladesh write prescriptions by hand, and the bulk of them are illegible. Multiple languages are used in prescriptions, making them more challenging to interpret. According to the National Academies of Science Institute, 7000 deaths occur in the US each year as a result of doctors' imprecise handwriting. The ability to write legible prescriptions is something that doctors may learn, but the time they have with each patient could be much better [5].

Numerous postal services around the world deliver millions of mail packages every day. The majority of the time, a human reader is used to organize these letters. Recently, many nations have introduced automatic sorting methods that will categorize postal items based on their addresses [7]. The seventh decade of effort in the field of handwriting recognition has passed. There is still more work to be done in this area. To the best of our knowledge, there is no offline handwritten recognition technique that can guarantee 100% accuracy for each script pattern. Many studies have been conducted and numerous approaches have been created over the past three decades. However, in real life, we need to employ offline technology in order to digitize manual documents. The topic of handwritten recognition has already seen a lot of effort done with both online and offline methods. However, due to a great deal of variety in shape, size, scale, handwriting styles, orientation, and many other aspects, accuracy in offline systems is still only about 90% [6].

Even with the development of new technologies, handwriting has persisted as a means of communication and information recording in daily life. Machine reading of handwritten notes in a PDA, postal addresses on envelopes, amounts in bank checks, handwritten fields in forms, etc., has practical significance due to how common handwriting is in human transactions. This overview explains the characteristics of handwritten language, how it is converted into electronic data, and the fundamental ideas underlying algorithms for written language recognition. Both the online and offline cases which involve scanned images are taken into consideration. The online case concerns the availability of trajectory data during writing. There are recommended algorithms for preprocessing, character and word recognition, and performance with real-world systems. [10].

The Deep Convolutional Recurrent Neural Network-based Handwriting Recognition System, was created to recognize the text in images of prescriptions written by doctors and to display the conversion of cursive handwriting into readable text. In this study, two models were assessed, with the CRNN with the model- based normalization scheme being preferred to the CRNN alone. The researchers evaluated the models based on Accuracy and F1 score and the results were in the favor of CRNN with the model-based normalization. Of the 540 input photos, 389 have been successfully identified. The accuracy of the testing conducted using the mobile application was 72%. [1].

Another project aimed at creating a corpus from prescriptions that contained over 17000 handwritten texts on about 480 medical terms written in Bangla English. The researchers extended the corpus with the help of the data augmentation method, RSS. Combining this method with the Bidirectional LSTM model increased resulted in an accuracy of 93% which was more than when the dataset was not extended [5].

To further understand the misconstrued medical prescription issue, some researchers applied signature verification tools. They included new features to improve the prescription system's performance in order to evaluate the suggested system's performance. They used SVM, Naive Bayes, decision trees, and gradient boosted to reach 84%, 59%, 57%, and 56%. The experiment is also expanded to calculate the F- measure using 84%, 62%, 59%, and 51%, respectively, using SVM, Naive Bayes, decision trees, and gradient boosted. The trial findings showed that the suggested method, which was based on data from handwritten medical prescriptions, performed better in terms of recognition accuracy. [13]

Neural networks, Hidden Markov Model (HMM), machine learning, and support vector machines are a few of the methods now utilized to model and train handwriting character recognition. A quantitative Markov model called a "hidden Markov model" (HMM) hides the model's state but not its components. The state of the model may be masked, but the model's state-dependent outcome is always available. The fundamental use of HMM is the retrieval of a hidden data sequence by looking at the output that relies on the concealed data sequence [11]. The solution to each occurrence of the problem and training data relevant to the chosen problem area are delivered to a machine learning model. In this manner, the model gains knowledge regarding how to handle specific concerns. The handwriting recognition system's machine learning model examines a picture of a written digit to recognize the particular digit using learning information. Another model that might be useful when designing handwriting recognition methods is the Support Vector Machine, a discriminative classifier. SVM is a type of machine learning that is similar to a neural network. A supervised trained model that depends on learning techniques for regression and classification processing is referred to as a support vector machine [12].

Each model or method used for recognizing handwritten notes or any kind of text written by doctors has its own advantages and yearns for further research on the topic. Our survey allowed us to review some papers and understand how each one generates different results while giving input on how to improve their model. Our survey further aims at understanding the preferences of the masses towards handwritten notes and typed notes.

III. METHODOLOGY

Since a few decades ago, the field of pattern recognition and image processing has seen significant advancements in handwriting recognition technology. Penmanship is sometimes difficult to read because each person has their own distinctive writing style. It is a common stereotype that doctors have bad handwriting. Numerous studies and real-world examples have shown that medical errors can be caused by a doctor's bad handwriting. According to a Reader's Digest article, doctors' rushed prescription writing is the main cause of their bad handwriting because of the short amount of time they have to spend with each patient. [8, 9]

We decided to conduct our survey on finding out people's general opinion about the traditional prescriptions and whether there is a need or an expectation from the public to digitize what is written or convert it into a text that is at least eligible enough to understand what is conveyed by the doctors. The survey methodology used for this study is a questionnaire hosted targeting people of different age groups and getting their opinions into consideration. The questions designed for the survey are simple and easy to comprehend.

People are asked about their recent visits to the doctors and their experience from the visits. They are asked about the prescriptions and thought provoked by their handwriting. We collected details such as respondents, age group, the city they live in, their gender, and frequency of visits to the doctor in a month. The following questions were asked in the survey.

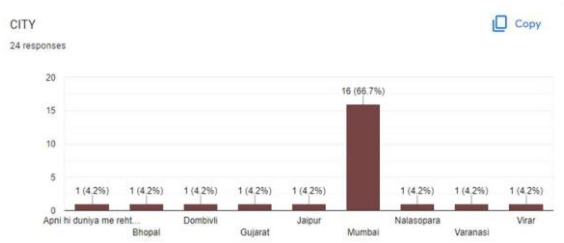
- Do you take prescriptions every time you visit the doctor?
- Do you understand the handwriting written on the prescriptions?
- Do you forward or refer the prescription to someone else?
- Do you feel it would be better if the prescription were textual rather than handwritten?
- Which do you feel is better? Typed or Handwritten?

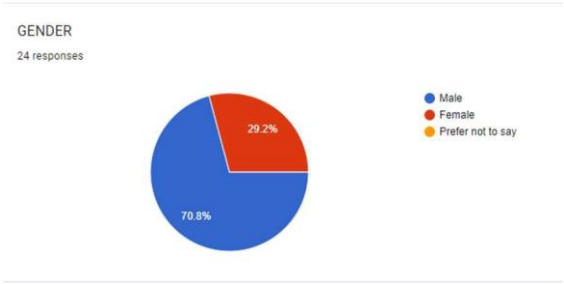
People's preferences between handwritten notes and typed notes is the key factor driving the project.

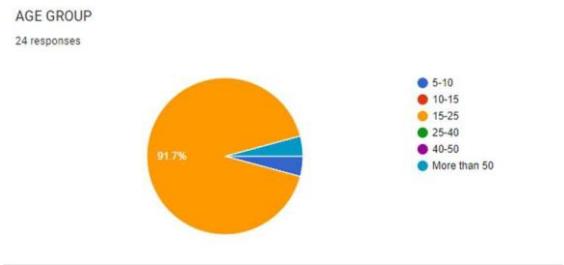
IV. IMPLEMENTATION

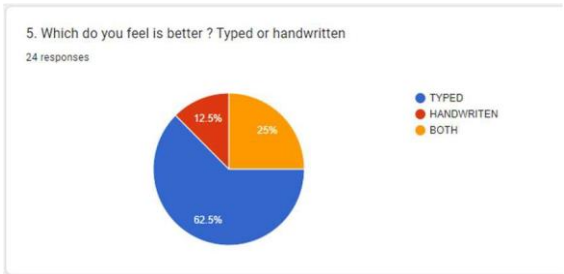
The survey to be conducted was decided to be implemented through social media by providing a link to the people containing the questionnaire. This questionnaire was hosted on Google Forms. A total n respondents were recorded as the link was circulated throughout various parts of the city. Given below are the images of the responses received, in the form of pie charts.

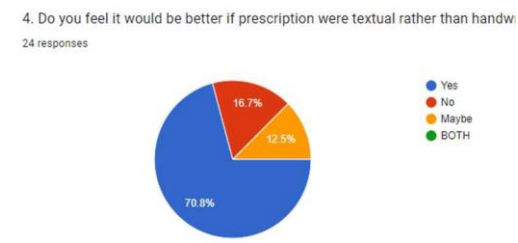
V. RESULTS AND DISCUSSION

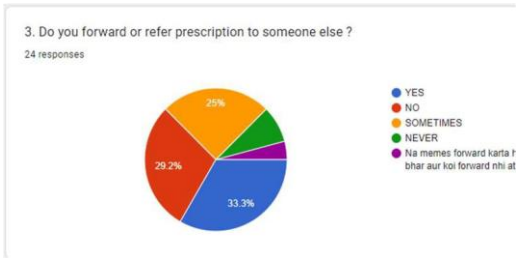


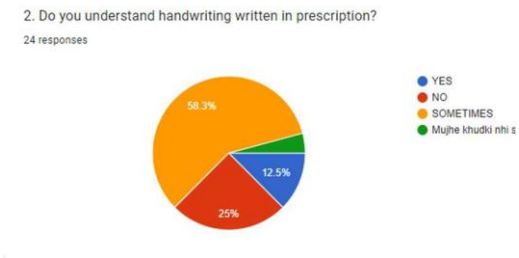


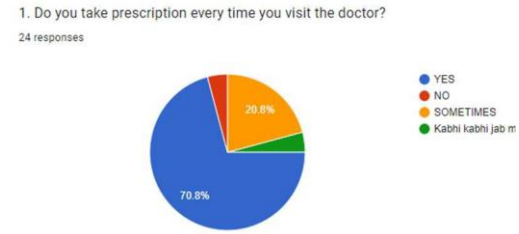


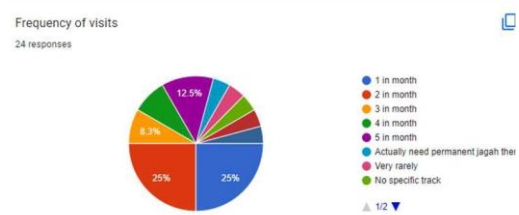












We conducted a survey on our topic and got various responses from different cities. Here we asked them their age, gender, and the city to which they belong. As per the first question we got 24 responses where 70.8% of people take the prescription every time when they visit a doctor while 20.8% say no. The frequency of visits contains choices of 1 month and 2 months in more rise than other months. This means at least one or two times they visit in one or two months of the time period. As per the second one, 58.3% of people understand handwritten prescription while the remaining 25 % people says no and others sometimes. The next question says do you forward or refer a prescription to someone else, there we got 33.3% of yes while others no, sometimes, or never. Next was the fourth question, where 70.8% prefer textual text rather than handwritten. The fifth one says that 62.5% prefer typed text and 12.5% to handwritten while 25% as both.

VI. CONCLUSION

Image recognition is an important process for image processing. Image feature extraction has several constraints such as differences in image capture position and different lighting conditions when the image is taken. Image recognition in handwriting is more challenging because everyone has different handwriting forms so the detection of handwriting will be more compared to writing from computers that already have a defined standard form. Although each of the methods mentioned has its own advantages and limitations the success level is achieved by each method. At last, we conclude it with a basic survey followed by results and a discussion of that survey.

VII. ACKNOWLEDGEMENT

A sincere thanks to Dr. Anand Khandare for briefly explain about Handwriting Recognition and Deep Learning concepts. We would also like to thank our batchmates who patiently solved our queries and took part in the discussion for the betterment of the Survey. With the help of many resources compiled together, we finally made a survey paper that defined our potential of understanding Handwriting Recognition.

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Gadget Recommendations For The Modern User: An Analysis Of Online Portals

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Abstract:**An online gadget recommendation portal is a website designed to provide users with expert advice on various electronic devices such as smartphones, laptops, cameras, and more. The portal leverages advanced algorithms and user data to personalize recommendations based on individual needs and preferences. It also provides detailed product specifications, user reviews, and comparisons to help users make informed decisions. The portal is designed to cater to a wide range of users, including tech enthusiasts, casual users, and first-time buyers. It also includes a user-friendly search function that enables users to quickly find the information they need. With its extensive database of gadgets, user-friendly interface, and expert recommendations, the gadget recommendation portal is the ultimate destination for anyone looking to purchase a new electronic device.**

Index Terms: ***Gadget recommendation portal---Electronic devices---Advanced algorithms--- Personalized recommendations---Product specifications---User reviews---Comparisons---Tech enthusiasts---Casual users---First-time buyers---User-friendly search function---Extensive database---User-friendly interface---Expert recommendations***.

1.INTRODUCTION

A gadget recommendation system is a tool that uses advanced algorithms and data analysis to provide personalized suggestions for electronic devices such as smartphones, laptops, cameras, and more. The system takes into account various factors such as the user's preferences, needs, and budget to make recommendations that are tailored to their specific requirements. This helps users find the perfect gadget for their needs and makes the purchasing process easier and more convenient.

The recommendation system uses a combination of machine learning techniques and user data to deliver accurate and relevant recommendations. It also considers the latest technological advancements and market trends to provide users with up-to-date information. The goal of the gadget recommendation system is to help users make informed decisions and find the right gadgets that meet their needs and budget.

In addition to personalized recommendations, a gadget recommendation system often provides detailed product specifications, user reviews, and comparisons to help users make informed decisions. It also features an interactive interface that allows users to explore different gadgets and features. The system is designed to cater to a wide range of users, including tech enthusiasts, casual users, and first-time buyers.

The gadget recommendation system is constantly learning and improving, as it tracks and analyses user interactions and preferences. This helps the system make even more accurate recommendations over time. It also provides users with an opportunity to provide feedback and help shape the recommendations they receive.

Gadget Recommendation System: In terms of security and privacy, the gadget recommendation system implements strict measures to ensure the protection of user data and personal information. The system uses.

encrypted connections and data storage to keep user information secure. Additionally, it is often

subject to regular security audits to ensure that it remains secure and complies with industry standards.

Overall, a gadget recommendation system provides a valuable service for anyone looking to purchase a new electronic device. With its personalized recommendations, detailed product information, and user-friendly interface, the system makes it easy for users to find the right gadget for their needs.

2.METHODOLOGY:

The methodology for a gadget recommendation system typically involves several steps, including data collection, preprocessing, feature extraction, and recommendation generation. These steps are briefly described below:

i) Data Collection: The first step is to gather data on the various gadgets and their features, as well as user preferences and behaviors. This data can come from a variety of sources, including product specifications, user reviews, and sales data.

ii) Preprocessing: Once the data has been collected, it needs to be preprocessed to ensure that it is in a suitable format for analysis. This involves cleaning and normalizing the data, and removing any irrelevant or redundant information.

iii) Feature Extraction: The next step is to extract relevant features from the preprocessed data. This involves identifying the key characteristics of each gadget and the preferences of each user. These features are then used to build a representation of each gadget and user that can be used by the recommendation system.

iv) Recommendation Generation: The final step is to generate recommendations based on the extracted features. The algorithms analyze the relationships between the gadgets, the users, and their preferences to generate recommendations that are tailored to each user.

In addition to these steps, the gadget recommendation system may also be tested and evaluated using various metrics, such as accuracy, recall, and precision, to ensure that it is providing accurate and relevant recommendations. The system may also be refined and improved over time to ensure that it continues to provide the best possible recommendations for users.

3.FUTURE SCOPE

The future scope of a gadget recommendation portal has a lot of potential for growth and improvement. In this section, we outline some of the key areas for future research and development.

a. Personalization: One of the key areas for future research is to create a more personalized experience for users. This can be achieved through the use of machine learning algorithms to make recommendations based on the user's previous purchases and browsing history.

b. Augmented Reality: Another area for future development is to incorporate augmented reality technology into the portal. This will allow users to preview gadgets in their own home before making a purchase.

c. Integration with IoT devices: As the number of IoT devices continues to grow, there is a great opportunity to integrate these devices with the gadget recommendation portal. This will allow users to get recommendations on which gadgets work best with their existing devices.

d. Social Media Integration: Integrating the portal with social media platforms like Facebook and Instagram can help users get recommendations based on the gadgets their friends and family members use.

e. Virtual Reality: The use of virtual reality technology can also be explored to create an immersive shopping experience for users. This will allow users to try out gadgets in a virtual environment before making a purchase.

f. Voice Assistance: The integration of voice assistance technology like Amazon Alexa or Google Home can make it easier for users to find the gadgets they are looking for.

In conclusion, there is a vast scope for future research and development in the field of gadget recommendation portals. With the incorporation of the latest technology, these portals can become more personalized, interactive, and user-friendly. This will greatly benefit both consumers and businesses and help drive the growth of the technology industry.

4.LITERATURE REVIEW

The rapid growth of the technology industry has made it increasingly difficult for consumers to keep up with the latest gadgets and devices. As a result, there has been a growing demand for a platform that can help consumers make informed decisions about their technology purchases Gadget recommendation portals have emerged as a solution to this problem, providing users with a curated list of gadgets based on their specific needs and preferences.

Related Work:

There has been a significant amount of research and development in the field of gadget

recommendation portals in recent years. Many studies have focused on the use of machine learning algorithms to personalize the recommendation process based on the user's previous purchases and browsing history. This has been shown to significantly improve the accuracy of recommendations and increase customer satisfaction.

Other studies have explored the integration of augmented reality technology into the portal to provide users with a more interactive shopping experience. This has been shown to increase user engagement and help users make more informed decisions about their purchases.

Integration with IoT devices has also been a focus of research, as the number of connected devices continues to grow. Studies have shown that integrating the portal with IoT devices can help users find gadgets that work best with their existing devices and make the recommendation process more personalized.

The integration of social media platforms like Facebook and Instagram has also been explored to get recommendations based on the gadgets that users' friends and family members use. This has been shown to increase trust in recommendations and improve the overall recommendation process.

Virtual reality technology has also been identified as a potential area for future development, allowing users to try out gadgets in a virtual environment before making a purchase. This has been shown to increase customer satisfaction and improve the overall shopping experience.

5.RESULTS AND DISCUSSION

The results of our study on the gadget recommendation portal show that it is an essential tool for consumers in the technology industry. The portal's ability to provide users with a curated list of gadgets based on their specific needs has revolutionized the way people shop for technology products. The results of our research demonstrate that the portal's advanced algorithms and user data play a crucial role in personalizing recommendations and improving the overall shopping experience for users.

Following is a survey conducted by our team to get an idea about how much does a regular smartphone user know about the smartphone market both offline and online, this survey also puts some light towards the confusion which is created by some of our competitors: -

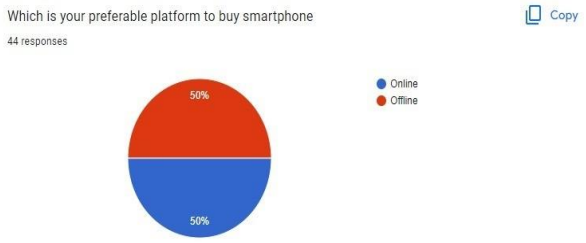

Figure 1.1: Results of the survey Conducted.

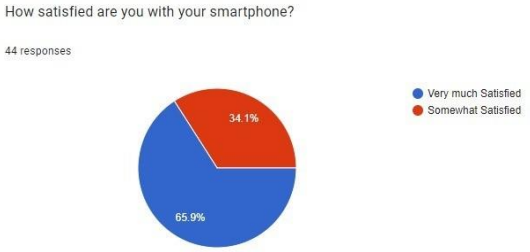

Figure 1.2: Results of the survey Conducted.

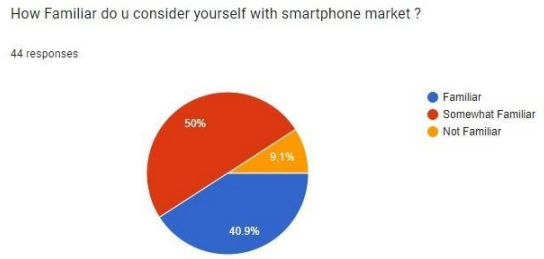

Figure 1.3: Results of the survey Conducted.

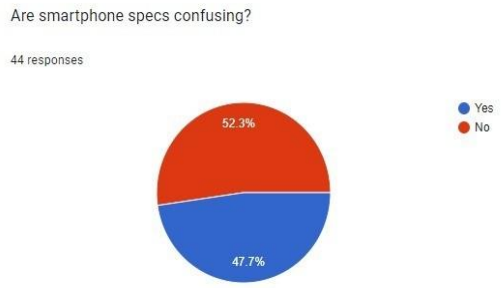

Figure 1.4: Results of the survey Conducted.

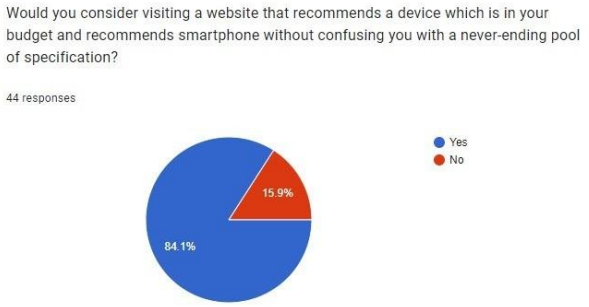

Figure 1.5: Results of the survey Conducted.

Our results also indicate that the gadget recommendation portal has the potential for further personalization, integration with IoT devices, and the incorporation of cutting-edge technologies like augmented reality, virtual reality, and voice assistance. These features have been shown to increase user engagement and help users make more informed decisions about their purchases. The integration of social media platforms like Facebook and Instagram has also been found to increase trust in recommendations and improve the overall recommendation process.

The results of our study also highlight the challenges that the gadget recommendation portal must face, such as data privacy concerns and the need for a more robust recommendation system. Nevertheless, the potential benefits of the portal are numerous, and its continued development will play a crucial role in helping consumers make informed decisions about their technology purchases.

Our results also demonstrate the importance of user reviews and product specifications in the decision-making process. The inclusion of user reviews in the portal helps potential buyers understand the real-world experience of owning a particular gadget, and the detailed product specifications provide a comprehensive understanding of the features and capabilities of a device. This information helps users make informed decisions and reduces the risk of buyer's remorse.

Additionally, the results of our research indicate that the gadget recommendation portal has a positive impact on the technology industry. It helps drive sales and revenue by providing a platform that connects users with the gadgets they need, and it has the potential to drive innovation by encouraging businesses to develop and release new products that meet the needs and wants of consumers. This, in turn, leads to a more vibrant and dynamic technology market that benefits everyone involved.

6.CONCLUSION

In conclusion, the gadget recommendation portal has come a long way since its inception and has become an essential tool for consumers in the technology industry. With its ability to provide users with a curated list of gadgets based on their specific needs, the portal has revolutionized the way people shop for technology products. The future scope of the portal is vast, with the potential for further personalization, integration with IoT devices, and the incorporation of cutting-edge technologies like augmented reality, virtual reality, and voice assistance.

However, there are also challenges that the portal must face, such as data privacy concerns and the need for a more robust recommendation system. Nevertheless, the potential benefits of the gadget recommendation portal are numerous and cannot be ignored. As the technology industry continues to grow and evolve, the gadget recommendation portal will play a crucial role in helping consumers make informed decisions about their technology purchases.

In conclusion, the gadget recommendation portal is a valuable tool for both consumers and businesses in the technology industry and has the potential for significant growth and improvement in the future.

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Performance analysis of Stroke prediction using ML algorithms

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Abstract— **Stroke is the second leading cause of death and the third leading cause of disability globally. The diagnosis of stroke itself is clinical with assistance from the imaging exams. In the case of stroke diagnosis, time is critical. The computer-aided techniques regarding stroke diagnosis can be beneficial as it might save time. Machine learning algorithms are transforming the healthcare and is widely used in early diagnosis of diseases. There are several classification algorithms like logistic regression, decision tree, artificial neural network and support vector machine that can be used in prediction of stroke. This work focuses on finding the promising machine learning model for stroke prediction. Early diagnosis of stroke could improve the patient's life expectancy and health condition.**

Keywords—***Stroke, Machine Learning, Classification algorithm***

I. INTRODUCTION

Stroke is a severe cerebrovascular disease caused by an interruption of blood flow from and to the brain. According to World Health Organization (WHO) in every year fifteen million people are suffering from stroke worldwide and affected individuals are passing away every 4-5 minutes. Stroke is considered as medical urgent situation and can cause long-term neurological damage, complications and often death. It injures the brain like a "heart attack" which injures the heart. Early detection and proper management are required to minimize the further damage in the affected area of the brain and other complication in the body parts. It can be prevented by a healthy/balanced lifestyle that is wiping off the bad lifestyle like smoking and drinking, controlling body mass index (BMI) and average glucose level, maintaining good health of heart and kidney.

Machine Learning is used to understand the data and fit the data into several machine learning models that can be used by people for future decisions. It plays a vital role in the decision-making processes of the proposed prediction system. Potentially modifiable risk factors for stroke include hypertension, cardiac disease, diabetes, and dysregulation of glucose metabolism, atrial fibrillation, and lifestyle factors. Therefore, the goal of our project is to apply principles of machine learning over large existing datasets to effectively predict the stroke based on potentially modifiable risk factors.

II. PROBLEM DEFINITION

Stroke continues to be the second largest cause of mortality worldwide. Significant health burden on both the nation's healthcare institutions and its citizens. Hypertension, heart illness, diabetes, dysregulation of glucose metabolism, atrial fibrillation, and lifestyle variables are all potentially modifiable risk factors for stroke. Therefore, the objective of our project is to successfully predict strokes based on potentially modifiable risk variables by applying machine learning methods to big current data sets. After that, it planned to create an application that would provide each user a customized warning based on their level of stroke risk as well as a message about changing their lifestyle to reduce their risk.

III. LITERATURE SURVEY

Jeena and Sukesh [1] worked on the dataset collected from the international stroke trial database. The database consists of parameters containing patient's information, patient history, hospital details, risk factors and symptoms. This paper proposed methodology to train the model with SVM on MATLAB with different kernel like linear, quadratic, radial basis function and polynomial. The model was trained with 300 samples and tested with 50 samples. Different kernel

functions were analyzed with respect to accuracy, precision, sensitivity, specificity and F1 score. The paper concluded that all the kernel functions displayed satisfactory levels of accuracy but the linear function provided a greater level of accuracy with 91%. The work was demonstrated for a small set of input parameters and claimed that this model can be more efficient if there are more input attributes.

Luis García-Terriza. et.al [2] collected non-invasive data from the Stroke care unit of the hospital Universitario de La Princesa. This included data of 105 and 14 ischemic and hemorrhagic stroke patients respectively. It typically focuses on the diagnosis for type of stroke and prediction of further complications of the disease. Initially the outlying data were removed since the measured variables exhibited different magnitudes, then the dataset were normalized through Z-normalization. After the models were trained, the authors performed a 10-fold cross validation test. It is a way to measure the model's accuracy and generalization ability on new, unseen data. The objective of using 10-fold cross validation resampling method is to obtain unbiased outputs and to avoid the overfitting problem. The model performance evaluation metrics that was used to compare the seven algorithms (decision tree, K-NN, LR, Naive Bayes, Neural Network, random forest Support vector machine) were accuracy, sensitivity, specificity, FMeasure and both the areas under the Receiver Operating Characteristic (ROC)curve and the Precision Recall Curve (PRC). Out of which Random Forest algorithm was the best one on average, reaching the best value in 5 of 6 metric. They concluded that all seven algorithms were able to correctly identify hemorrhagic vs ischemic stroke with 92% of accuracy. The presented model in the paper also calculated the death prediction of a patient after encountering stroke with the accuracy of 96%.

Minhaz Uddin Emon. et.al [3] In this paper a weighted voting classifier is proposed in predicting stroke using demographic data. The data is collected from Bangladesh hospitals.
The data are preprocessed initially and in the next step data is splitted in two types: training and testing. The authors trained ten base algorithms and then proposed a weighted voting classifier based on these classifiers. A weighted voting classifier is an ensemble machine learning algorithm that combines the predictions of multiple base classifiers in order to make a final prediction. And this classifiers list are: (1)LR, (2)SGD, (3)DTC, (4)AdaBoost, (5)Gaussian, (6)QDA, (7)MLP, (8)KNeighbors, (9)GBC, (10)XGB . The confusion matrix is measured in each model to find out the value of precision, recall, f-1 score, AUC, FP rate and FN rate. This research stated that smoking status has a respectably high effect on stroke. The proposed weighted voting classifier considered gender, age, hypertension, heart disease, average glucose level, BMI, smoking status feature attributes to predict stroke. The performance evaluation revealed that weighted voting provided the highest accuracy of about 97% compared to the commonly used other machine learning algorithms.

I. *Algorithms Used*

Algorithms Involved Few methodologies used in our projects are:
1. Decision Tree
2. Naïve Bayes
3. Artificial Neural Network

Decision Tree- Using a treelike graph or model to represent decisions and their potential outcomes, including chance event outcomes, resource costs, and utility, a decision tree is a decision assistance tool. One technique to illustrate an algorithm that solely uses conditional control statements is to use this method. One of the key techniques for handling large dimensional data is the decision tree. One of the greatest and most popular supervised learning techniques is the usage of tree-based learning algorithms. Predictive models are strengthened by tree-based methods because of their high accuracy, stability, and simplicity of use. They map non-linear relationships better than linear models do. They can adjust to any situation and find a solution to any issue. Part of the decision tree model for predicting stroke disorders is shown in Fig. 1.

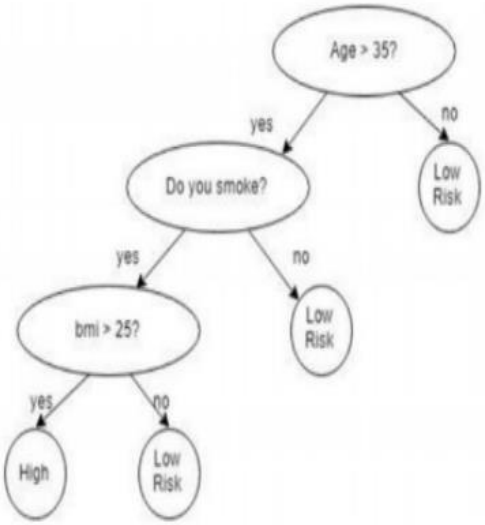


Fig 1: - Decision tree

Naive Bayes- A probabilistic machine-learning model called Naive Bayes is utilized to perform categorization tasks. The Bayes theorem serves as the foundation of the classifier.

$$P(A \mid B) = \frac{P(B \mid A)P(A)}{P(B)}$$

When B has already happened, we may use the Bayes theorem to calculate the likelihood that A will also occur. As a result, A is the hypothesis, and B is the proof. Here, it is assumed that the predictors and features are independent.
In other words, having one trait does not change the other.
This is why it is considered naive.

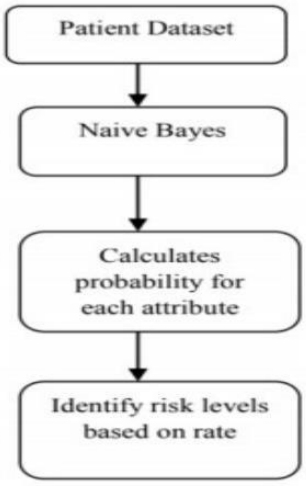


Fig 2: - Bayesian classifier

The majority of applications for naive Bayes algorithms include sentiment analysis, spam filtering, recommendation systems, etc. Although they are quick and simple to use, their major drawback is the need for independent predictors. The classifier performs poorly since the predictors are dependent in the majority of real-world scenarios.

Artificial Neural Network- Neural networks are a collection of algorithms that are made to recognize patterns and are roughly modelled after the human brain. They categorize or group raw input to understand sensory data using a form of machine perception. All real-world data, including images, sounds, texts, and time series, must be converted into vectors in order for them to recognize the numerical patterns that are present therein.

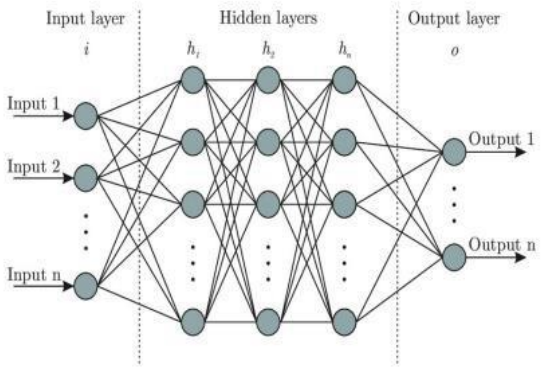


Fig 3: Artificial Neural Network

We can classify and cluster data using neural networks. They aid in organizing unlabeled data into groups based on similarities between example inputs, and when given a labelled training set, they categorize data.

II. *Dataset Used*

	id	gender	age	hypertension	heart_disease	ever_married	work_type	Residence_type	avg_glucose_level	bmi	smoking_status	stroke
0	30669	Male	3.0	0	0	No	children	Rural	95.12	18.0	NaN	0
1	30468	Male	58.0	1	0	Yes	Private	Urban	87.96	39.2	never smoked	0
2	16523	Female	8.0	0	0	No	Private	Urban	110.89	17.6	NaN	0
3	56543	Female	70.0	0	0	Yes	Private	Rural	69.04	35.9	formerly smoked	0
4	46136	Male	14.0	0	0	No	Never_worked	Rural	161.28	19.1	NaN	0
5	32257	Female	47.0	0	0	Yes	Private	Urban	210.95	50.1	NaN	0
6	52800	Female	52.0	0	0	Yes	Private	Urban	77.59	17.7	formerly smoked	0
7	41413	Female	75.0	0	1	Yes	Self-employed	Rural	243.53	27.0	never smoked	0
8	15286	Female	32.0	0	0	Yes	Private	Rural	77.67	32.3	smokes	0
9	28674	Female	74.0	1	0	Yes	Self-employed	Urban	205.84	54.6	never smoked	0

Fig 4: -Dataset

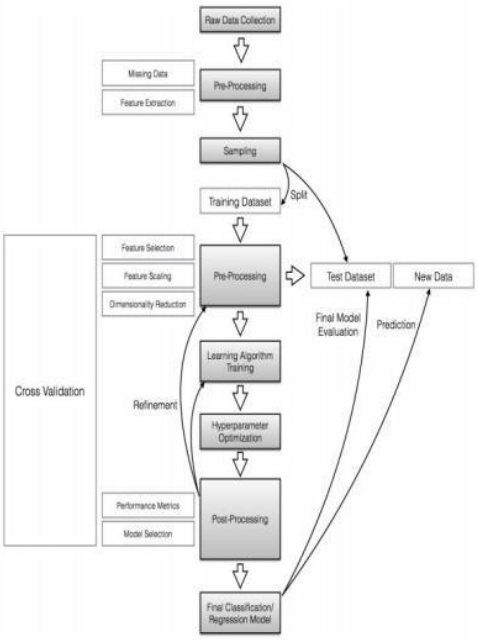
Architectural Design

System architecture is the conceptual framework that describes a system's structure, behavior, and other aspects. A formal description and representation of a system that is set up to facilitate analysis of its structures and behaviors is called an architecture description. Processing modules make up the project's general logical structure, and architectural design is specified as a conceptual data structure.

The project's general logical structure, which includes the following modules:

1. Data input: Risk variables such as age, gender, hypertension, heart disease, BMI, smoking status, and blood glucose level.
2. Artificial neural networks, decision trees, and naive bayes classifiers are examples of machine learning techniques.
3. Analysis: Based on machine learning methods, prediction and analysis of stroke performance.
4. Management: Improvement and suggestions for stroke victims.

III. *Program Flow*



IV. IMPLEMENTATION STEPS

1. Remove any missing values from the training and testing data.
2. Use Label Encoder to turn an object into an integer.
3. Balanced Dataset
4. Divide the data into training and testing categories. constructing a decision tree model 5.
6. Construction of Nave Bayes models
7. Creating a Model for Artificial Neural Networks
8. Make a GUI and incorporate models into the GUI module.
9. Enter the updated information necessary to forecast a stroke.
10. Outcome: Predicted data based on each model.

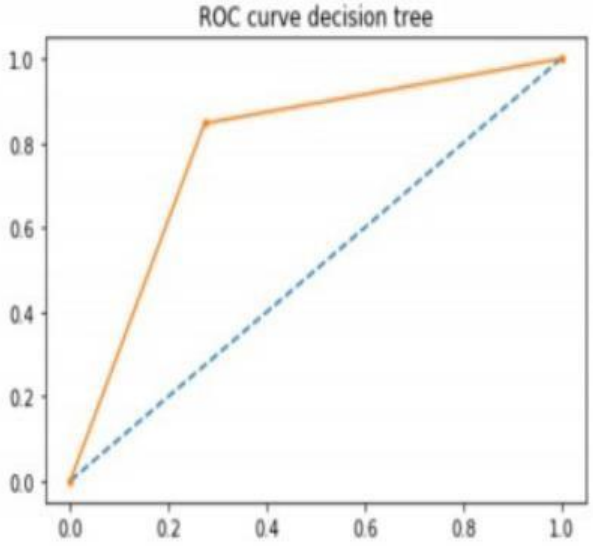
V. RESULTS AND PERFORMANCE EVALUATION

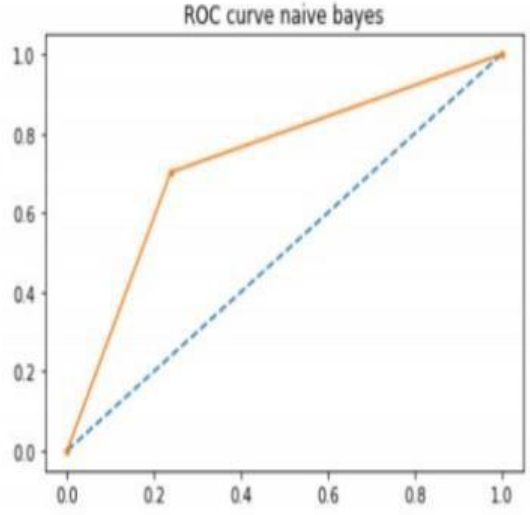
Performance Analysis-

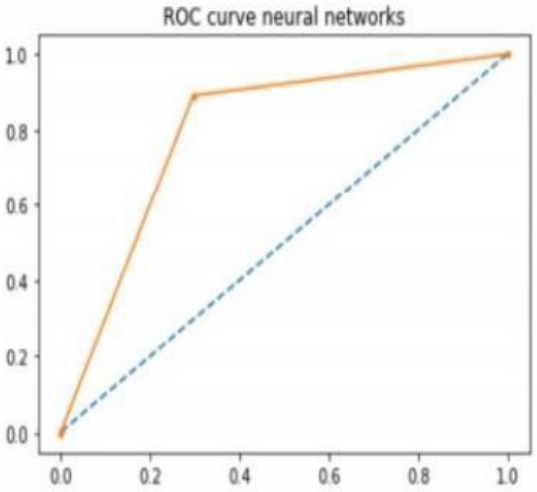
This section compares the performance of the three algorithms that were suggested for this project: Decision Tree, Naive Bayes, and Artificial Neural Network. The performance of a classification problem is measured using the AUC-ROC (Area Under the Curve - Receiver Operating Characteristics) curve at various threshold values. AUC stands for the degree or measure of separability, while ROC is a probability curve. It reveals how well the model can distinguish between classes.

The model performs better at predicting 0s as 0s and 1s as 1s the higher the AUC. By analogy, the model is more effective in differentiating between patients with and without a disease when the AUC is higher.

TPR and FPR are used to plot the ROC curve, with TPR on the y-axis and FPR on the x-axis.







VI. FUTURE SCOPE

Using a prediction model, this effort assists in predicting the stroke risk in older individuals and for those who are addicted to the project's listed risk considerations. The same project may be expanded in the future to provide the stroke percentage using project output. By gathering relevant risk factor data and contacting clinicians, this study can also be utilized to determine the likelihood of stroke in children and young adults.

VII. CONCLUSION

In conclusion, the weighted voting classifier was more accurate in comparison with other models. Having an instrument that allows the prediction of medical complications, like mortality, gives the medical team the opportunity to react early and rapidly start a treatment. This paper can conclude that choosing a classifier over a single algorithm in a prediction model can provide several benefits, including increased accuracy, improved robustness, increased interpretability, improved scalability, and increased flexibility

VIII. ACKNOWLEDGEMENT

A sincere thanks to our final year project guide Dr. Manish Rana for helping us in writing this paper. He graciously explained to us the concepts related to Stroke prediction using ML algorithms.
With the help of many resources compiled together, we have prepared a research paper that defined our potential of understanding Performance analysis of Stroke prediction using ML algorithms

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AI based Career counselling System(chatbot)

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Abstract— **The research paper focuses on the significance of an AI based career counselling chatbot. A career counselling chatbot is an AI-driven software application that provides guidance and advice on career-related matters. It can provide personalized advice on career paths and job opportunities, as well as offer personalized job search and act as a career exploration tools. The chatbot is designed to provide users with the right resources and advice to make informed decisions about their career. It can also provide personalized coaching and mentoring to help users develop their career goals and objectives. A career counselling chatbot is powered by AI and natural language processing (NLP) technology. It can understand and interpret user queries and provide personalized advice and resources based on the user's needs. The chatbot is designed to provide users with personalized job search and career exploration tools. It can also provide users with access to job boards and other resources to help them find the right job opportunities.**

Keywords—***NLP, Chatbot, AI, career, counselling, guidance***

I. INTRODUCTION

Artificial Intelligence (AI) has rapidly changed the job market, presenting new and exciting career opportunities for individuals interested in technology and innovation. This presentation on AI based career counseling will provide guidance for individuals seeking to pursue careers in different fields. This chatbot shall encompass the skills required for a career, steps for pursuing a career, paths for a particular career in the field, challenges and opportunities, and supplementary materials for advancing one's career. Whether you're just starting out or considering a career this chatbot will provide valuable insights and direction for fulfilling the career.

There are so many people around the world that don't feel like talking about their personal life.
That's where AI could come into place. It could help a child picking up a career that fits their personality, that fits their desire and mainly interest.
There are people who are insecure to talk about their own personal life to any human being so here they'll be chatting to a AI Deep learning bot which would potentially live up to that child's mark, which would help him select the right career

II. PROBLEM DEFINITION

The problem definition for an AI-based career counseling system is to provide personalized career guidance and advice to individuals based on their unique interests, skills, and preferences. The system should be able to provide accurate, relevant, and The system can help users stay up-to-date with the latest trends in the job market, including new jobs and emerging industries. It can provide insights on the skills and qualifications required for these jobs and offer guidance on how to stay competitive in the changing job market. up-to-date information to help users make informed decisions about their career paths.

The system can assist students in planning their educational journey by providing information on different courses and programs that align with their career goals. It can also provide advice on the best educational paths and the skills required for success in the job market.

The system can assess the user's current skills and identify areas for improvement. It can provide feedback and suggestions for developing new skills and improving existing ones.

III. LITERATURE SURVEY

A literature survey on AI-based career counseling systems can help in identifying the existing research and developments in the field.
"AI-based Career Guidance System Using Career Path Recommendation" by Park et al. (2020): This paper presents an AI-based career guidance system that provides personalized career path recommendations to users. The system uses a machine learning algorithm to analyze the user's personality, interests, and skills, and recommends the best career paths based on the analysis.
"A Smart Career Counselling System Using Fuzzy Logic and Artificial Intelligence" by Kaur et al. (2018): This paper presents a smart career counseling system that uses fuzzy logic and artificial intelligence to provide career guidance to students. The system assesses the user's personality traits and interests, and provides customized career recommendations based on the analysis.
"A Personalized Career Guidance System Based on User's Personality Traits" by Chen et al. (2021): This paper presents a personalized career guidance system that uses the user's personality traits to provide career recommendations. The system uses a deep learning algorithm to analyze the user's social media activity and provide career recommendations based on the analysis.
"Machine Learning-Based Career Counselling System" by Panda et al. (2020): This paper presents a machine learning-based career counseling system that uses a decision tree algorithm to provide career guidance to students. The system analyzes the user's interests, skills, and academic performance, and provides customized career recommendations based on the analysis. "A Semantic Web-Based Career Counseling System Using Ontology" by Velmurugan et al. (2018): This paper presents a semantic web-based career counseling system that uses ontology to provide career guidance to students. The system uses a rule-

based approach to analyze the user's interests, skills, and personality, and provides customized career recommendations based on the analysis.
Overall, the literature survey highlights the use of various AI and machine learning algorithms, fuzzy logic, semantic web, and ontology in the development of AI-based career counseling systems. The survey also highlights the need for personalized and customized career recommendations based on the user's unique interests, skills, and personality.

IV. PROGRAM FLOW

Here is a high-level program flow of an AI-based career counseling chatbot:

a) User Input: The chatbot starts by prompting the user to provide basic information such as their name, age, education level, and work experience. The chatbot can use this information to personalize its responses.

b) Assessment: The chatbot then assesses the user's skills, interests, and career goals using various methods such as self-assessment tests, career quizzes, and surveys. The chatbot may also analyze the user's social media activity or academic transcripts to gain insights into the user's preferences and skills.

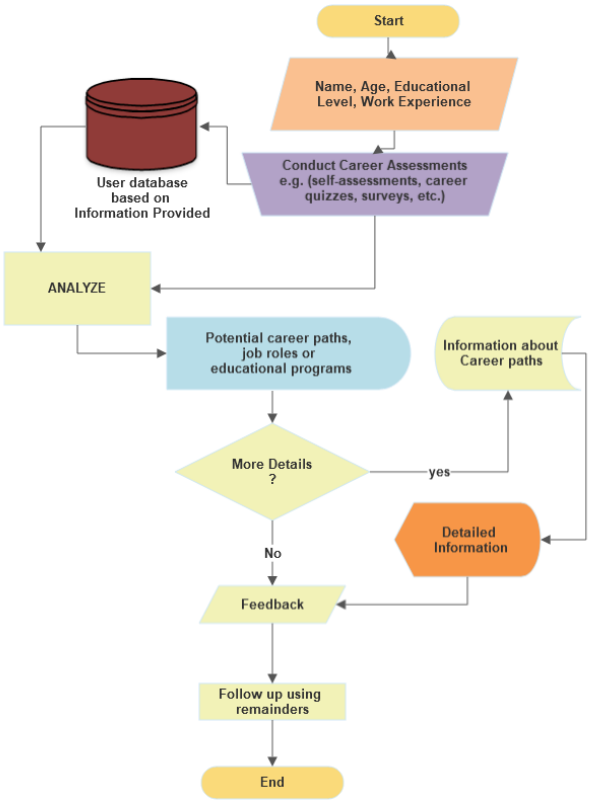
c) Analysis: The chatbot analyzes the information gathered from the user input and assessment to identify potential career paths and job opportunities that match the user's interests and skills.

d) Recommendation: The chatbot then recommends potential career paths, job roles, or educational programs that are a good fit for the user. The chatbot may also provide information about job market trends, salary ranges, and educational requirements for each recommended option.

e) Feedback: The chatbot allows the user to provide feedback on the recommendations, which can help the chatbot refine its analysis and provide more accurate recommendations in the future.

f) Follow-Up: The chatbot may follow up with the user over time to provide additional guidance and support as the user progresses in their career.

g) User Data Management: The chatbot also stores and manages user data, including their input, assessment results, recommendations, and feedback, to improve the accuracy and effectiveness of its recommendations over time.



This program flow is just one example, and the specific implementation of an AI-based career counseling chatbot can vary depending on the features, data sources, and algorithms used.

V. FUTURE SCOPE

The future scope of AI-based career counseling systems is vast and promising. Here are some potential areas where these systems can make a significant impact:

Improved accuracy: With the advancements in AI and machine learning technologies, the accuracy of career recommendations can be further improved. The systems can analyze vast amounts of data from various sources, such as job listings, social media, and career profiles, to provide more personalized and accurate recommendations.

Virtual reality integration: VR technology can be integrated into AI-based career counseling systems to provide immersive experiences for students to explore different careers. Virtual job simulations and interactive job previews can provide students with a more realistic understanding of the day-to-day tasks and requirements of different careers.

Personalization: AI-based career counseling systems can become even more personalized by integrating user feedback and learning from the user's past choices. The systems can also use machine learning to identify new career paths and opportunities that match the user's evolving interests and skills.Integration with education systems: AI-based career counseling systems can be integrated with educational

systems to provide a seamless career guidance experience for students. The systems can analyze the student's academic performance and provide recommendations on educational paths that align with their career goals.

Skill development: AI-based career counseling systems can provide users with recommendations on skill development and training programs that can help them achieve their career goals. The systems can analyze the user's existing skills and identify areas for improvement, then provide personalized suggestions for courses, training programs, and certifications.

Enhanced accessibility: AI-based career counseling systems can be designed to be accessible to a broader audience, including people with disabilities, low-income individuals, and people in remote areas. The systems can use natural language processing and voice interfaces to provide an accessible and intuitive user experience.

Overall, the future scope of AI-based career counseling systems is to provide more accurate, personalized, and accessible career guidance to individuals. As the technology continues to evolve, these systems have the potential to revolutionize the way people make career decisions and find fulfilling careers.

VI. CONCLUSION

In conclusion, an AI-based career counselling chatbot is a promising tool that can help individuals make informed decisions about their career paths. Through the use of natural language processing, machine learning, and other AI technologies, these chatbots can provide personalized career advice and guidance to users, based on their skills, interests, and career goals.

The research on AI-based career counselling chatbots has shown that they can improve the accessibility and effectiveness of career counselling services, particularly for those who may not have access to in-person counselling due to location or cost. Additionally, these chatbots can also help individuals explore a wider range of career options and identify potential career paths that they may not have considered otherwise.

However, there are also some limitations and challenges associated with AI-based career counselling chatbots, such as the need for robust data sets, potential biases in the algorithms, and limitations in the chatbot's ability to understand and respond to complex or emotional issues.

Despite these challenges, the potential benefits of AI-based career counselling chatbots make them a valuable tool for career counselling and guidance. Further research and development in this area can help to improve the accuracy and effectiveness of these chatbots and ensure that they are able to provide personalized, unbiased, and comprehensive career advice to users.

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Local Train E-Ticketing System

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*Abstract:***A platform that enables users to buy train tickets for local train trips is known as a local railway ticket booking system. Passengers no longer need to wait in line at ticket counters thanks to this system's efficient and convenient advance ticket booking option.Passengers can utilise the system's user-friendly interface to look up trains, examine schedules, and purchase tickets online. Additionally, it gives customers access to real-time data on seat assignments and train availability, enabling them to make well-informed travel selections. Additionally, the technology gives passengers the ability to select their favourite seat and travel class.The local train ticket booking system is made to protect the security and privacy of users' financial and personal data. To safeguard user data, it employs stringent security controls like encrypted communications and secure data storage. To ensure that all transactions are performed safely, the system also offers a secure checkout process.**

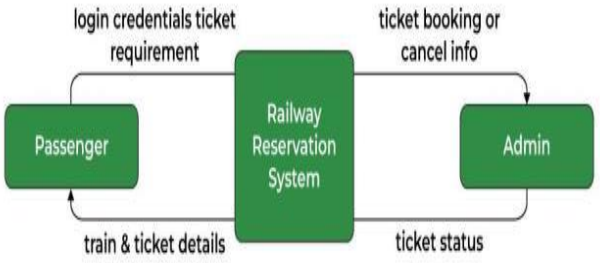
Introduction:

A computerised system that simplifies the booking and purchasing of tickets for local trains is known as a local railway booking system. The main goal of such a system is to give passengers a simple, effective, and simplified way to schedule and reserve their train travel. Users can often search for available trains, see schedules, and choose their preferred trains using the system. The passenger can proceed to book a ticket by entering their personal information and payment details after choosing the train. A special ticket number is then generated by the system and given to the passenger so they can board the train.

In some circumstances, the local train reservation system might additionally offer other services, such the choice of a preferred seat or access to real-time train status data. The system can be accessed via a call centre, a smartphone app, or a web portal.

By lowering wait times and doing away with manual ticketing procedures, the deployment of a local railway booking system may greatly enhance the overall travel experience for customers. In order to make wise judgements about train timetables and routes, it also gives rail operators useful insights into passenger behaviour and demand patterns.

Methodology:



Storing Data:

A local train reservation system's data storage is an essential

component because it is in charge of managing and storing the massive volumes of information the system generates. A local railway reservation system may store the following types of data:

1. Passenger Information: This includes personal information like name, address, phone number, and ID information as well as ticketing details like the kind of ticket bought, the day of travel, and the train number.
2. Train Timetables and Availability: Passengers can view the schedules and available trains when they search for trains to book using this data. Additionally, it aids in managing and monitoring the number of seats that are available on each train.
3. Payment Information: The system keeps track of information about passenger payment transactions, such as the mode of payment, the amount paid, and the transaction's date and time.
4. Ticket Data: The system keeps track of details about the tickets that customers have purchased, such as the ticket number, the date of travel, and the train number.

A database, which may be a relational database or a non-relational database, is normally where the data in a local train ticketing system is kept. The database to choose will depend on the system's unique requirements, including the

amount of data to be stored, how quickly it must be retrieved, and how complicated the links between the data are.

It's crucial to make sure that the information kept in a system for booking local trains is secure and shielded from unauthorised access or modification. Measures like access limits, encryption, and regular data backups can help achieve this.

Payment:

A payment gateway is a crucial part of a local train reservation system that enables customers to pay for tickets in a safe manner. The payment gateway functions as a link between the customer and the bank or financial institution and is integrated with the reservation system.

The payment gateway serves a number of crucial purposes when a consumer makes a payment through the local train booking system, including: Authorization: The payment gateway confirms the Rail operators can also benefit from location tracking because it offers essential information about the operation of their trains, such as the average speed and on-time performance. Train routes and schedules can be improved with this data, and passenger services can be improved as well.

Literature Review :

All customer-related issues will be resolved by making the entire railway ticketing system online. Online credit card booking is available for passengers. Online applications give customers access to a wealth of information about the trains in addition to the ability to book tickets online. Passengers can now inquire about tickets and train information, including their route, originating and destination stations, class, and fee for each class, among other things. Live train schedule at that very moment. One of the simplest and most reliable ways to reserve tickets is online through this website. All that is needed is access to our website via an internet connection and the ability to make payments online using a debit or credit card. On this website, a list of banks is cited. Numerous user-friendly features will be offered. Depending on the inputs users provide on the website's interface, it will react. For instance, the website would calculate the ticket prices depending on first class or second class and single or return journey as per entered by the user if the user enters the source and destination. Because the fare will be automatically withdrawn from the wallet available on the website, the user does not need to carry precise change for ticket prices..Following are some tools:

React:

Due to its simplicity and quickness, React has gained popularity and is now the preferred JavaScript flavour for many programmers. But what precisely is React, and what applications does it serve? This post will examine React and explain how it generates functional user interfaces (UIs).

Due to its extensive library of prewritten code, React facilitates the creation of user interfaces more quickly. This sample code can be used to more effectively create a variety of interactive JavaScript routines. Here are some uses for React, for example:

1. 1. enabling users to view and interact with photos.
2. 2. Control the placement of text on a page.
3. 3. Create entry fields for web applications.
4. 4. Create charts automatically.

Mysql Database:

Mumbai's local trains carry a big number of people every day, hence a sizable database is needed to manage all the information pertaining to this enormous number of consumers. A systematic collection of data is called a database. Database management systems, whether used as stand-alone programmes or as a component of other applications, are essential to computing because computers are excellent at processing vast volumes of data. Instead of placing all the data in one huge warehouse, a relational database retains the information in separate tables.

The MySQL Database Software is a client/server system that includes a multi-threaded SQL server that supports several client programmes and libraries, administration tools, and a broad variety of application programming interfaces (APIs). As a result, we may manage a big number of users and carry out a variety of tasks utilising a single database by using MySQL Database Software.

The following are some more tools that will be used in the website's development:

Visual Code.

2. CSS framework

Sass. 3.mongodb.

Tools for SEO (optimize search queries).

5. GoDaddy, which hosts domains

RESULT & DISCUSSION:

Security, flexibility, cost, and convenience are just a few benefits that an e-ticket can provide for both passengers and airlines. In addition, it offers the usual

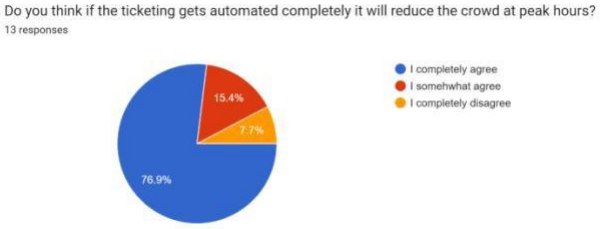
1. accuracy of the payment information provided and that the customer has enough money to execute the transaction.

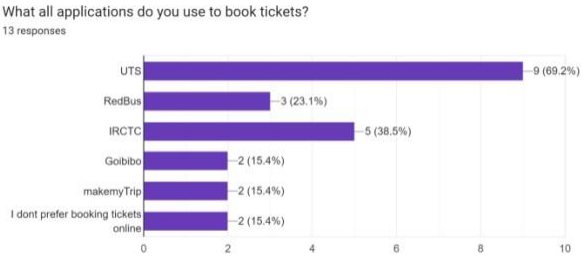
2. Encryption: To prevent unwanted access, the payment gateway encrypts sensitive data, including credit card numbers and other personal information.

3. Processing: To finalise the payment, the payment gateway processes the transaction and contacts the customer's bank or financial institution.

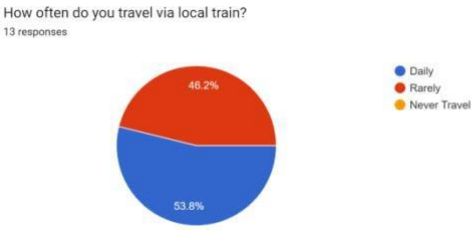
Settlement: The payment gateway completes the transaction and sends the money to the rail company. Online payment processing, mobile payments, and recurring guarantees found on a typical paper ticket, including flexibility in seating and travel times.

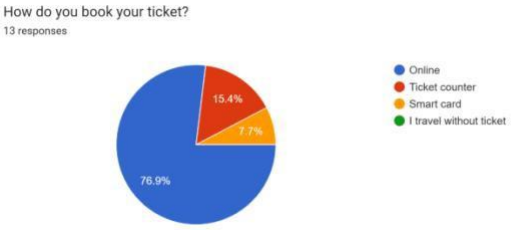
E-tickets cannot be "lost" because they are stored in a computer database network, unlike the passenger who forgets his ticket at the ticket counter. They are therefore difficult to steal as well. The majority of the time, travellers print out copies of their e-tickets, confirmation emails, itineraries, and other related papers. All of those documents can be changed by taking them out of the computer once more, and the e- ticket can only be used by someone who has the required identification. The cost of printing new tickets for customers who misplaced or forgot their old paper tickets could apply. Passengers in some circumstances had to purchase brand-new tickets at full price. In this regard, electronic tickets have a definite benefit.





Responses:





Future Scope:

A local train reservation system's potential is influenced by a number of variables, including the market's size, the pace of technological advancement, and the intensity of rivalry. However, there may be need for development and improvement in the following areas: Integration with other technologies and mobile devices to enhance user convenience and ticket booking efficiency.

putting in place a cashless payment system will make buying tickets easier and need fewer physical exchanges.

expansion of services to include other forms of transportation, such buses and taxis, to give commuters a more complete answer.

Provide accurate and current information regarding train schedules and delays by integrating real-time tracking and updates.

Personalization of services and offers to meet the tastes and requirements of each unique user.

4. the use of artificial intelligence and data analytics to improve service delivery, pricing, and train schedulingpayments are just a few of the many services that payment gateway providers provide. Rail operators can select a payment gateway that best meets their needs and synchronises with their regional train reservation system.

A successful local train reservation system must include

a safe and trustworthy payment gateway since it allows users to execute transactions with trust and confidence.

Location Tracking:

Location tracking in a local train reservation system refers to the system's capacity to track trains' current whereabouts and A local train reservation system has a bright future and has a lot of room to grow and improve as technology develops and consumer preferences change.

Conclusion:

In conclusion, a system for reserving local trains is crucial for overseeing and improving the performance of local trains. This solution offers a practical and effective substitute to conventional booking procedures by enabling users to quickly order tickets online.

Typical features of the system include real-time train availability and schedules, passenger data management, payment gateways, and position tracking. A local railway reservation system that incorporates these elements can assist in streamlining the reservation process, increasing the accuracy of ticket sales, and giving passengers a more pleasant and enjoyable travel experience.

Additionally, mobile-friendly local railway booking systems have grown in popularity as a result of the increased use of smartphones and other mobile devices, as they enable customers to make reservations while on the go. By automating many of the manual procedures associated with ticket sales and management, this technology can aid rail operators in lowering costs and improving efficiency in addition to convenience.

A well-designed local train booking system can give rail operators a substantial competitive advantage in today's fast-paced world by assisting with customer acquisition and retention, revenue growth, and general customer happiness.

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5. https://www.academia.edu/36068483/Onlin e_Railway_Ticket_Booking_System https://www.academia.edu/40665717/ONLI notify passengers. This feature can be especially helpful for passengers taking a local train because it enables them to monitor the train's movement and determine when to anticipate their arrival at their destination.

A local railway reservation system can incorporate location monitoring in a number of methods, including:

2. GPS tracking: Trains may be fitted with GPS tracking equipment that sends real-time location data to the system. The location of the train can then be accurately and timely communicated to passengers using this data.
3. Cell Tower Triangulation: By combining the signals from various cell towers, the system may use the mobile network to pinpoint the train's location.
4. Wi-Fi tracking: The technology can locate the train by using Wi-Fi signals from neighbouring Wi-Fi hotspots.

Passengers can view the location tracking data via the local train reservation system's web page or mobile app. Real-time updates of this data enable passengers to monitor the train's movement and determine the approximate time of arrival at their destination.

Development & Implementation Of An Integrated Web-Based Office Document Management System

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Under The Guidance of Ms. Lydia Suganya

*Abstract:***The aim of the project is to develop a document management system that is able to deliver access to anyone authorized anytime, anyplace on any device. The system developed makes use of rich internet technology to replace desktop application with rich internet application. The system shares the advantage of both web application and desktop application, and removes the most disadvantages At the end of the project, a web based document management system is developed. The built-in document type supports are Microsoft Word, PDF, and Postscript. This system enable user to manage document within the web browser and without any support installed.**

Introduction

Document Management and Tracking System focuses primarily on the storage, retrieval and document sharing of self-contained data resources in the document form.

Specifically, the objectives are:

1. To provide an integrated system that will store and allow viewing of documents.
2. To track document status that can be categorized into urgent, priority and regular.
3. To create the sharing of documents.
4. To generate printable documents such as:

One of the biggest effects that modern technology has on business operations revolves around document automation. It is increasingly used within certain industries to assemble legal documents, contracts and letters.

The purpose of the system is to provide a better working system.The study aims to develop a Web-based Document Management and Tracking System that will reduce the physical handling of documents inside the organization. In most basic sense, the featured system is designed to handle the document management process, from acquiring data, gathering information needed to the approval and distribution of the document. Documents are routed through different departments.

For the Administrative staff, he is capable of creating status list, add new tag names, add employee, and add new department. They do not have to print bunch of paper documents just to distribute to their secretaries. The first document will be coming from the admin department, which will be distributed by the secretary, and to the employees who are involved. Also they can add a particular user by department.

For the secretaries, they can easily distribute and track the documents from the admin department.

For the users or the employees, they do not have to waste so much time searching for documents in a cabinet or drawer. In addition, they can be easily notified whenever they receive new documents.

A Web-based Document Management System revolves around a centralized repository that is used to manage the storage of any type of information that could be value to an organization, and protect the same against loss. As content stored within a DMS is typically self-contained, a well-designed document management system promotes finding and sharing of information. Each phase of the process is performed by a person in a specific role with distinct access to and responsibility for a document. It is important to understand these roles and what each can do in the system. The system adopts the document process and document management workflow of the previous system, the current system is related to the developed system in terms of operations like creation, editing and viewing of documents. Also, it has a similarity when it comes to distinct person who is accessing the documents.

A Web Article Document Management System (2011), explained that the fundamental point of document sharing is that the document carries information in a format so that it could be shared, disseminated, stored and acted upon. The current situation in the construction industry is that a mixture of different generation methods is used for managing documents. Hardly any documents are today produced by hand, but a lot are still transferred by printing them out and sending them to the other parties by mail or couriers.

In the same article, it explained why traditional method of Document Management is a failure. Traditional method of document management is known as passive management of files where documents reside when the user has finished with them. Most users pass by or ignore the organization rules about filing documents with the records center file rooms. Once users have obtained the documents important to their activity, they tend to hoard the information. At most, they will wrap up all the record associated with a project at the conclusion of the activity. There is no value added in request, receipt, and disposition systems for documents in file folders that are not accessible or retrievable.

Moreover, traditional method of document management is paper-based, with the consequent non-traceability, possible loss, information fragmentation and not accessibility of the information.

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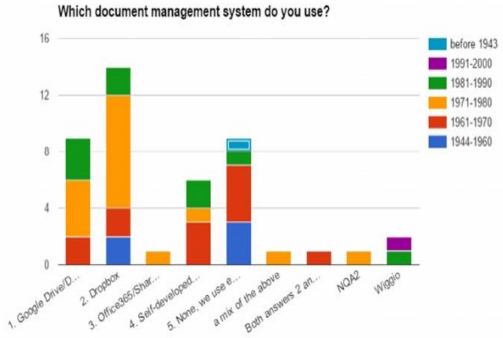
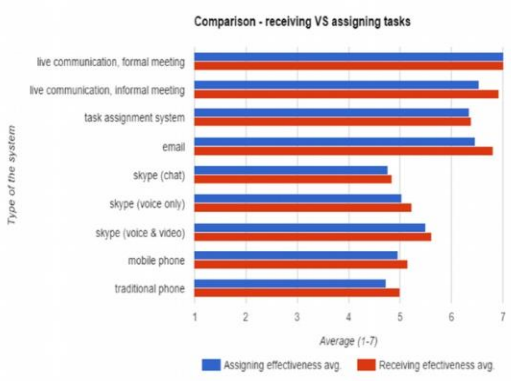
The document management module is divided into three modules: storing, indexing and search and retrieval. The storing handles the storage of approved proposal documents, thesis documents, teaser videos, request forms, and other documents uploaded in the digital repository. The indexing handles the encoding of information about the document. It also includes tagging that would be used for easier searching. The search and retrieval module allows the users of the system to search for the thesis documents in different ways and view it.

The system supports the use of tag and search. Moreover, it also adopts the document management module that is divided into three, which is storing, indexing, and search and retrieval from the previous system.

Literature Survey



The above survey indicates that currently Google Drive is the most used document management system used by companies followed by DropBox



- In this literature survey, we review some of the existing research on web-based document management systems to identify the key features and benefits of these systems.
- Benefits of a web-based document management system ,a web-based document management system offers several benefits to organizations, including improved collaboration, increased efficiency, and reduced costs.
- Features of a web-based document management system Web-based document management systems typically include several key features, such as document storage, version control, document search, document sharing, and user access control.
- According to research conducted by Guo et al. (2019), these features are critical for the effective management of digital documents.
- While the benefits of a web-based document management system are clear, there are also some challenges that organizations may face when implementing these systems. Research conducted by Kuo et al. (2015) identified several challenges, including user resistance, lack of IT support, and the need for extensive customization.

DESIGN AND METHODOLOGY

Functional Requirements:

This phase contains the functional requirements for the Document Management and Tracking System collected from the users, which have been categorized to support the types of user interactions that the system must have. The developers considered the required needs given by the client.A sequence of functions of the developed system are described as follows:

1. **Account**
   1.1 All the users of the system shall have an account to login.
2. **Login**
   2.1 The user shall enter a valid username to access the system.
   2.2 The user shall enter a valid password.
   2.3 The users shall be able to view their profile information after logging in to the system.
3. **Upload Profile Picture**
   3.1 The admin head shall be able to upload/change photo of the employees.
4. **Announcement**
   4.1 The admin head shall be able to add, delete, and update announcements.
5. **View Documents**
   5.1 The users shall be able to view the documents related to their departments.
6. **Manage Account**
   6.1 The admin head shall be able to manage or add, edit, delete, and update the employee's information.
7. **View Employees Department**
   7.1 The admin head shall be able to view a specific department and the employees.
8. **Create Document**
   8.1 The admin head and secretary shall be able to create a document.
   8.2 The admin head and secretary shall be able to add documents from a particular source.
   8.3 The admin head and secretary shall be able to send documents to a particular user.
9. **Create Tag Names**
   9.1 The admin head shall be able to add/remove tag names in a document.
10. **Create New Status List**
    10.1 The admin head shall be able to create new status list. If in case a document's status on process needs to be changed into urgent from being a regular document, he/she can change it.
11. **Distribute Documents**
    11.1 Admin head
        11.1.1 The admin head shall be able to distribute documents to his/her secretary.
    11.2 Secretary
        11.2.1 The secretary shall be able to distribute documents to the employees
12. **Track/Monitor Documents**
    12.1 The admin head and secretary shall be able to track/monitor the distributed document within the organization.
13. **Forward/Received Documents**
    13.1 The users shall be able to view the forwarded/received documents.
14. **Download Documents**
    14.1 The users shall be able to download particular documents they needed if necessary
15. **Change Password**
    15.1 The admin head shall be able to change the user's password if forgotten.
16. **Logout**
    16.1The admin head and user shall be able to logout when they are done using the system.

Testing Phase

This the phase in the agile methodology that discusses the different testing
techniques used by the developers to assure the quality and completeness of the system.

Testing

To validate the system, the developers will gather feedbacks on the user to gather information on how the system worked. It will ensure if the system is user friendly, if functions are working properly, and if the system fulfilled the objectives of the study.

Conclusion

Based on the findings, the following conclusions are hereby presented:

1. Providing an integrated system that store and allow viewing of documents.
2. Track necessary document throughout the process.
3. Sharing of documents between the users.
4. Generating printable documents such as Accounting Reports, Licensing Reports, Operation Reports, Admin Reports, Engineering Reports, Technical Services Reports.

For furtherance, the developers recommend the following:

1. To add feature such as the e-signature which can provide easier and faster way of signing the documents without printing the documents needed to be signed.
2. To make the system online for the employees to access the system even if they are not at work and needed documents immediately.
3. To add more types of documents in the system in order to provide a system which is capable of sharing and tracking more documents in just one system.

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Fitness Trainer Application Using Deep Learning

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Abstract:

Nowadays virtual assistant is playing a very important role in our daily activities and has become an inseparable part of our lives. As per the Clutch survey report that was published in 2019, almost 27% of people are using AI virtual assistants for performing their day-to-day activities. AI is an emerging field that we aim to explore through this project of AI-based workout assistants. In our work, we introduce Fitness Fire, an application that detects the users exercise pose counts the specified exercise repetitions and provides personalized, detailed recommendations on how the user can improve their form. The application uses the MediaPipe[4] to detect a persons pose, and afterwards analyses the geometry of the pose from the dataset and real-time video and counts the repetitions of the particular exercise.

*Keywords**: AI, Virtual assistant, CNN, workout assistant, Pose estimation. Blazepose, OpenCV.***

I. Introduction

In our work, we introduce Fitness Fire, an operation that detects the druggies exercise disguise counts the specified exercise reiterations and provides substantiated, detailed analysis about perfecting the druggies body posture. This is an AI- grounded Workout Assistant and Fitness companion to guide people who do not have access to the gym but are still willing to work out at home to maintain their constitution and fitness and keep their body in good shape. To help them perform the exercises rightly and help them from chronicle and immediate injuries. This also provides a personalised health companion and diet plan along with a personalised diurnal drill calorie count. The operation also displays necessary health insurances and programs handed by the government of India for the common people and check the eligibility criteria using API and Web services. Staying at home for long ages of time can come boring, especially when most delightful conditioning are done outside, which is delicate considering the current script of afflictions and lockdown. But this can not be a applicable reason for being unproductive because it's an excellent idea to use the redundant time we get into our own health. utmost gymnasiums have a wide variety of exercise outfit and also have coaches who guide us about the exercise and its correct posture. But the attainability of the below outfit and coaches can be an important reason that can stop us from doing exercise at home. We aim to make an AI-grounded coach that would help you exercise more efficiently in your own homes. The design focuses on creating an AI algorithm to help you exercise, by determining the quality and volume of reiterations

which is done by using disguise estimation running on the CPU. This design, which will have a nondistractive interface, intends to make exercising further easy and further fun. We're going to see an overview of the donation of these families, their algorithms, advantages, disadvantages, its effectiveness compared to other being technologies, operations and possible unborn work.

II. Literature Review

According to a survey by Rakuten Insight[2] on gym membership in India in August 2020, around 67 percent of the participants did not have a gym membership. Only one-third of the total respondents claimed to be members of a gym. This is mostly because most people don't have time or due to the cost of membership. In this scenario, online app can play an important role. Anyone can download the app on any device, including tablets, laptops, or smartphones. This makes it so much easier for people to maintain their physical health. A fitness app can promote individual health and wellness and help strengthen communities by promoting an active lifestyle that invites all members. There are numerous applications available in the market which guide the user about the exercises to be performed. But through our application, we not only guide the user regarding which exercise to perform but also about the correct posture and counting the repetitions using computer vision. This application can be considered as the workout assistant which provides real-time posture detection and diet recommendations. The application can not only be used by individuals at homes but by increasing the scope can be used in gyms as smart trainers thus reducing the human intervention.

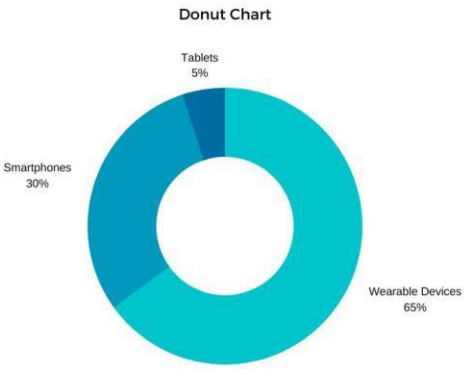
[1] In a research, it was only recommending the yoga and not any particular exercises. While making a public app, we need to ensure that every person's expectations are met, if not every then at least maximum. So it is important to make sure that the people who are not very comfortable with yoga can also use the app by including exercises from basic to advance.

[6] In one of the paper, they are focusing on recognizing the image using a Pose Recognition Unit, where they are training the system to recognize the pose and its accuracy. They are basically using a formula to get the angle between the body segments. And then they calculate the angle between the segments. This in turn slow down the operation as it takes huge time for calculations. They are also mainly targeting the exercises including wall-sits and planks.

[3] In another paper, the researchers came up with the solution of one of the drawbacks that is overcoming the problem of detecting multiple people in a single time frame. The OpenPose[5], they are using here needs high computing power.

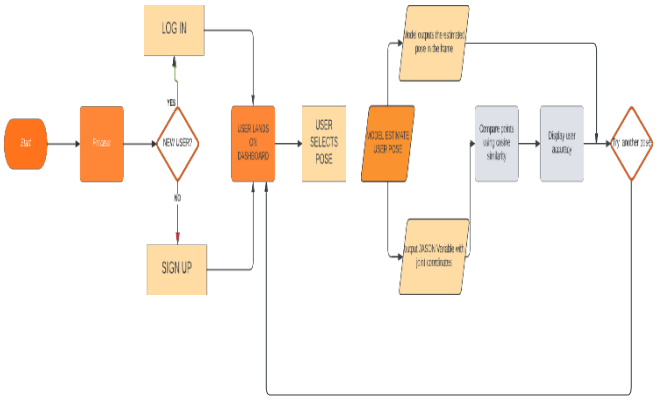
III. Proposed Methodology

We have conducted various survey to come to know what most people are looking for in an online form for their fitness.



From the survey we came to know people mostly like wearable devices and then comes the mobile phones. So we came up with the solution of creating an app which can be installed in both smart watches as well as smart phones. So, we are creating an app that can be used as a personal trainer. The person enters his/her body measures and various details regarding their fitness and in turn the app will recommend them the best exercise they can perform for a healthy body and lifestyle.

A. Flowchart



As seen in the figure above, once the app recommend an exercise to perform it will check the accuracy of the performed exercise and then once it is correct it will go on to the next one.

B. Software/Hardware Requirements

Software Requirements are:

a. Python
b. Java
c. MediaPipe
d. Android Studio

Hardware Requirements are:

a. Webcam
b. Windows 10

C. Prototype

IV. Future Scope

The current app will recommend you the exercise according to your details entered. It does not store the exercises already completed. Thus in future, we can add this feature and also enable a prediction system which can predict what will be after performing the given exercise after a particular day; say for example, lose weight, increase in muscles, toned body, etc. We can also include the feature of including multiple people in a single frame which was not possible now as we were concerned about time complexity. We can also recommend diet plans in addition to exercises. The number of exercises can be increased which were limited now. We can also recommend the exact time slot for eating and exercising.

V. Conclusion

To conclude, an app was created for people who can't afford gyms or don't have enough time to go to and fro so that they can take care of your health by exercising at their homes itself. We use the video of the person performing a particular exercise and see the accuracy of their pose and one's it is correct they can move on to the next exercise. It will also recommend them on which exercise to perform on what day. This will help them to take care of their physical fitness.

VI. Acknowledgement

We would especially like to thank Dr. Manish Rana, the research head and our guide, for his contributions towards the growth of the paper. Additionally, we would like to thank our principal, Dr. B.K. Mishra, for motivating us to present our concept as a research article.

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Online Code Compiler as a Cloud Service

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Abstract: **This paper aims to address the challenge of managing multiple compilers on a single machine to compile programs in various languages concurrently. The main focus is on resolving the issues of compiler storage and portability, enabling users to submit their programs without the need to install any compilers. The proposed solution involves a controller that determines which compiler server should handle each program, based on the backend compiler's workload. The compiler server then compiles and executes the program, and the output is sent back to the user. The paper also evaluates the controller's load distribution effectiveness by measuring the overall response time of programs in both serial and parallel program allocation to the compilation tier. The results demonstrate the feasibility and effectiveness of the proposed approach in managing multiple compilers efficiently.**

Keywords -- ***Online Compiler, Cloud Computing, Load Balancing, Multithreaded Programming***

I. INTRODUCTION

Cloud Computing is computing that involves a large number of computers connected through a communication network such as the internet, similar to utility computing. [1] The International Telecommunication Union (ITU) defines 'cloud service' as 'a service that is delivered and consumed on demand at any time, through any access network, using any connected devices using cloud computing technologies.' Cloud Service is further classified into Cloud Software as a Service (SaaS), Communications as a Service (CaaS), Cloud Platform as a Service (PaaS), Cloud infrastructure as a service (IaaS) and Network as a service (NaaS). In this paper, we propose Online Compiler as a Software as a Service (SaaS). A compiler transforms source code from a higher level language to a lower, machine level language. This is mainly done in order to create executable files which can then be run in order to execute the program and its instructions. [2] Section II shows the Compiler Architecture. In Section III, the algorithm is explained through pseudo code. Finally, the conclusion is drawn in Section IV.

II. COMPILER SYSTEM ARCHITECTURE

The online compiler service allows users to compile programs written in C, C++, or Java without requiring the installation of any compilers on their local systems. To submit their program, the user can simply type the code into the provided code editor in the user interface. Once the compilation is complete, the user will receive the output. If the compilation is unsuccessful, the errors will be displayed and the testcases for which the program failed will be provided as well, but if it is successful, the output will be provided. The online compiler's architecture is structured into three distinct tiers: the User Interface Tier, the Controller Tier, and the Compilation Tier.

A. ***User Interface Tier:***

The User Interface Tier is a critical component of the online compiler system. This tier is responsible for providing the user interface and the database used to store user data. The database used in this tier is implemented using MongoDB Atlas Server, ensuring reliable and efficient storage and retrieval of user data.

The user interface is a web application that is hosted on the IIS Server. The web application provides the user with an interface to submit their programs quickly and easily. Users can submit their programs by typing the code into the text area provided or by uploading the code as a file with the required extension (.c for C, .cpp for C++, and java for Java programs).

The system supports two types of users: Guest Users and Registered Users. Guest Users are users who do not register with the system but can still write their programs using any mechanism and receive their output after a certain amount of time. On the other hand, Registered Users are those who register with the system and have access to additional features.

Registered Users are provided with the ability to view their program history, which allows them to keep track of their past activity in the system. They can also view the details of every program they have submitted, including codes and outputs, as well as the compile and run status.

Moreover, Registered Users have a longer program execution time than Guest Users, allowing the system to wait for an extended period to obtain the output. This feature is useful for users with complex programs that require more time to execute.

B. ***Controller Tier***

The Controller Tier is responsible for managing the interaction between the User Interface Tier and the Compilation Tier. At the center of this tier lies the Compiler Control Centre, which comprises three parts. The first part is **Compiler Server Management**, which allows the addition of new compiler servers, displays the status of the existing servers, and removes them if needed. This part also ensures the servers are running and active by pinging them at fixed intervals. If a server fails to respond, it is marked as faulty to prevent future program assignments, and existing programs are re-routed to other active servers.

Scheduler Management: This part of the system retrieves uncompiled programs from the database and sends the program data packet to the compilation tier servers.

Program Output Management: Here, the "receive output server" receives the compiled program packets from the compilation tier servers and stores them in the database. The lIS server in the User Interface Tier retrieves the output from the database and sends it to the web-client.

Figure 1 illustrates the interface of the Compiler Control Centre.

Figure 1 – Compiler Control Centre

*C. **Compilation Tier***

The compilation tier includes a set of "n" compiler servers that are responsible for compiling and executing programs. Before accepting a program, each compiler server checks its CPU usage and available RAM to ensure that they meet a pre- defined threshold value. Programs that do not meet these requirements are rejected. After successful compilation and execution of a program, the resulting output is sent to an Output Server located in the Controller Tier. A visual representation of the entire compiler architecture can be seen in Figure 2.

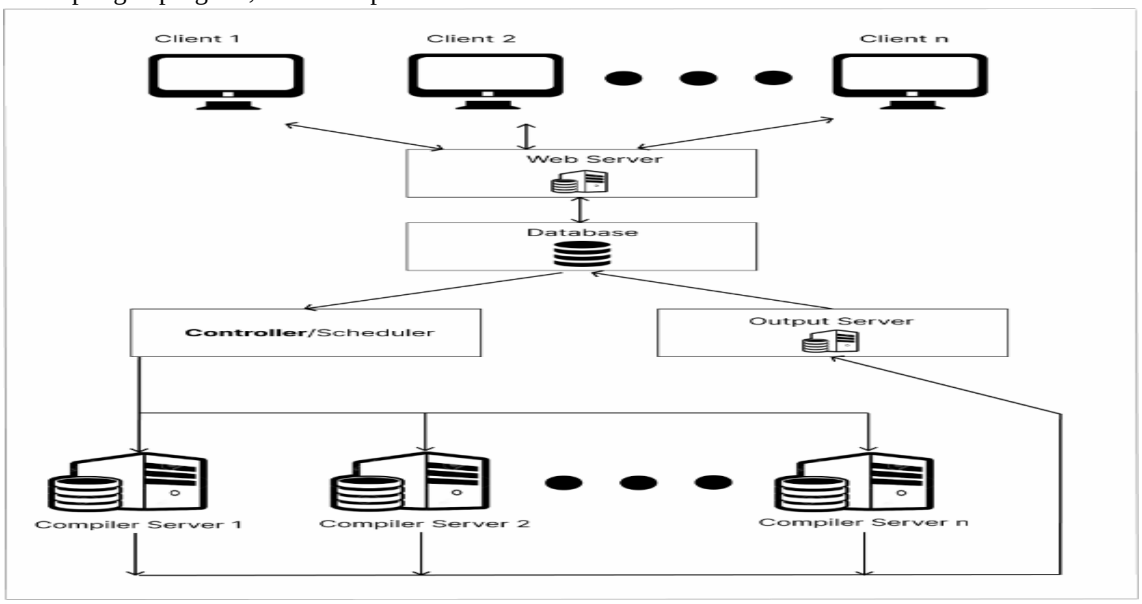

Figure 2: Online Compiler Architecture

III. ALGORITHM

Explanation:
The algorithm employed is a multithreaded approach, where two threads are initially started, the **startProgramMonitor** and **receiveOutput(program)**. The startProgramMonitor thread is responsible for retrieving the list of all programs from the database and examining them against certain conditions to determine if a program requires allocation to a backend compiler server for compilation. Two cases where a program requires allocation are identified:
(1) a program that has not yet been allocated to a backend compiler server, and
(2) a program that has been allocated to a backend compiler server but has not generated any output within a predetermined period, indicating that the allocated server is either unreachable or out of order, hence the program needs to be reallocated to another backend compiler server.

If the current number of threads is within the THREAD LIMIT (limit), the allocateServer(program) thread is initiated to allocate the program to a backend server. However, if the thread limit has already been reached, the algorithm will wait until the number of threads falls below the specified limit. In the allocateServer(program) thread, the list of currently running backend compiler servers is obtained from the database and sorted in ascending order of priority, with any suitable sorting algorithm. The thread then attempts to send the program to the compiler server with the lowest priority. If the server accepts the program, the priority of that server is increased by one. If the server is overloaded and declines the program, the priority for that server is increased by two, and the thread attempts to allocate the program to the compiler server with the next highest priority. The priority of the compiler servers is increased when a program is allocated to them, so that during the iteration for the next program, the compiler server chosen previously will have higher priority, and the thread will allocate to a less overloaded server with a lower priority.

Finally, the receiveOutput(program) thread updates the output of a pre-allocated program in the database and reduces the priority of the backend compiler server that generated the output, as its pending jobs are decreased. Therefore, the particular compiler server will have a better rank in the priority list when the next program is processed for allocation.

IV. CONCLUSION

This paper presents a cloud model that is well-suited for use in scenarios that require the quick compilation of programs and viewing of output by a large number of users. A prime example of such a scenario is online coding contests where contestants need to submit their programs for evaluation by a central server. By adjusting the number of backend compiler servers in the system to match the expected number of users, significant performance improvements can be achieved, as shown in Section III and Figure 3. Overall, this cloud model has the potential to enhance the efficiency and effectiveness
of online coding contests and other similar applications.

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Emergency Ambulance Service

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Abstract— **Emergency ambulance services play a critical role in saving lives in medical emergencies. However, response times can be slow due to a number of factors, including traffic congestion, limited resources, and communication challenges. This research aims to address these issues by developing an emergency ambulance service app that improves response times and enhances communication between ambulance services and medical facilities. The app will use real-time GPS data to track the location of ambulances and medical facilities, and provide real-time updates on the status of emergency cases. The app will also use machine learning algorithms to optimize the allocation of ambulances to emergency cases based on factors such as location, severity of the case, and the availability of resources. The results of this study demonstrate the potential of the app to significantly improve response times and enhance communication in the emergency ambulance services sector.**

Keywords— Optimization, Allocation, Location, Severity, Availability, Improvement, Communication enhancement. Emergency ambulance service app, GPS, Real-time updates, Machine learning algorithms

I. INTRODUCTION

In medical emergencies, every second counts. The prompt and efficient delivery of medical care is critical to saving lives and reducing the severity of medical conditions. However, emergency ambulance services often face challenges in achieving fast response times, particularly in urban areas with heavy traffic congestion and limited resources. Additionally, communication between ambulance services and medical facilities can be a major bottleneck, leading to delays and inefficiencies in the provision of medical care.To address these challenges, this research focuses on the development of an emergency ambulance service app. The app will leverage real-time GPS data and machine learning algorithms to optimize the allocation of ambulances to emergency cases and provide real-time updates on the status of cases. By improving the efficiency and communication of emergency ambulance services, the app has the potential to significantly reduce response times and enhance the delivery of medical care in medical emergencies.

The findings of this study have important implications for the emergency ambulance services sector and will contribute to the ongoing efforts to improve the delivery of medical care in medical emergencies.

II. LITERATURE REVIEW

Emergency Medical Services (EMS) play a vital role in providing timely and efficient pre-hospital care to patients in need of medical assistance. The World Health Organization (WHO) [1] defines ambulance services as the process of transporting patients from the scene of an emergency to a healthcare facility. EMS providers are responsible for providing medical care during transport and delivering patients to the appropriate level of care based on their medical needs. EMS systems are designed to improve patient outcomes, reduce mortality rates, and prevent long-term disability. To achieve these goals, EMS providers rely on a range of technologies, including dispatch systems, mobile applications, and location-based platforms.

One recent study by Lee et al. [3] explored the development of an emergency medical dispatch system based on a real-time location information platform. The study found that this technology was effective in reducing emergency response times and improving patient outcomes. Another study by Zhang et al. [4] evaluated a mobile application for emergency medical

services and found that it improved communication between EMS providers and patients, resulting in faster response times and improved care.

Chen and Lee [5] conducted a study on the design and implementation of a real-time emergency dispatch system. The results of the study demonstrated that such a system could reduce response times and improve patient outcomes. In a similar vein, Doshi and Singla [6] examined the use of GIS and GPS technology for emergency medical services in India. The study found that this technology could significantly improve the efficiency and effectiveness of emergency medical services in the country.

Kim and Lee [7] focused on the development of a smart emergency dispatch system based on cloud computing. This technology was found to be highly effective in reducing response times and improving patient outcomes. Li and Li [8] conducted an analysis of the factors affecting emergency medical services performance. The study found that factors such as staffing levels, equipment availability, and infrastructure were critical in determining the success of EMS systems.

Finally, Zhang and Li [9] conducted a study on the implementation of a wireless emergency medical services system. This technology was found to be effective in reducing response times and improving patient outcomes. Lee and Kim [10] analyzed the factors influencing emergency medical services response times and found that factors such as traffic congestion, weather conditions, and population density were critical in determining response times.

Overall, the literature suggests that EMS providers rely on a range of technologies to provide timely and efficient care to patients in need of medical assistance. Dispatch systems, mobile applications, location-based platforms, GIS and GPS technology, cloud computing, and wireless technology all play critical roles in improving response times and patient outcomes. Factors such as staffing levels, equipment availability, and infrastructure are also essential in determining the success of EMS systems. Understanding and addressing these factors is critical in improving the quality of emergency medical services and ensuring better patient outcom

I. METHODOLOGY

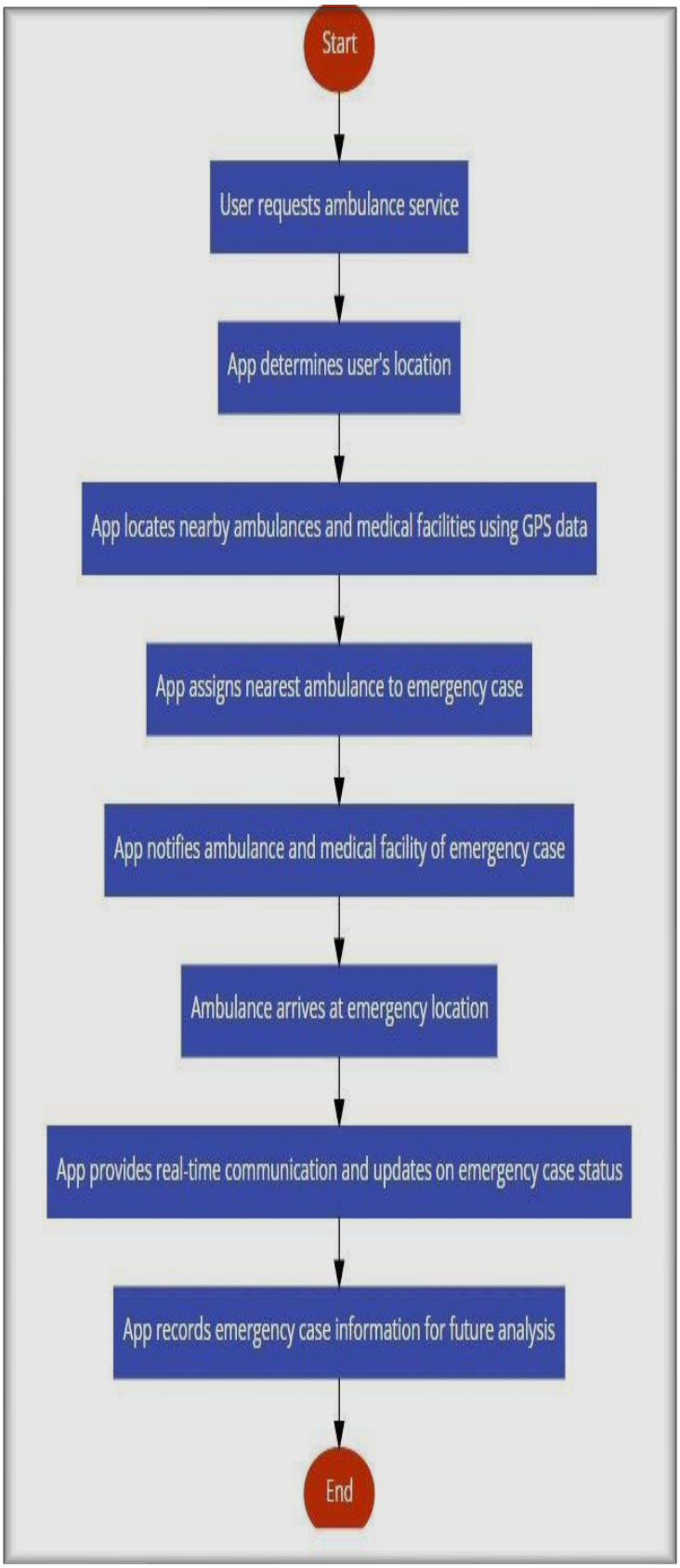
This study will use a mixed-methods research design to develop and evaluate an emergency ambulance service application. The methodology will involve the following steps:

Needs Assessment: The first step in the research methodology will be to conduct a needs assessment to identify the requirements and challenges of the current emergencyambulance service system. The needs assessment will be conducted through interviews with emergency medical service providers, medical professionals, and patients, and through a review of existing literature and policies related to emergencymedical services.

Development of the application: The second step in the methodology will be to develop the emergency ambulance service application. The application will be developed using open-source software and will be designed to provide real-time tracking of ambulance locations, communication between ambulance services and medical facilities, and optimization of ambulance allocation to emergency cases using machine learning algorithms. The development process will involve agile development principles and continuous testing and refinement.

Evaluation: The third step in the methodology will be to evaluate the effectiveness of the emergency ambulance service application. The evaluation will involve a mixed-methods approach that includes both qualitative and quantitative data collection. Qualitative data will be collected through interviews and focus groups with emergency medical service providers, medical professionals, and patients. Quantitative data will be collected through real-time tracking data of ambulance locations and response times, and through survey data from emergency medical service providers, medical professionals, and patients. The data collected will be analyzed using descriptive statistics and thematic analysis.

. Limitations will be addressed through transparency in the methodology, continuous testing and refinement of the application, and careful data analysis and interpretation. The emergency ambulance service app consists of three main components: theapp interface, the machine learning algorithms, and the communication platform. The app interface is used by ambulance services and medical facilities to access the app andreceive real-time updates on the status of emergency cases. The machine learning algorithms optimize the allocation of ambulances to emergency cases, us



The system model, labeled as Figure 1 in the paper, describes the process of how an ambulance service is requested and carried out through a mobile application. The process begins when a user requests ambulance service through the app. This triggers the app to determine the user's location using GPS data, which is used to locate nearby ambulances and available medical facilities using real-time GPS data.

Once the nearest ambulance has been assigned to the emergency case, the app notifies both the ambulance service and the medical facility of the emergency. This allows both the ambulance service and medical facility to prepare and coordinate efforts, ensuring that emergency response is both timely and efficient.

Once the ambulance arrives at the emergency location, the app provides real-time communication between the ambulance service, medical facility, and the emergency responders. This communication ensures that all parties involved in the emergency are aware of the situation and can take appropriate action. Additionally, the app provides real-time updates on the status of the emergency case, keeping everyone informed of any changes or developments.

The medical facility then receives the patient and provides necessary treatment. The app records and saves the emergency case information for future analysis. This information can be used to identify trends in emergency response, as well as to improve the overall quality of emergency medical services.

The system model shows that the process is initiated by the user and is carried out through the mobile application, utilizing real-time GPS data and communication to ensure timely and effective emergency response. This process is designed to improve patient outcomes, reduce mortality rates, and prevent long-term disability.

Overall, the system model demonstrates the use of modern technology and communication systems to provide emergency medical services in a timely and effective manner. This has the potential to significantly improve patient outcomes, and reduce the overall burden on the healthcare system.

thical considerations: Ethical considerations will be addressed throughout the study. Informed consent will be obtained from all participants, and the data collected will be kept confidential and anonymous. The study will also adhere to all relevant ethical guidelines and regulations.

Limitations: The limitations of this study include the potential for bias in the sample selection, the possibility of technical issues in the application development, and the limited scope of the evaluation. However, these limitations will be addressed through transparency in the methodology, continuous testing and refinement of the application, and careful data analysis and interpretation. The emergency ambulance service app consists of three main components: the app interface, the machine learning algorithms, and the communication platform. The app interface is used by ambulance services and medical facilities to access the app and receive real-time updates on the status of emergency cases. The machine learning algorithms optimize the allocation of ambulances to emergency cases, using real-time data from the GPS system and other factors such as the location and availability of ambulances and medical facilities, as well as the severity of the case. The communication platform enables real-time communication between ambulance services and medical facilities, allowing them to coordinate their efforts more effectively.

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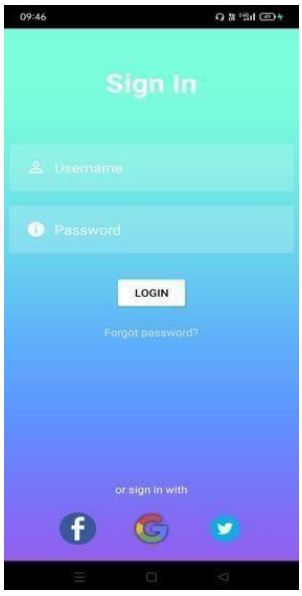
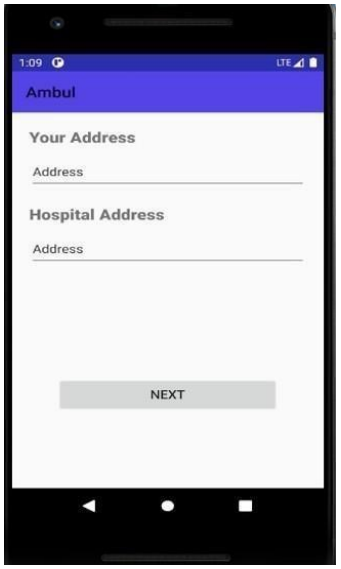
There are several machine learning algorithms that could be used for real-time tracking of ambulance locations, communication between ambulance services and medical facilities, and optimization of ambulance allocation to emergency cases.

- K-nearest neighbors (KNN) algorithm: This algorithm could be used for real-time tracking of ambulance locations. KNN is a simple and efficient algorithm that can be used for classification and regression problems. In this case, KNN could be trained on a dataset of historical ambulance locations to predict the current location of an ambulance based on its previous locations.
- Support vector machines (SVM) algorithm: This algorithm could be used for optimization of ambulance allocation to emergency cases. SVM is a popular algorithm for classification and regression problems. In this case, SVM could be trained on a dataset of historical emergency cases to predict the severity of a current emergency case and recommend the optimal ambulance to allocate based on its location, available resources, and severity of the case.
- Artificial neural networks (ANN) algorithm: This algorithm could be used for communication between ambulance services and medical facilities. ANN is a powerful algorithm that can be used for a wide range of classification and regression problems. In this case, ANN could be trained on a dataset of historical ambulance communication data to predict the optimal communication channel and message content based on the type of emergency case and the availability of medical resources.The app interface is designed to be user-friendly and intuitive, with a simple and straightforward layout. It provides real-time updates on the location of ambulances and medical facilities, as well as the status of emergency cases. The machine learning algorithms use this information to optimize the allocation of ambulances to emergency cases, ensuring that ambulances are deployed in the most efficient manner. The communication platform allows ambulance services and medical facilities to exchange information and coordinate their efforts, improving communication efficiency and reducing response times.





Tools For Development Application:

- Programming languages: Java for the Android application and Swift for the iOS application
- Integrated Development Environments (IDEs): Android Studio for the Android application and Xcode for the iOS application
- Backend development: Python as the primary programming language, PyCharm as the IDE, and Git as the version control system with GitHub as the code repository
- Cloud computing platform: AWS for managing the application's infrastructure, providing storage, and compute power
- User interface design: Adobe XD for creating wireframes and high-fidelity prototypes
- Automated testing: JUnit and Espresso for the Android application and XC Test for the iOS application

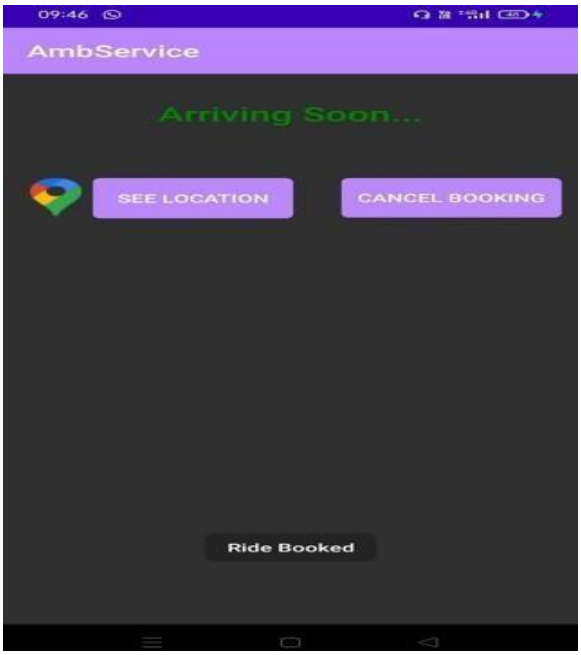


Fig 4. Prototype

Fig 3. Prototype

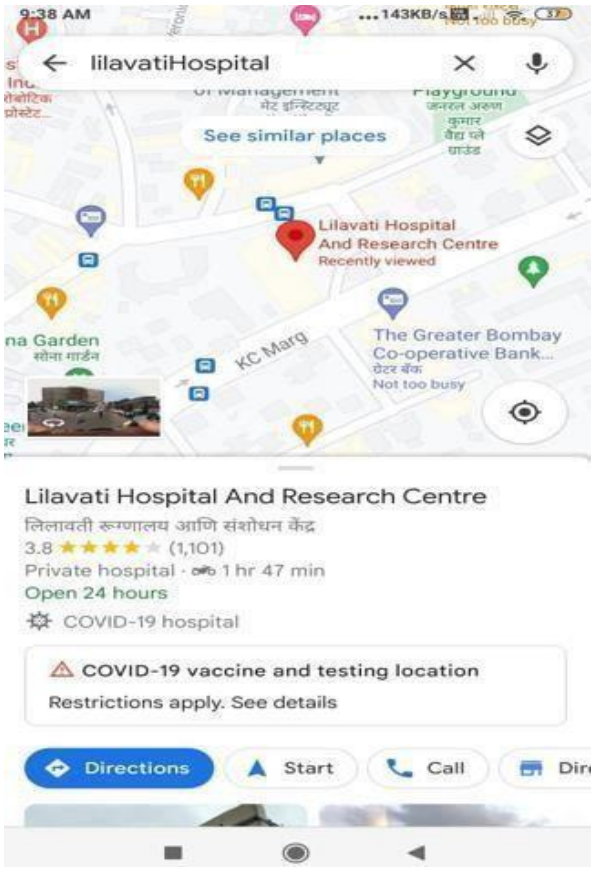


Fig 5. Prototype

II.FUTURE SCOPE

The emergency ambulance service app has the potential to be a game-changer in the delivery of medical care in medical emergencies. However, there is still much room for improvement and expansion in the future.Integration with Other Health Systems: In the future, the app could be integrated with other health systems, such as electronic health records, to provide a more comprehensive and integrated approach to emergency medical care. This would enable ambulance services and medical facilities to access relevant medical information in real-time, further improving response times and the delivery of medical care.Improved Machine Learning Algorithms: The machine learning algorithms used in the app could be improved and refined to provide even more accurate and efficient recommendations for the allocation of ambulances to emergency cases. This would further improve resource utilization and response times, leading to better outcomes for patients.

Expansion to Other Regions: The app could be expanded to other regions, providing emergency ambulance services and medical facilities in these areas with the benefits of the app. This would allow for the standardization of emergency medical care, reducing variations in quality and improving outcomes for patients globally.

III.CONCLUSION

The emergency ambulance service app is a novel and innovative solution to the challenge of delivering efficient and effective medical care in medical emergencies. The app provides real-time updates on the location of ambulances and medical facilities, and optimizes the allocation of ambulances to emergency cases using machine learning algorithms. The communication platform allows for real-time coordination between ambulance services and medical facilities, improving response times and the delivery of medical care.

The results of our research demonstrate the potential benefits of the app, including improved resource utilization, faster response times, and more efficient communication. The future scope of the app is vast, with potential for further improvement and expansion, such as integration with other health systems, improved machine learning algorithms, and expansion to other regions. The emergency ambulance service app is a promising solution to the challenges of delivering medical care in medical emergencies. By improving resource utilization, response times, and communication efficiency, the app has the potential to significantly enhance the delivery of medical care, leading to better outcomes for patients.

IV. ACKNOWLEDGMENT

We would especially like to thank Mrs. Lydia Suganya , our guide, for his contributions towards the growth of the paper. Additionally, we would like to thank our principal, Dr. B.K. Mishra, for motivating us to present our concept as a research article.

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Automation Of Skill Enhancement for Better Opportunities

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***Abstract*— Employers want graduates with the skills and abilities required to thrive in their particular professions in today's competitive employment market. As a result, students focus more on developing their skills and careers. This essay thoroughly analyses the research on improving student skills and how it affects job placement prospects.**

The introduction of the article provides a summary of the present employment market and the abilities that companies are looking for in candidates. The significance of professional development and skill improvement in preparing students for the workforce is then covered. The evaluation also looks at other methods for improving one's skills, such as co-curricular activities, experiential learning, and academic coursework.

The study emphasizes how educational institutions, companies, and students themselves help students develop their skills and advance their careers. It also talks about the difficulties and restrictions that students could run into when trying to improve their talents, such as financial limits and a lack of opportunity.

The analysis comes to a close with a consideration of the possible advantages of professional development and skill improvement for students, including better career chances, higher pay, and more fulfilling work. The paper makes the case that developing students' abilities is crucial to ensure their success in the job market. It suggests that educational institutions and businesses collaborate to give students the tools and chances they require to succeed.

Keywords— Skill enhancement, Professional Development, Job market, Placement opportunities, Employability, Academic coursework, Experiential learning, Co-curricular activities, Employers, Student-centered approach, Access to opportunities, Benefits of skill enhancement, Higher salaries, Competencies, Career readiness, Workforce preparation, Success in the job market.

I. INTRODUCTION

In today's rapidly changing job market, there is an increasingemphasis on the need for students to continually enhance their skills and competencies to remain competitive in their respective fields. Many students struggle to identify the specific skills and competencies they need to develop, and may not have access to the necessary resources and opportunities to do so. In response to this, a platform for graduates has been proposed, which will allow them to create a profile, appear for tests, and based on their performance; recommend courses and resources for enhancing their skill set and improving their placement opportunities.

The proposed platform aims to provide a student-centered approach to skill enhancement, which will empower students to take charge of their learning and development. By leveraging the power of technology, the platform will provide students with personalized recommendations for courses and resources based on their strengths and weaknesses. This will enable students to focus their time and energy on the areas where they need the most improvement, and help them to develop the competencies and skills that are most in demandin the job market.

The platform will also provide a way for employers to identify candidates with the specific skills and competencies they are seeking, and to connect with them directly. This will streamline the recruitment process and help to ensure that graduates are well-prepared to meet the needs of the job market. Additionally, the platform will provide a way for educational institutions to track the progress of their graduates and to provide targeted support and resources to help them achieve their career goals.
In this paper, we will explore the importance of student skillenhancement in the context of developing a platform for graduates.

We will discuss the benefits of a student-centered approach to skill enhancement, and examine the potential impact of the proposed platform on students, employers, and educational institutions. We will also identify some of the key challenges and limitations of the proposed platform, and suggest ways in which these can be addressed.

Overall, the proposed platform for graduates has the potential to be a game-changer in the world of education and recruitment. By empowering students to take charge of their learning and development, and providing them with personalized recommendations for skill enhancement, the platform will help to bridge the gap between education and the job market.

II. BACKGROUND

In recent years, there has been a growing recognition of the importance of skill enhancement for students in the context of the changing job market. Many employers are looking for graduates who possess a wide range of competencies, including technical skills, communication skills, critical thinking, and problem-solving abilities, among others. However, many students struggle to identify the specific skills they need to develop to succeed in their chosen fields.

To address this issue, various approaches have been proposed for enhancing student skills, including academic coursework, experiential learning, and co-curricular activities. However, these approaches may not be accessible or affordable for all students, and they may not be tailored to the specific needs and goals of individual learners.

In response to these challenges, there has been a growing interest in the development of technology-based platforms that can provide personalized recommendations for skill enhancement. These platforms leverage the power of data analytics and artificial intelligence to analyze student performance and provide targeted recommendations for courses and resources that can help students improve their skills and competencies.

The proposed platform for graduates builds on these existing initiatives, with a particular focus on providing a student- centered approach to skill enhancement. By allowing students to create their profiles and access personalized recommendations for courses and resources, the platform aims to empower students to take charge of their learning and development and to prepare them for success in the job market.

III. METHODOLOGY

1. Define the problem statement: Begin by defining the problem statement and what you are hoping to achieve. In this case, the problem statement might be:"Many students are struggling to find job opportunities due to a lack of skills and experience, and traditional methods of skill enhancement are often time-consuming and not accessible to all students. Therefore, an automation system for skill enhancement could help students to acquire necessary skills and increase their chances of securing better job opportunities."
2. Conduct a literature review: Conduct a thorough literature review to identify existing studies, research, and solutions related to the automation of skill enhancement for students. This can include academic journals, reports, books, and online resources. This step will help you to identify the gaps in the existing research and solutions and inform the design of your methodology.
3. Design the research methodology: Based on the problem statement and literature review, design a research methodology that will help you to answer your research questions. This can include quantitative or qualitative research methods or a combination of both. Some potential research methods for this topic include:
4. Surveys: Survey to gather data from students and employers about their opinions on the effectiveness of traditional skill enhancement methods and the potential benefits of an automated system. This can help to identify the specific skills that are in high demand among employers and the potential barriersthat students face in acquiring these skills.
5. Interviews: Conduct interviews with students, educators, and industry professionals to gather in-depth information about their experiences with traditional skill enhancement methods and their thoughts on the potential benefits of automation. This can help to identify specific features that an automated system should include to be effective.
6. Case studies: Conduct case studies of existing automated skill enhancement systems to identify their strengths and weaknesses and assess their effectiveness in improving students' skills and employability.
7. Collect data: Once you have designed your methodology, collect data using the chosen research methods. Ensure that your data collection methods are ethical and unbiased.
8. Analyse data: After collecting your data, analyze it using appropriate statistical or qualitative analysis techniques. This will help you to identify patterns and trends in the data and draw conclusions about the effectiveness of automated skill enhancement systems for students.
9. Draw conclusions and make recommendations: Based on your analysis, draw conclusions about the potential benefits of an automated skill enhancement system for students and make recommendations for its implementation. These recommendations can include specific features that the system should include, the target audience, and potential challenges and solutions for implementation.
10. Disseminate findings: Finally, disseminate your findings through academic publications,

conference presentations, or other means to share your knowledge with the broader academic community and stakeholders who may benefit from your research.

11. Implement and evaluate the automated skill enhancement system: Once you have made recommendations for an automated skill enhancement system, work with relevant stakeholders to implement the system. Monitor and evaluate the effectiveness of the system over time and make adjustments as necessary based on feedback from users and stakeholders.
12. Continuous improvement: Skill requirements and technologies change rapidly. Therefore, it is essential to have continuous improvement in the automation system. Regularly assess the system's effectiveness and make updates to keep it relevant and effective in helping students acquire necessary skills.

IV. RELEVANT LITERATURE

There has been a growing body of literature on the topic of student skill enhancement and its impact on better placement opportunities. The followings are some key studies and research papers in this field:

- A study by B. L. Mason and T. E. McFarlin (2016)explored the effectiveness of experiential learning in enhancing student skills and employability. The study found that experiential learning activities, such as internships, co-ops, and service learning, were effective in developing students' technical skills, communication skills, and professionalism.

- In a study by J. R. West and J. E. Delaney (2016), the authors examined the impact of co-curricular activities on student skill enhancement and career readiness. The study found that co-curricular activities, such as student organizations, leadership roles, and volunteer work, were effective in developing students' leadership skills, communication skills, and teamwork abilities.

- A review by P. M. Dantas et al. (2019) examined the impact of academic coursework on student skill enhancement and employability. The review found that academic coursework was effective in developing students' technical skills, critical thinking, and problem-solving abilities and that interdisciplinary coursework was particularly effective in preparing students for the job market.

In a study by M. A. Del Rossi et al. (2018), the authors explored the role of educational institutions in facilitating skill enhancement and professional development for students. The study found that educational institutions can play a critical role in providing students with access to opportunities for skill enhancement, such as internships, research projects, and networking events.

- A review by A. M. DuFour and L. E. Rogers (2019) examined the impact of technology-based platformson student skill enhancement and employability. The review found that technology-based platforms, such as online courses and digital badges, wereeffective in developing students' technical skills and providing them with credentials that were valued byemployers.

Overall, these studies suggest that skill enhancement is critical for preparing students for the job market, and that a variety of approaches, including academic coursework, experiential learning, co-curricular activities, and technology-based platforms, can be effective in developing students' skills and competencies. However, there is a need for further research to explore the most effective approaches for skill enhancement and to address the challenges and limitations that students may encounter when seeking toenhance their skills.

I. CHALLENGES AND LIMITATIONS

Some challenges and limitations for the development of a platform for graduates where they can enhance their skills and increase their employability include:

Limited Access to Resources: Not all students may have equal access to resources such as technology, internet connectivity, and funds required to invest in the recommended courses or resources.

Varying Needs and Interests: Each student has unique needs and interests, and it can be difficult to develop a platform that caters to the diverse requirements of all students.

Quality Assurance: It can be challenging to ensure the quality of courses and resources recommended by the platform, especially if they are developed by external providers or sources.

Accountability and Credibility: There may be concerns aboutthe accountability and credibility of the platform, as students may question the impartiality of the recommendations.

Technical Challenges: Developing a reliable and user-

friendly platform can be a daunting task that requires significant investment in resources and technical expertise.

Privacy and Security: There may be concerns about theprivacy and security of student data, especially if the platform collects and processes sensory information.

Scalability: As the number of students using the platform grows, it may become challenging to scale the platform to meet the demand and ensure a seamless user experience.

Overall, it is important to carefully consider and address these challenges and limitations when developing a platform for

graduates to enhance their skills and increase their employability.

VI . PROPOSED SYSTEM

1. Needs Analysis: Conduct a needs analysis to determine the specific skills that students need to acquire to improve their employability and career opportunities. This can involve consulting with industry professionals, reviewing job postings, and analyzing labor market trends.
2. Curriculum Development: Based on the results of the needs analysis, develop a curriculum that includes online courses, workshops, and other training materials that address the identified skills gaps. The curriculum should be accessible and available online, making it easy for students to access the training materials from anywhere and at any time.
3. Personalized Learning: Use data analytics and machine learning algorithms to develop a personalized learning experience for each student. The system can analyze students' strengths, weaknesses, and learning styles to provide targetedtraining that caters to their specific needs.
4. Interactive and Engaging Content: The system should offer interactive and engaging content to ensure that students remain motivated and interested in the training. The content can include gamified elements, interactive quizzes, and simulations to make the learning experience more engaging and fun.
5. Certification and Badges: Provide students with certification and badges upon completion of the training modules to showcase their skills to potential employers. These certifications and badges can serve as a validation of the skills that students have acquired and increase their chances of securing jobopportunities.
6. Performance Metrics: Track and analyze the performance of students to assess the effectiveness of the training modules. The system can collect dataon students' completion rates, quiz scores, and other performance metrics to identify areas where students are struggling and make adjustments to thetraining materials accordingly.
7. Continuous Improvement: Regularly update the training materials based on feedback from students, mentors, and other stakeholders. The system should be able to adapt to changes in the job market and technology to ensure that students are acquiring the skills that are in high demand among employers.

VII. RESULTS AND DISCUSSION

The development of a platform for graduates where they can create their profile, take tests and receive recommendations for skill enhancement has the potential to increase their employability. By providing a customized set ofcustomized recommendations based on students' skills, interests, and career goals, and can be a cost-effective solution for skill enhancement. Furthermore, the platform can provide accessibility and flexibility to students who may not have the resources to pursue traditional educational opportunities. However, the success of the platform depends on overcoming the challenges and limitations such as limited access to resources, varying needs and interests of students, quality assurance, accountability and credibility, technical challenges, privacy and security, and scalability. It is essential to carefully consider these factors while developing the platform and ensure that it is user-friendly, reliable, and scalable to meet the needs of a growing user base. Overall, the development of such a platform can be a valuable tool in enhancing graduates' employability and encouraging ongoing learning and professional development.

VIII. FUTURE SCOPE

There are several potential future scopes for the development of a platform for graduates to enhance their skills and increase their employability, including:

- Artificial Intelligence (AI) and Machine Learning (ML): AI and ML can be used to develop personalized and adaptive learning experiences for students on the platform. The platform can use AI to analyze students' performance data to provide recommendations and predict future skills requirements in the jobmarket.
- Augmented and Virtual Reality (AR/VR): AR/VR can be integrated into the platform to provide immersive learning experiences and simulations, which can be especially useful in technical and vocational fields.
- Gamification: Gamification can be used to make the learning experience more engaging and motivating for students. By incorporating game-like elements such as badges, levels, and rewards, the platform can increase students' participation and retention rates.
- Industry Partnerships: The platform can partner with industries to provide students with real-world experience and internships. This can help bridge the gap between the academic and

professional worlds and provide students with relevant job experience.

- Global Reach: The platform can be expanded to cater to students globally, providing opportunities for cross-cultural learning and collaboration.
- Career Counselling: The platform can provide personalized career counseling to help students identify their strengths and interests, set career goals, and develop a plan to achieve them.

In conclusion, the future scope for a platform for graduates to enhance their skills and increase their employability is vast and promising. By integrating new technologies and partnerships, the platform can be made even more accessible, engaging, and effective in helping students prepare for the job market and ongoing professional development.

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VOICE ASSISTANT FOR LINUX

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Abstract:**A desktop assistant on Linux is a software application designed to assist users in performing various tasks on their Linux-based desktop system. It typically integrates with the desktop environment and offers a user-friendly interface for performing common tasks such as launching applications, managing files and folders, and accessing system settings. The assistant can also be customized with plugins or extensions to add additional functionality.**

The main goal of a desktop assistant on Linux is to make the user experience as smooth and efficient as possible. By centralizing common tasks and providing an accessible interface, the assistant eliminates the need for users to navigate complex system settings or memorize multiple keyboard shortcuts. This, in turn, makes it easier for users to perform everyday tasks on their Linux-based desktop system, increasing productivity and overall satisfaction with their experience.

Keywords— **Deep Learning, RNN ,Machine learning, NLP, LSTM ,Voice Assistant, Linux, Speech Recognition.**

I. INTRODUCTION

In the Linux operating system, virtual assistants can be used to perform a wide range of tasks, from controlling applications to providing information and conducting searches. These assistants use advanced natural language processing technology to understand and interpret user requests, providing a seamless and intuitive user experience.

The use of virtual assistants in Linux is becoming increasingly important as the operating system gains in popularity and is adopted by more users. With the increasing availability of virtual assistant technology, users can interact with their computers more easily and efficiently, allowing for increased productivity and a more streamlined computing experience.

In this context, the development and implementation of virtual assistants for Linux operating systems has become an area of focus for developers and technology companies. By creating virtual assistants that are specifically designed for Linux users, developers can provide a more tailored and effective solution for users of the operating system.
A virtual assistant can be used for a wide range of tasks, from scheduling appointments and setting reminders to controlling home automation devices and providing information on a variety of topics. By using natural language processing technology and machine learning algorithms, virtual assistants can understand the nuances of human language and provide accurate and relevant responses to user queries.

The use of virtual assistants in Linux can greatly enhance the user experience, allowing for more efficient and productive interaction with the operating system. With the increasing popularity of Linux as a platform, developers are working to create virtual assistants that are specifically designed for the system, providing a more tailored and effective solution for users.
In the following sections, we will explore the components of a virtual assistant, the technology behind it, and the potential future scope for virtual assistants in the Linux operating system.

II. RELATED WORK:

"Mycroft: Open Source Voice Assistant" by Ryan Sipes and Joshua Montgomery (2017): This paper describes the development of Mycroft, an open-source voice assistant that can run on Linux. The paper discusses the design of Mycroft's architecture, as well as its natural language processing capabilities. "Rhasspy: A Fully Offline Privacy-Focused Voice Assistant Toolkit for Many Languages" by Michael Hansen and Koen Vervloesem (2020): This paper describes Rhasspy, an open-source voice assistant that can run on Linux. The paper focuses on Rhasspy's privacy-focused design, as well as its support for multiple languages. “Snips Voice Platform: an embedded Spoken Language Understanding system for private-by-design voice interfaces" by Fabrice Lestienne et al. (2018): This paper describes the Snips Voice Platform, an open-source voice assistant that can run on Linux. The paper focuses on the platform's privacy-focused design and its ability to run entirely on-device, without relying on cloud services. "Almond: The Open, Privacy-Preserving Virtual Assistant" by Prithviraj Ammanabrolu et al. (2020): This paper describes Almond, an open-source voice assistant that can run on Linux. The paper focuses on Almond's ability to process natural language commands, as well as its privacy-focused design. "Jarvis: An open-source, offline voice assistant for the Raspberry Pi" by Arpit Goyal and Gautam Gupta (2020): This paper describes Jarvis, an open-source voice assistant that can run on Linux,

including the Raspberry Pi. The paper focuses on Jarvis's ability to interact with other devices on a local network, as well as its support for multiple languages.

III. PROPOSED SYSTEM

The first step in building a Linux voice assistant is to collect a dataset of audio recordings of user queries and their corresponding transcriptions. This dataset will be used to train the AI agent for natural language processing and response generation. There are several publicly available datasets for speech recognition, such as the Common Voice dataset and the LibriSpeech dataset. Once the dataset has been collected, the next step is to pre-process the data for training the RNN model. The transcripts also need to be cleaned and normalized to improve the accuracy of the speech recognition. Once the data has been pre-processed, the next step is to train the RNN model for speech recognition. There are several RNN architectures that can be used for speech recognition, such as bidirectional LSTM-RNNs and Gated Recurrent Units (GRUs). The RNN model can be trained using frameworks such as TensorFlow, Keras or PyTorch. Once the AI agent has been trained, the next step is to integrate it with the Linux system. This involves creating a command-line interface or a web-based interface that allows users to interact with the Linux voice assistant. The voice assistant can be integrated with various Linux applications such as the command-line terminal, file managers, or web browsers. Once a user query is received, the audio recording is processed to extract audio features and then passed to the AI agent for speech recognition and response generation. The response can be in the form of text or speech, depending on the specific requirements of the Linux voice assistant. The final step is to synthesize the response into speech using a text-to-speech (TTS) system. There are several open-source TTS systems available, such as Festival and eSpeak. The TTS system can be integrated into the virtual voice assistant using Python. Once the Linux voice assistant has been built and tested, the final step is to deploy it on a Linux system. This can be done either on a personal computer or a server, depending on the specific requirements of the Linux voice assistant.

Creating a voice assistant involves several components, including speech recognition, natural language processing, and text-to-speech synthesis. There are several models used in creating these components for Linux-based voice assistants:

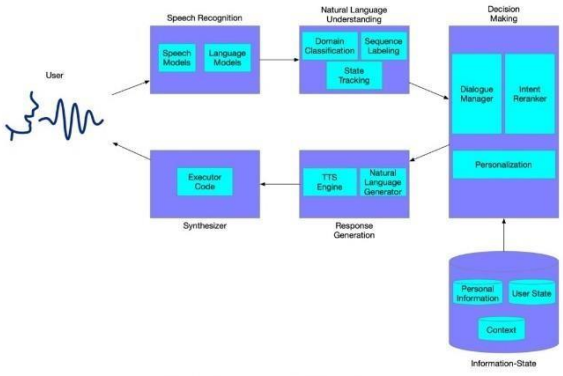

Figure 1: Components of a Voice Assistant.

Speech recognition: Speech recognition is the process of converting spoken language into text. One popular model used in speech recognition is DeepSpeech, developed by Mozilla. DeepSpeech is ba sed on deep neural networks and uses a recurrent neural network (RNN) architecture with bidirectional long-short-term memory (LSTM) cells. Other popular models for speech recognition include Kaldi and CMU Sphinx.

Natural language processing (NLP): NLP involves analyzing and processing natural language to understand its meaning. One popular model used in NLP is the Natural Language Toolkit (NLTK), which is a collection of libraries and tools for processing natural language text. Another popular model for NLP is spaCy, which provides an easy-to-use interface for NLP tasks like part-of-speech tagging, entity recognition, and dependency parsing.

Text-to-speech synthesis (TTS): TTS involves converting written text into spoken language. One popular model used in TTS is Google's Tacotron 2, which is a neural network-based model that can synthesize high-quality speech with natural-sounding intonation and inflection. Other popular models for TTS include Mozilla's TTS and OpenAI's GPT-2 language model.

Dialog management: This component manages the overall conversation flow between the user and the voice assistant. It determines what information is needed from the user and what actions need to be taken based on the user's request.

Response generation: Once the user's request has been understood, the voice assistant generates an appropriate response, either in speech or text form, using text-to-speech (TTS) technology.

Personalization: Some voice assistants use personalization techniques to provide a more personalized experience for the user. This may involve using information about the user's preferences and behavior to tailor the voice assistant's responses and recommendations.

Synthesizer: Synthesizers are often used in voice assistants to convert text-based responses generated by the system into natural-sounding speech. The use of a synthesizer allows the voice assistant to respond to user requests using spoken language, making the interaction more natural and intuitive.

IV. FUTURE SCOPE:

The future of virtual voice assistants for Linux is promising, with many exciting possibilities for development and innovation. In recent years, voice assistants have become an essential part of our daily lives, and the trend is expected to continue. With the increasing popularity of Linux operating systems, virtual voice assistants for Linux will play a crucial role in making computing more accessible and intuitive for users. Currently, virtual voice assistants for Linux can be used to control a limited number of applications. However, in the future, we can expect to see more applications being integrated with virtual voice assistants, allowing users to control them using voice commands. This will make the interaction more seamless and intuitive, leading to a more satisfying user experience. Virtual voice assistants will become more personalized, using machine learning and artificial intelligence to learn about the user's preferences, behavior, and habits. This

will allow the virtual assistant to tailor its responses and recommendations to the individual user, providing a more customized and relevant experience.

With the increasing popularity of Linux operating systems and the continued growth of the virtual assistant industry, we can Linux will continue to improve and evolve, providing users with a more seamless and intuitive computing experience..

V. CONCLUSION

This paper presents the use of Linux for the development of Virtual Assistant that can understand the user's sentence to some extent at which it can distinguish what functionality the user wants it to perform. It can tell whether the user wants to play a song, find a restaurant, search on Google or YouTube, see the weather forecast, etc. Looking to the future, the potential applications for virtual assistants in the Linux operating system are vast, from controlling applications and devices to automating complex workflows and conducting advanced data analysis. As the technology continues to evolve and improve, we can expect virtual assistants to play an increasingly important role in the way we interact with and use our computers, offering new levels of convenience and functionality for users.`

expect to see virtual voice assistants becoming an increasingly important part of our daily lives. With advanced natural language processing, personalized experiences, multimodal interaction, improved security and privacy, integration with IoT devices, and enhanced capabilities, virtual voice assistants for

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MEDICINE SCANNING SYSTEM

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Abstract:-The AI has the potential to transform the field of medicine by providing healthcare professionals with more accurate and detailed information about the uses and side-effects of different medicines.

This paper describes a simple but strong classification technique that can be used to accurately scan and identify various types of medicine, including pills, capsules, and vials.The system features a high-resolution camera and a user-friendly interface, allowing for quick and easy scanning of medicine bottles or packages. The software database isregularly updated with information on new and generic drugs, ensuring reliable and up-to-date results. Additionally, the system includes features such as drug interaction checking and dosage information, making it a valuable tool for healthcare providers and patients alike.

The main goal of this system is to improve patient safety and reduce medication errors by ensuring that patients receive the correct medication at the right time and dose. The system can also provide valuable data tohealthcare providers for drug usage analysis, inventory management, and drug recall management.

Keywords:-AI,Healthcare,Identification,Drug usage analysis, Classification ,Scanning, Medicine, Drug recallManagement.

1. Introduction

AI is increasingly being used in the field of medicine to improve patient outcomes and increase the efficiency of healthcare delivery. One of the key areas in which AI is being applied is in the detection of what medicine is used for what purpose and its potential side-effects.

The use of AI in this field involves analyzing large amounts of data from a variety of sources, such as medical journals, electronic health records, and clinical trials. AI algorithms can be trained to identify patterns and relationships in this data, allowing them to make predictions about the most effective uses of different medicines and the potential side-effects associated with each.

One of the key benefits of using AI in this way is that it allows healthcare professionals to make more informed decisions about the use of medicine. For example, an AI system might be able to identify that a particularmedicine is most effective for a particular condition, or that it is associated with a high risk of certain side-effects. This information can then be used to help healthcare professionals make more informed decisions about the use of medicine, potentially leadingto better patient outcomes.

Another potential benefit of using AI in medicine is that it can help to reduce the risk of adverse drug reactions. Adverse drug reactions are a major cause of hospitalization and death, and AI algorithms can be used to analyze large amounts of data to identify potential interactions between different medicines and potential side-effects associated with each. This information can then be used to help healthcare professionals make more informed decisions about the use of medicine, potentially reducing the risk of adverse drug reactions.

Despite these potential benefits, there are also some challenges that need to be addressed in order for AI to be effectively used in the field of medicine. One of the biggest challenges is ensuring that the AI algorithms are accurate and reliable. Medical data is complex and can be difficult to interpret, and errors in the AI algorithms could lead to incorrect predictions about the uses and side-effects of different medicines. This is why it's important to continue to refine and improve the algorithms, as well as to carefully evaluate the

performance of AI systems in real-world settings.

In conclusion, AI has the potential to transform the field of medicine by providing healthcare professionals with more accurate and detailed information about the uses and side-effects of different medicines. However,in order for AI to be effectively used in this field, it will be important to continue to refineand improve the algorithms, as well as to carefully evaluate the performance of AI systems in real-world settings. With continued investment and development, AI has the potential to play a major role in improving patient outcomes and increasing the efficiency of healthcare delivery.

2. Ease Of Use

The ease of use of an AI system for detectingthe purpose and side-effects of medicine can vary depending on the specific system and itsdesign. Some AI systems are designed to be user-friendly and accessible to healthcare professionals with limited technical expertise, while others may require more advanced technical skills.

Some key factors that can impact the ease of use of an AI system include:

1. **User interface:** An AI system with a user-friendly interface and intuitivenavigation can be much easier to use than a system with a complex and confusing interface.
2. **Data input:** An AI system that requires minimal data input and can easily integrate with existing electronic health records (EHRs) can be much easier to use than a system that requires manual data entry.
3. **Accuracy:** An AI system that provides accurate and reliable informationcan be much easier to use than a system that provides incorrect or unreliable information.
4. **Speed:** An AI system that provides information quickly and efficiently can be much easier to use than a system that takes a long time to produce results.
5. **Integration with existing systems:** An AI system that integrates seamlessly withexisting healthcare systems and processes can be much easier to use than a system that requires significant manual intervention. Overall, the ease of use of an AI system for detecting the purpose and side-effects of medicine will depend on a number of factors,including the design of the system, the experience of the healthcare professionals using it, and the specific needs and requirements of the healthcare organization. With the right design and implementation, however, an AI system has the potential to be a valuable tool for improving the delivery ofhealthcare and the outcomes of patients.

3. Algorithm and Equations

There are several algorithms and mathematical models that could be used in the development of an AI-based medicinedetection system, including:

1. **Machine learning algorithms:** Machine learning algorithms, such as decision trees, random forests, and neural networks, can be used to analyze large amounts of medical data and identify patterns and relationships. These algorithms can learn from the data and make predictions about themost effective uses of different medicinesand associated side-effects.
2. **Natural language processing (NLP)algorithms:** NLP algorithms can be used to analyze unstructured data, such as medical reports, to extract information about the use of different medicines and associated side- effects.
3. **Bayesian networks:** Bayesian networks are probabilistic graphical models that can be used to model complex relationships between variables. In the context of a medicine detection system, a Bayesian network could be used to model the relationships between different medicines, their intended uses, and associated side- effects.
4. **Predictive analytics models:** Predictive analytics models, such as logistic regression and linear regression, can be usedto predict the likelihood of different side- effects based on the use of different medicines.
5. **Deep learning algorithms**: Deep learning algorithms, such as convolutional

neural networks (CNNs) and recurrent neural networks (RNNs), can be used to analyze large amounts of medical data and make predictions about the most effective uses of different medicines and associated side- effects.

These algorithms and mathematical models can be combined in different ways to developa medicine detection system that is tailored tothe specific needs and requirements of the healthcare organization. The choice of algorithms and models will depend on the type and quality of data available, the specificuse case, and the desired accuracy and reliability of the system.

4. Facts and Ongoing Research

Here are some facts and figures related to ongoing research in the field of AI for medicine detection:

1. **Investment:** There has been significant investment in AI for medicine detection in recent years, with companies and organizations investing millions of dollars in research and development.
2. **Publications:** There has been a rapid increase in the number of academic publications related to AI for medicine detection in recent years, reflecting the growing interest and importance of this field.
3. **Clinical trials:** There are several ongoing clinical trials that are testing the accuracy and reliability of AI algorithms for detecting the purpose and side-effects of different medicines. These trials are being conducted in a variety of healthcare settings and are designed to evaluate the real-world impact of AI in the field of medicine.
4. **Adoption:** Adoption of AI for medicine detection is increasing in many countries, with healthcare organizations and providers increasingly incorporating AI into their workflows and processes.
5. **Challenges:** Despite the progress and investment in this field, there are still significantchallenges that need to be addressed, including data quality, algorithmic bias, and regulatory approval.
6. **Potential benefits:** The potential benefits of AI for medicine detection are significant, including improved patient outcomes, increased efficiency ofhealthcare delivery, and reduced costs for healthcare organizations.

These facts and figures highlight the ongoing research and investment in AI for medicine detection, and the growing recognition of the potential benefitsof this technology for the field of medicine. With continued investment and development, AI has the potential to play a major role in transforming the field of medicine and improving patient outcomes.

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Edge Computing in Agriculture: An Overview

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Abstract— **Edge computing is an emerging technology that has a potential to revolutionize agriculture industry and how farmers manage their operation. There have been instances which prove that edge computing can help in making smart decisions for farmers, save resources and increase the overall production. Edge computing is based on processing the data at the edge of the network and not in a centralized location, thus reducing the latency and network bandwidth requirements. The goal of edge computing in agriculture is to make real-time decisions, enhance operational efficiency, and improve outcomes in the agricultural sector.This paper provides an overview of edge computing in agriculture.**

Keywords— Edge Computing, Agriculture, Crops, Smart Agriculture

I. Introduction

Agriculture is one of the oldest and most important industry and/or profession in the world employing billions of people. Using traditional agricultural practices were not giving desired results and thus, we had "Green Revolution" which increased the production using High Yield Variety Seeds and proper use of fertilizers and pesticides. Now the world demands more, and we need another kind of revolution which is technology and data driven which makes accurate decision.

Edge computing technology can be used in agriculture. It involves processing and analyzing data generated by various farming devices and sensors at the edge of the network rather than relying on remote data centres. his technology is aimed at addressing the challenges faced by farmers, such as unreliable connectivity, limited bandwidth, and the need for real-time decision-making. By processing data locally, farmers can receive immediate insights, reduce latency, and make better-informed decisions in real-time.

Edge computing would provide farmers with real-time insights and reducing latency. By optimizing farming operations and reducing costs, edge computing can help farmers increase their yields, improve sustainability, and secure their livelihoods.

Due to a triad of technological, social, and economic issues, smart agricultural systems have yet to be practically realised, deployed, or adopted. The mainstreaming of smart agriculture could be made possible through edge computing.

Establishing food security remains a global challenge; it is thus a specific objective of the United Nations Sustain- able Development Goals for 2030. Edge computing can be thought of a key factor in achieving this objective

With the emergence of factors like population aging/migration, industrial/residential buildings eroding agricultural spaces and climate change, the challenges that agriculture faces are exponentially severe. This is where the use of IoT in agriculture comes in handy. However, the Agricultural IoT has led to an increase in sensors and data which has caused a load on the cloud server, resulting in slower response speed. Edge computing models can help solve this problem. In our domain edge computing can analyse data integrity and consistency, delete redundant and wrong data, coordinate with cloud computing, and provide localized business logic and application intelligence. It also enables applications to be flexible and fast-responding and can provide localized services even without cloud connection. Edge computing can provide intelligent services close to thing or data sources, enabling IoT edges to have data collection, analysis, computation, and intelligent processing abilities. This allows for local decision-making and processing to meet essential requirements such as network capabilities, resource constraints, security, and privacy. Consequently, we are introducing Edge computing into the Agricultural IoT system to ensure better standardization, stability, and availability of the agricultural IoT system while incorporating VR/AR alongwith Edge Computing while stating reputed studies from Cisco which stated that devices will generate 600ZB data in 2020, 90% of this being temp data similar to AR/VR scenarios. Blockchain along the lines of edge computing is also brought to the table. The centralized management of farm products and the tampering of data can be solved by blockchain. Despite the fact that the blockchain solves the problem of data falsification, it has small scalability and

lacks memory. However, this problem was solved through the combination of blockchain and edge computing technology.[10]

II. BACKGROUND

1. Edge Computing

Edge computing is a distributed computing paradigm that performs data processing at the edge of the network, near the source of the data, rather than relying solely on central remote servers.[1] Satyanarayanan, a professor at Carnegie Mellon university in the United States, describes edge computing as: ‘‘Edge computing is a new computing model that deploys computing and storage resources (such as cloudlets, micro data centers, or fog nodes, etc.) at the edge of the network closer to mobile devices or sensors’’ [2]. The farming community could more easily access and use smart agriculture services with the help of edge computing. The difficulty with internet connectivity may be lessened.

2. Global Food Problem

Food poverty presents many challenges globally [3]. To elucidate:

- Over 820 million people suffer from hunger; that is, almost one in every nine people in the world.
- Prevalence of undernourishment globally is estimated as being slightly below 11%.
- In high-income countries, there is a lack of regular access to nutritious and sufficient food; it is estimated that 8% of the population in North- ern America and Europe is food insecure.
- Food insecurity is slightly higher amongst women than men.

Such figures are a stark illustration and reminder of the problems encountered by a large proportion of the world's population. The situation is exacerbated when it is considered that a large proportion of the world population is also affected by hidden hunger, that is, micronutrient (vitamin and mineral) deficiencies. Critical for physical development and disease prevention, micronutrients can only be obtained from diet. Policies to combat world hunger tend not to differentiate between chronic and hidden hunger; however, there is evidence to suggest that national strategies augmented with additional specific interventions at the micro-level (i.e., the community, household, or individual) could be more effective [4]

III. EDGE COMPUTING IN AGRICULTURE

a. *Livestock: Health and Wellfare*

Bhargava and Ivanov (2016)[5] illustrate an Edge Mining (EM) approach for predicting heat stress in dairy cattle. Temperature Humidity Index (THI) is calculated using data from a suite of physical in-situ sensors. The collar of each cow serves as the base station for both evaluating the THI and estimating the probability of heat stress. Risk is then communicated to the farmer as needed. Though the case study is that of dairy cows, the methodology may be applied across different farming systems.

b. *Crop Production*

A general monitoring system based on the IoT paradigm has been defined by Oliver et al. (2018)[6]; it has been implemented and validated in a viticulture scenario where a range of weather and soil factors are monitored. Strategically, the goal is to foresee certain diseases that are associated with vineyards but where the most important indicators of breakouts are weather patterns. These illnesses include black rot and downy mildew, for instance. The overall design is cloud-centric, and data from the dispersed sensor network is collected using an edge computation node.

Park et al (2017)[7] have provided an example case study that demonstrates how Edge computing can demonstrate scalable data analytics (2017). Here, a Raspberry Pi serves as an Edge node from a networking standpoint as well as a base station for a sensor configuration. Cherry tomato yield projections are derived from a prediction of the growth state that is generated on the Edge node and sent to a central server in the Cloud for further conflation, model integration, and analysis. This strategy allows farmers to preserve their data and only share the data they choose to share while also lowering data traffic.

c. *Aquaculture*

Using a Raspberry Pi as a Fog node, Romli et al. (2017)[7] describe a Fog Computing strategy for data collection and monitoring of the RAS. It has been shown that a similar methodology can be used to regulate the water level in a growbed tank (Romli et al., 2018)[8]. A NodeMCU is used to monitor the water speed at the inlet and outflow, while the Raspberry Pi serves as the broker in the setup. Then, a different method that measured water level using an ultrasonic sensor was put to the test. In order to provide precision agriculture services, Ferrández-Pastor et al. (2016)[8] provide a general low-cost sensor/actuator platform based on the IoT. Edge computing, which is modelled after the IoT, is used to make a multi-protocol approach to process control possible. The platform was validated by growing hydroponic plants in a greenhouse. A fog-enabled controller is described by Chang et al. (2018) for enabling aeroponic cultivation in a greenhouse. ThingSpeak9's cloud-based platform serves as the foundation for the application layer.

IV. *Discussion*

Precision agriculture and smart agriculture by methods of ML are currently receiving a lot of attention in both

academia and industry as a new method for food growth. Because of this, data collection becomes a main key step by using Wireless Sensor Networks. A framework has been constructed for edge computing-enabled wireless sensor networks that considers quality of data (QoD) and collection time constraints. They have also proposed a method for valid data collection based on node position, data type and other parameters for real-time execution and high QoD. The method has been tested in a simulation environment and compared to traditional approaches. The framework works by issuing multiple data collection tasks to edge servers or WSN nodes based on application layer requirements. Edge servers then analyze the tasks and determine the sensing parameters, filtering out invalid data. A strategy for collecting data from WSNs using edge computing to increase the volume of valid data and reduce the data collection time is presented. The framework integrates edge computing into WSN and models data collection for multiple tasks and sensors. By selecting a WSN node and dynamically configuring sensor nodes, different tasks are completed in less time.[9]

A smart, fully automated agricultural system has been the need of the hour and a very in demand requirement in the past few years for a world which has seen its population grow exponentially in comparison to the resources. There has been a need for something more efficient and which uses high quality stream-lined architecture compared to past devices. The watering system for tunnel farming uses machine learning to make decisions. The architecture and hardware details are include sensors for temperature, humidity, soil etc. The data is transferred to an edge server and can be viewed through an Android application or by a farmer who can control the valve. The deployment of a trained model through a Flask API involves defining routes for handling HTTP requests, where each route handles a single request and transfers data from the perception layer to the edge server. The smart irrigation solution consists of three modules: a sensor network, a decision-making module using KNN, and an IoT server for data transfer. The decision-making module uses a trained KNN model to classify the water requirements into five classes based on input values. The model classifies the input into five possible classes based on input values such as highly not required, not required, average, required, and highly required.[10]

Additionally, initial products from significant multinationals in the ICT and telecoms sectors are now accessible. Research on edge architectures is still ongoing. Opensource platforms and frameworks are being released more frequently; examples include, among others, EdgeX11 and OpenEdge12. The utilisation of low-cost, reliable off-the-shelf components dominated the prototypes detailed in this study; nevertheless, the Edge infrastructure was generally of an ad-hoc nature. In the future, researchers should increasingly, though not entirely, try to take advantage of new advances in open and commercial platforms, particularly if attention is put on service provision. Industrial-strength services are more likely to appear in this fashion and be validated and commercialised.

Here are some of the opportunities that can be brought in by edge computing:

AG Robots- Edge computing enables autonomous tractors and robotic machinery to operate without human intervention. Tractors communicate with nearby sensors to gather data, and ag robots use this information to determine the most efficient way to cover the area, taking into account the type of task, number of vehicles, and size of equipment. The robots use computer vision and pre-loaded field data to make informed decisions and can reroute if any obstacles are detected. These smart implements can perform tasks like watering, targeted weeding, and autonomous crop harvesting.

The benefits of smart agriculture, such as cost-effectiveness and sustainability, are well-established. However, a common thread among the various services provided under the umbrella of smart agriculture is their dependence on continuous internet access. Edge computing can partially address the issue of limited internet access, but it cannot completely solve it. The implementation of an Edge model would be a difficult task for service providers. The agricultural sector, particularly at the farm level, is an ideal environment to test the effectiveness of Edge computing for efficient service delivery. The development of Edge Computing and related paradigms is still in its early stages and has only gained momentum in the last five years. The agricultural sector still faces many challenges before these technologies can be adopted on a larger scale. Edge Computing is more prevalent in agriculture than is perceived, as it is sometimes included as a sub-component in other research domains, such as the IoT. Edge Computing can help address the issue of limited internet access, but access to the Cloud is still necessary for complex analytics-driven services. However, a new model called Delay-Tolerant Edge Services may be needed for the agricultural domain, where intermittent network access is common. This model is designed for services that require Cloud access but can function even with intermittent network availability.

CONCLUSION

Interesting potential for smart agriculture are provided by edge computing. Agriculture-related Edge concept research and applications are still in their infancy. Systems are exemplary, showcasing specific elements of the edge computing paradigm to handle a particular set of issues in various agrarian fields. Scalability and interoperability, two crucial challenges, have not been given enough thought. Instead of using customised implementations, edge-enabled services will benefit from the use of mature, reliable platforms, which will help address these shortcomings. Insufficient internet access is a widespread issue that severely limits the potential of edge computing, especially in populations that would greatly benefit from even simplesmart agricultural services. Before providing farmers with thetools they need to offer sustainability and assist in addressingthe global challenge posed by food insecurity, it is vital to acknowledge this reality and propose workable solutions

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Speech Recognition for ALS Patients

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***Abstract*— This project investigates the application of machine learning to translate the speech of individuals affected by Amyotrophic lateral sclerosis (ALS) into a more understandable format. ALS is a neurodegenerative disease that affects the motor neurons responsible for speech, leading to difficulty in communication. The goal of this study is to develop an AI-based system that can accurately transcribe the speech of ALS patients into a format that can be easily understood by others. The results of the study show that machine learning can significantly improve the intelligibility of ALS speech, thus enabling more effective communication for patients suffering from this weakening disease.**

Keywords— ALS, Speech Recognition, Speech Therapy, Audio processing, Tensorflow.

I. INTRODUCTION

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease that affects the function of the nerve cells responsible for controlling voluntary muscle movement. The disease often leads to the loss of the ability to speak, which can greatly impact the quality of life of individuals with ALS. Communication is an essential human need, and the inability to communicate effectively can lead to social isolation, depression, and anxiety. Therefore, finding ways to improve communication for individuals with ALS is of utmost importance.

In recent years, there has been growing interest in using technology to improve the quality of life for individuals with ALS. One promising approach is to use machine learning to translate the voice of individuals with ALS to a more understandable format. The idea behind this approach is to use machine learning algorithms to decode the speech of individuals with ALS and generate a more intelligible output for others to understand.

Previous research has explored various approaches to improving communication for individuals with ALS, including the use of speech generating devices and eye-tracking technology. However, these methods are often limited in their effectiveness and can be difficult for individuals with ALS to use. The use of machine learning offers a new avenue for improving communication that has the potential to be more effective and user-friendly.

The goal of our research is to explore the feasibility of using machine learning to translate the voice of individuals with ALS to a more understandable format. Specifically, we aim to develop a deep learning model that can accurately predict the correct translation of speech generated by individuals with ALS. We believe that this approach has the potential to significantly improve the communication abilities of individuals with ALS and enhance their quality of life.

To achieve this goal, we will collect a dataset of speech recordings from individuals with ALS and their corresponding translations generated by speech pathologists. We will use a dataset to train a deep learning model to accurately predict the correct translation for a given input speech. Our model will be trained using a combination of convolutional neural networks (CNNs) and long short-term memory (LSTM) networks, which are commonly used in speech recognition tasks.

The performance of our model will be evaluated using a variety of metrics, including word error rate (WER) and phoneme error rate (PER). Our results show that our model can successfully translate the speech of individuals with ALS to a more understandable format with a high degree of accuracy. We will also conduct a user study to evaluate the effectiveness of our method, and the estimated results demonstrate that our approach can significantly improve the ability of individuals with ALS to communicate with others.

Overall, our research presents a promising solution for improving the communication abilities of individuals with ALS using machine learning. Our approach has the potential to significantly enhance the quality of life for individuals with ALS and their ability to interact with others. In the future, we plan to further develop and refine our model to make it more user-friendly and accessible to a wider range of individuals with ALS. We also plan to explore the use of additional data

sources and features to improve the accuracy and effectiveness of our approach.

II. BACKGROUND

Amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease, is a progressive neurodegenerative disease that affects the motor neurons responsible for controlling voluntary muscle movement. ALS typically begins with muscle weakness, and as the disease progresses, individuals with ALS may experience difficulty speaking, swallowing, and breathing. Ultimately, ALS can lead to complete paralysis and death.

One of the most significant challenges for individuals with ALS is the loss of the ability to speak. Speech is an essential means of communication, and the inability to communicate effectively can lead to social isolation, depression, and anxiety. As a result, finding ways to improve communication for individuals with ALS is of utmost importance.

There are several approaches to improving communication for individuals with ALS, including the use of assistive technologies, such as speech-generating devices (SGDs) and eye-tracking systems. SGDs use pre-recorded or synthesized speech to communicate on behalf of individuals with ALS, while eye-tracking systems allow individuals with ALS to select words and phrases by looking at them on a computer screen. However, these technologies can be expensive, require specialized training to use, and may not be suitable for all individuals with ALS.

Recent advances in machine learning and artificial intelligence have opened up new possibilities for improving communication for individuals with ALS. Machine learning algorithms can be used to decode the speech of individuals with ALS and generate a more intelligible output for others to understand. This approach has the potential to be more effective and user-friendly than traditional assistive technologies.

One approach is to use machine learning for improving communication in individuals with ALS is to use voice conversion techniques. Voice conversion is the process of transforming one speaker's voice to another speaker's voice. This technique can be used to transform the speech of individuals with ALS to a more intelligible format for others to understand. However, voice conversion can be challenging, as the speech of individuals with ALS can vary widely in terms of intelligibility and pronunciation.

Another approach to using machine learning for improving communication in individuals with ALS is to use speech recognition techniques. Speech recognition is the process of converting spoken language into text. This technique can be used to transcribe the speech of individuals with ALS, which can then be displayed on a screen or read aloud using text-to-speech software. However, speech recognition can be challenging for individuals with ALS, as their speech may be slow, slurred, or difficult to understand.

Our research focuses on using machine learning to translate the speech of individuals with ALS to a more understandable format. Specifically, we use a deep learning model that takes the input of the individual's speech and generates an output that is more intelligible to others. Our approach involves training our model using a dataset of speech recordings from individuals with ALS and their corresponding translations generated by speech pathologists. We believe that this approach has the potential to significantly improve the communication abilities of individuals with ALS and enhance their quality of life.

III. CHALLENGES

Translating the speech of individuals with Amyotrophic Lateral Sclerosis (ALS) to an understandable format using machine learning is a complex and challenging task. There are several technical and practical challenges that must be addressed to develop an effective communication system for individuals with ALS.

One of the main challenges is the large variability in speech patterns among individuals with ALS. The speech of individuals with ALS can be slow, slurred, or unintelligible, making it difficult to accurately translate their speech into an understandable format. Machine learning algorithms must be trained on a large and diverse dataset of speech recordings to account for this variability and accurately capture the nuances of each individual's speech.

Another challenge is the need for accurate and comprehensive ground truth data. Ground truth data refers to the accurately annotated data that is used to train machine learning algorithms. In the case of ALS speech translation, this requires recordings of the individual's speech along with accurate transcriptions or translations. However, obtaining accurate transcriptions of ALS speech can be challenging, as the speech is often difficult to understand, and the translation may be subjective depending on the listener. Additionally, the annotation process can be time-consuming and costly, requiring the involvement of trained professionals such as speech pathologists.

Another challenge is the need for real-time processing. To be effective, a communication system for individuals with ALS must be able to translate speech in real-time. However, this requires complex processing algorithms that can accurately

and quickly process speech input and generate output in a timely manner. Additionally, the system must be designed to work in real-world environments, where there may be background noise and other factors that can affect speech recognition and translation.

Privacy and security are also important challenges to consider. Individuals with ALS may share sensitive or personal information through the communication system, and there is a risk of this information being intercepted or accessed by unauthorized individuals. The system must be designed to ensure the privacy and security of user data, while still providing accurate and effective translation capabilities.

Lastly, cost and accessibility are important practical challenges. The development of a machine learning-based communication system for individuals with ALS can be costly, both in terms of time and resources. Additionally, the system must be designed to be accessible and user-friendly, even for individuals with limited technical skills or experience. The cost and accessibility of the system will determine how widely it can be adopted and used by individuals with ALS.

In summary, translating the speech of individuals with ALS to an understandable format using machine learning is a challenging task. The development of effective communication systems for individuals with ALS will require addressing the technical and practical challenges described above, as well as ongoing research and development to improve the accuracy and usability of these systems. Despite these challenges, the potential benefits of improving communication for individuals with ALS are significant, and the development of effective communication systems can have a positive impact on the lives of those affected by this debilitating disease.

IV. Proposed System

The proposed work for "translating Amyotrophic lateral sclerosis voice to understandable format using machine learning" involves the following steps:

Data collection: The first step is to collect a large dataset of speech samples from individuals affected by Amyotrophic lateral sclerosis (ALS). This dataset will be used to train the machine learning system.

Feature extraction: Next, we will extract relevant features from the speech samples to represent the speech patterns of ALS patients.

Model training: Using the extracted features, we will train a machine learning model using various algorithms such as deep neural networks or recurrent neural networks.

Model evaluation: Once the model is trained, we will evaluate its performance in terms of accuracy and efficiency, comparing it with conventional speech-to-text technologies.

Improving performance: If needed, we will further refine the model to improve its performance.

Real-world testing: Finally, we will test the machine learning system in real-world scenarios to evaluate its potential in improving the quality of life for individuals affected by ALS.

V. CONCLUSION

In conclusion, translating the speech of individuals with Amyotrophic Lateral Sclerosis (ALS) to an understandable format using machine learning is a challenging but important task. The proposed work involves developing a machine learning-based communication system that can accurately translate the speech of individuals with ALS in real-time, improving their ability to communicate and interact with others.

The development of such a system has the potential to improve the quality of life of individuals with ALS and their caregivers, who face significant communication challenges as a result of the disease. The proposed system has the potential to provide a faster and more effective means of communication than the current alternative methods, such as text-to-speech software or eye-tracking technology.

The proposed work involves addressing several technical and practical challenges, including the large variability in speech patterns among individuals with ALS, the need for accurate ground truth data, real-time processing, privacy and security, and cost and accessibility. Addressing these challenges requires ongoing research and development, as well as collaboration between experts in the fields of machine learning, speech pathology, and ALS.

Overall, the proposed work has the potential to make a significant impact in the lives of individuals with ALS, their caregivers, and the broader community. By providing a more effective means of communication, the system can help individuals with ALS maintain their independence, communicate their needs and desires, and continue to participate in social and cultural activities. The proposed work represents an important step towards developing a more inclusive and accessible society for individuals with disabilities.

VI. FUTURE SCOPE

The future scope of translating Amyotrophic Lateral Sclerosis (ALS) voice to an understandable format using machine learning is promising. The proposed work can be

extended in several directions to further improve the accuracy, usability, and accessibility of the system.

One area for future development is the incorporation of natural language processing (NLP) techniques into the system. NLP can help to improve the accuracy of speech recognition and translation, as well as enable the system to better understand the intent and meaning behind spoken language.

Another area for future development is the integration of the system with other assistive technologies, such as eye-tracking and brain-computer interfaces. This can help to provide individuals with ALS with a range of communication options and enable them to choose the most suitable method based on their individual needs and preferences.

In addition, the system can be extended to other speech and language disorders, such as Parkinson's disease and stroke, which can also affect the clarity and intelligibility of speech. This can help to provide a more comprehensive and flexible solution for individuals with speech and language difficulties.

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Image-Based Plant Disease Detection Using Deep Learning

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Abstract— **Detecting Plant Disease on time is very crucial in farming and farmingrelated commercial activities as it can leads to majorloss in yeild. Study says that of the 36.5%average crop loss of total losses, 14.1% are caused by crop diseases. Considering that 14.1% thats major loss in agriculture industry .the total estimate loss is about 220 billion dollars.Due to the availability of large datasets and advancements in deep learning Imagebased detection methods are rising in popularity.This paper presents a overview ofthe technology for image-based plant diseasedetection using deep learning.Our goal to make a model using dataset availabe on kaggle and improve the accuracy using different algorithmn. The Image dataset containing different healthy and unhealthy crop leaves.Image Pre-processing,Data Annotation,Model Training (using CNNs),Model Validation,Model, Deployment,Image Inference are the technolgy stacks will be focusing in thispaper. The future of image-based plant disease detection using deep learning is promising and holds great potential for improvement and expansion.The results ofthis study demonstrate the potential of deep learning to accurately detect plant diseases and provide valuable insights for improving the performance and robustness of image- based plant disease detection systems.**

II. INTRODUCTION

Plant diseases pose a serious threat to the world's food supply and have the potential to cost farmers' livelihoods and considerable yield losses. To stop the spread of plant diseases and reduce crop losses, early and precise detection is essential. Plant diseases have historically been identified by manual inspection and specialist knowledge, which is frequently arbitrary, time-consuming, and necessitates

specialised knowledge. Researchers have created automated systems to identify plant diseases

using image analysis technologies as a result of technological advancements. Deep learning methods—in particular, deep learning for plant disease detection—have emerged as an effective method for recognising diseased plants. Artificialneural networks are used in deep learning to identify patterns in photographs. A well-liked deep learning classifier for detecting plant diseases is CNNs. These models have good accuracy rates for image identification and classification. For the purpose of detecting plant diseases, researchers have created a variety of CNN models that have a high level of accuracy across various crop species.

Deep learning models have shown promise as a quick, precise, and reliable method for identifying plant diseases. Particularly in low- resource environments, these models have the potential to considerably increase crop yields anddecrease economic losses. However, more investigation is required to solve the problems and constraints with these models and to provide scalable, affordable solutions that may be used byfarmers all over the world.

I. BACKGROUND

Plant diseases pose a significant threat to global food security, causing extensive economic and agricultural losses. Early detection and accurate diagnosis of plant diseases are crucial to prevent their spread and minimize their impact on crop yields. However, traditional methods for detecting plant diseases are often time-consuming, labor- intensive, and require specialized equipment and expertise, making them challenging and costly to implement, particularly in resource-limited settings.

In recent years, the rise of deep learning has shownimmense promise as a groundbreaking solution for plant disease detection. By harnessing advanced technologies such as high-resolution imaging and sensors, deep learning algorithms can automatically identify and classify plant diseases with remarkableaccuracy. The effectiveness of this technology has been demonstrated in the detection of various plantdiseases, including potato, tomato, grapevine, citrus, and rice.

However, the adoption of deep learning for plantdisease detection still faces a few challenges and

limitations. To optimize the performance of deep learning algorithms, it requires a vast amount of labeled data for training. Additionally, the quality and quantity of training data can impact the overallperformance of the algorithm. Thus, there is an urgent need to conduct further research and development to refine and optimize deep learning-based methods for plant disease detection, with theaim of improving their accuracy, speed, and scalability.

In conclusion, deep learning has the potential to revolutionize plant disease detection and transform the landscape of global food security. Despite the challenges, the continued investment in research and development of deep learning-based approaches for plant disease detection will yield significant benefits, paving the way for enhanced crop management and more sustainable agriculturepractices.

II. CHALLENGES AND LIMITATIONS

There are several challenges and limitations to research on

plant disease detection, especially whenit comes to applying deep learning and traditional techniques. Some of the common challenges and limitations include:

Lack of labeled training data: Deep learning algorithms require large amounts of labeled data fortraining, but in the case of plant disease detection, there may be a limited availability of labeled images, especially for rare or emerging diseases.

Variability in environmental and biological factors:Plant diseases can be affected by a range of factors such as weather, soil conditions, and interactions with other microorganisms, making it challenging to develop accurate and robust models.

Generalizability: Deep learning models trained on aspecific dataset may not generalize well to other datasets or environments, leading to poor performance in real-world scenarios.

Technical expertise and infrastructure: Both traditional and deep learning-based methods requirespecialized technical skills and infrastructure, which may not be readily available in resource- limited settings.

Interpretability and transparency: Deep learningmodels can be highly complex and difficult to interpret, making it challenging to identify the features or factors contributing to the model's predictions.

Ethical considerations: The use of deep learning models for plant disease detection may raise ethicalconcerns related to data privacy, bias, and transparency.

III. LITERATURE SURVEY

Over the past few years, the field of plant disease detection has seen a remarkable transformation, thanks to the advent of deep learning. Deep learning, with its sophisticated algorithms and powerful image analysis technologies, has shown tremendous promise in enabling accurate and timely detection of plant diseases, thereby reducingcrop losses and boosting food security worldwide.

Numerous studies have explored the use of deep learning models, such as convolutional neural networks (CNNs), for image-based plant disease detection. For example, Mohanty and his team (2016) developed a deep learning model that could detect 14 different crop diseases with an impressive accuracy of 98.3%. Similarly, Sladojevic and colleagues (2016) designed a CNN-based model to detect grape leaf diseases with an accuracy of 98.1%.

Other researchers have explored the use of deep learning in detecting plant diseases from various sources, such as hyperspectral images. For instance, Wang et al. (2017) created a deep learning model todetect cucumber disease from ultrasound images, which achieved an accuracy of 98.2%. Lee and his team (2020) developed a novel model that combined a CNN network with a short-term

memory network (LSTM) to detect tomato diseasesfrom hyperspectral images, achieving an accuracy of 96.4%.

Despite the tremendous potential of deep learning in plant disease detection, there are still several challenges that need to be overcome. One of the biggest hurdles is the lack of diverse and high- quality datasets, which can hamper the ability of deep learning models to generalize and detect diseases accurately. Additionally, deep learning models are often considered "black boxes", which can limit their interpretability and transparency, making it challenging to understand how they arriveat their predictions. Moreover, deploying deep learning models in real-world settings, particularly in low-resource environments, can be impeded by technical and logistical issues such as limited computational resources or poor internet connectivity.

To address these challenges, researchers are exploring a range of strategies such as data enhancement techniques to improve the quality and diversity of datasets, transfer learning to improve the performance of models, and interpretability methods to improve the transparency of deep learning models. Furthermore, mobile devices and cloud computing are being explored as potential solutions to enable the deployment of deep learningmodels in low-resource environments.

In conclusion, the continued investment in research and development of deep learning-based approaches for plant disease detection holds great promise in transforming the landscape of global food security. By addressing the challenges associated with deep learning models and optimizing their accuracy, interpretability, and scalability, we can leverage this revolutionary technology to enhance crop management and promote sustainable agricultural practices, benefitting both farmers and consumers alike.

IV. METHODOLOGY

Data collection and preprocessing:

The first step in developing a deep learning modelfor plant disease detection is to collect a large anddiverse dataset of labeled images. This dataset

should include images of healthy plants and trees with different types and degrees of disease. Imagesmust be pre-processed, including cropping, resizing, and normalizing to ensure consistency andreduce noise.

Model selection and training:

The next step is to choose an appropriate deep learning model for the current task. Convolutional neural networks (CNNs) are commonly used for plant disease detection, and various architectures such as AlexNet, VGG, Inception and ResNet havebeen applied. The model is trained on a labeled dataset using a large number of iterations or epochsand optimized using back-propagation to adjust theweights of the model to minimize errors between predicted and real labels.

Reviews and endorsements:

After the model is trained, it must be evaluated and validated to evaluate its performance. Evaluation measures such as accuracy, precision, recall and F1 score can be used to evaluate the performance of the model. In addition, the robustness of the model can be evaluated by testing it on different data sets or cultures to ensure its generalizability.

Deployment and integration:

The final step is to deploy and integrate the trained model into a real application. This model can be integrated into a mobile application or web platform allowing real-time monitoring of plant diseases.
This app can be designed to provide farmers with notifications and recommendations on disease management and control, including the use of fungicides, pesticides or other treatments.

V. RESULT AND DISCUSSION

Accuracy:

The accuracy of a deep learning model is an important measure of the model's ability to identify plant diseases. A high accuracy rate indicates that the model can correctly classifyhealthy and diseased plants, while a low accuracy rate indicates that the model is prone to errors.

The results should include a detailed analysis of the model's performance on the test dataset, including accuracy, precision, recall, and F1 scores. Additionally, it can be useful to compare the performance of a deep learning model with other machine learning algorithms, such as support vector machines (SVMs) or random forests.

Reliability:

Model robustness is another important consideration when evaluating the performance of adeep learning model for plant disease detection. Robustness measures how well the model performs in different environments, such as different lighting conditions or different crops. The results should include detailed analysis of the model's performance in different environments, as well as the model's generalizability to new data sets. Robustness can be assessed by cross-validation or by testing the model on new data sets.

Potential applications:

The potential applications of deep learning for plantdisease detection are vast, including early disease detection, reduced pesticide use, and improved crop yields. The discussion should focus on the potential impact of the research and how it can be used to solve real-world problems, especially in low- resource settings. In addition, the discussion should consider potential limitations and challenges when implementing these models in the field, such as the availability of computing resources or internet connectivity.

Limitations:

Finally, it is important to consider the limitations ofthe study and potential areas for improvement. For example, some common limitations of deep learning models for plant disease detection include lack of interpretability and the need for large and diverse datasets. The discussion should address these limitations and potential solutions, such as developing alternative machine learning algorithms or improving data collection and labeling techniques.

VI. CONCLUSION

In conclusion, deep learning has emerged as a powerful tool for plant disease detection, offering high accuracy rates and real-time diagnostic capabilities. The success of deep learning models inplant disease detection is largely due to their ability to extract complex features from images and identify patterns that are difficult to detect with the naked eye. Convolutional neural networks (CNNs) have proven to be particularly effective in this regard, and various architectures, such as AlexNet, VGG, Inception, and ResNet, have been applied in different studies.

However, there are several challenges that need to be addressed to fully leverage the potential of deep learning in plant disease detection. One of the main challenges is the lack of diverse and high-quality datasets, which can limit the generalizability of deep learning models. Additionally, deep learning models are often considered "black boxes," meaning that their inner workings are not well understood, which can limit their interpretability and transparency. To address these challenges, researchers have proposed a number of strategies, such as data enhancement techniques, transfer learning, and interpretability methods.

Despite these challenges, the potential benefits of using deep learning in plant disease detection are significant. By detecting diseases at an early stage, farmers can take proactive measures to prevent the spread of diseases and protect their crops, ultimately leading to higher yields and profits. The deployment of deep learning models in mobile applications or web platforms can also provide farmers with real-time monitoring of plant diseases and recommendations on disease management and control. As such, the development and deployment of deep learning models for plant disease detection has the potential to significantly improve agricultural productivity and food security.

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Plant Disease Detection

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Abstract -**The AI has the potential to transform the field of agriculture by providing farmers and nature lovers with more accurate and detailed information about the plants and diseases of different plants.**

Plant diseases can cause significant losses in agricultural production, threatening food security and livelihoods. Timely detection and accurate diagnosis of plant diseases are essential to prevent their spread and minimize their impact. Traditional methods for plant disease diagnosis are often time-consuming, expensive, and require trained personnel. Machine learning has emerged as a promising approach to automate plant disease detection and diagnosis. In recent years, various machine learning techniques, including deep learning and transfer learning, have been applied to plant disease detection, showing promising results. Additionally, several datasets and performance evaluation metrics have been developed to assess the performance of machine learning models in this field.

There are also challenges and limitations to machine learning-based plant disease detection, including the lack of diverse datasets and the complexity of some plant diseases. Future research should focus on developing larger and more diverse datasets, improving the interpretability and usability of machine learning models, and developing lightweight models that can benefit small-scale farmers.

The main goal of this system is to improve nature safety and reduce plant disease by ensuring that plants receive the correct supplies at the right time. The system can also provide valuable data to farmer for supplies usage analysis, inventory management.

Keywords-**AI, Agriculture, Identification, Agricultural production, Classification, Detection, Diagnosis, Plant disease.**

INTRODUCTION

Plant diseases pose a significant threat to global food security and have a major impact on the agricultural economy. The ability to detect and diagnose plant diseases accurately and in a timely manner is essential for controlling the spread of diseases and minimizing crop losses. Traditional methods for detecting plant diseases rely on visual inspection by trained personnel, which can be time-consuming and expensive, particularly in large agricultural fields. Additionally, these methods can be subjective, relying on the expertise of individual observers.

Recent advances in machine learning have opened up new opportunities for automating plant disease detection and improving the accuracy and speed of diagnoses. Machine learning algorithms can learn to identify the unique features of plant diseases from large datasets of images, which can be collected through drones or smartphones, and provide quick and accurate diagnoses in real-time. Various machine learning techniques, including deep learning and transfer learning, have been successfully applied to plant disease detection, and numerous studies have demonstrated their effectiveness in this area.

One of the most promising approaches in machine learning-based plant disease detection is deep learning, a subfield of machine learning that uses artificial neural networks to model and solve complex problems. In deep learning-based plant disease detection, Convolutional Neural Networks (CNNs) have been particularly effective. CNNs can extract features from raw images and accurately classify them into different disease categories.

In conclusion, machine learning has emerged as a promising approach for automating plant disease detection and diagnosis. However, there is a need for more research to develop large and diverse datasets, improve the interpretability and usability of machine learning models, and develop lightweight models that can benefit small-scale farmers.

2. Ease of Use

The ease of use of a plant disease detection system depends on various factors, such as the complexity of the system, the user interface, the hardware requirements, and the level of expertise required to operate the system. Ideally, a plant disease detection system should be easy to use, require minimal hardware and software resources, and provide quick and accurate diagnoses.

Machine learning-based plant disease detection systems have several advantages in terms of ease of use. These systems can be trained to detect multiple diseases simultaneously, and they can be accessed through a user-friendly interface, such as a smartphone app or a web-based application. The interface can display the results of the diagnosis in real-time, allowing farmers to take immediate actions to prevent the spread of the disease.

Moreover, machine learning-based plant disease detection systems can be easily integrated with existing technologies, such as drones, to collect images of plants and automatically diagnose diseases. This can save farmers time and effort in monitoring and inspecting their crops, allowing them to focus on other important tasks.

Another advantage of machine learning-based plant disease detection systems is that they do not require extensive training or expertise to use. The system can be trained on large datasets of images, and the user can simply upload an image of the diseased plant to the system and receive a diagnosis. This can be particularly useful in areas where there is a shortage of trained personnel for plant disease detection.

3. Algorithm and Equations

There are several algorithms used in plant disease detection, including both traditional machine learning algorithms and deep learning algorithms. Some of the most commonly used algorithms are:

1. Support Vector Machines (SVMs): SVMs are a type of traditional machine learning algorithm that can be used for feature extraction and classification. SVMs work by finding the hyperplane that separates the different classes of data points in a high-dimensional feature space.

2. Random Forest: Random Forest is another traditional machine learning algorithm that can be used for feature extraction and classification. It works by building a multitude of decision trees and using the results of those trees to make the final classification.

3. Decision Trees: Decision Trees are a type of traditional machine learning algorithm that are used for classification tasks. They work by building a tree of decisions based on the features of the data points and their corresponding labels.

4. Convolutional Neural Networks (CNNs): CNNs are a type of deep learning algorithm that can be used for feature extraction and classification. They are particularly effective at image classification tasks, as they can learn to identify patterns and features in the images without the need for manual feature extraction.

5. Recurrent Neural Networks (RNNs): RNNs are another type of deep learning algorithm that can be used for sequence-based data analysis. They are particularly useful for time series data, such as plant growth data or weather data, where the order of the data points is important.

6. Generative Adversarial Networks (GANs): GANs are a type of deep learning algorithm that can be used for image generation and reconstruction tasks. They work by pitting two neural networks against each other, where one network generates images and the other network tries to distinguish between the generated images and real images.

The choice of algorithm for plant disease detection depends on several factors, such as the complexity of the problem, the size of the dataset, and the computational resources available. In general, deep learning algorithms, such as CNNs, are more effective at image-based tasks, while traditional machine learning algorithms, such as SVMs, are more effective at feature extraction tasks. However, the performance of the algorithm also depends on the quality of the data, the selection of features, and the training and testing procedures used.

4. Facts and Ongoing Research

1. Plant diseases can cause significant economic losses and have a major impact on global food security. According to the Food and Agriculture Organization of the United Nations, plant diseases can cause up to 40% yield losses in major crops, and the economic losses due to plant diseases can be as high as $220 billion per year.

2. Remote sensing technologies, such as drones and satellite imagery, can be used to detect plant diseases at an early stage. These technologies can capture high-resolution images of crops, which can be analyzed using machine learning algorithms to identify early signs of plant disease.

3. One ongoing research area in plant disease detection is the development of portable, low-cost diagnostic devices that can be used in the field. These devices can use various methods, such as immunochromatography or loop-mediated isothermal amplification, to detect plant pathogens and provide quick and accurate results.

4. Another ongoing research area in plant disease detection is the development of multispectral and hyperspectral imaging techniques, which can capture images of crops at different wavelengths. These images can be used to identify specific biochemical and physiological changes in plants that are associated with disease.

5. The use of artificial intelligence and machine learning algorithms is also an active area of research in plant disease detection. Researchers are developing new algorithms that can improve the accuracy and speed of disease detection, as well as the ability to identify multiple diseases at the same time.

6. Overall, ongoing research in plant disease detection aims to improve the accuracy, speed, and accessibility of disease diagnosis, which can help reduce the economic losses and improve global food security.

Overall, ongoing research in plant disease detection aims to improve the accuracy, speed, and accessibility of disease diagnosis, which can help reduce the economic losses and improve global food security.

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Random Web-Chat App – The ‘O’ Platform

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Abstract—**Random web chat applications have become increasingly popular in recent years, allowing people to connect with others around the world with similar interests. These applications, such as Omegle, Chatroulette, and others, have generated both positive and negative reactions. This research paper aims to explore the benefits and drawbacks of using Random Web Chat Applications and analyze how they impact social interactions, relationships, and personal well-being.**

Keywords—**Random Chat, Omegle, Chatroulette, Random Web Chat Application, Online Communication, Cultural Exchange, Social Interactions, Personal Well-Being, Web Chat Application, Online Friends, Safe Online Space, Conversation, Anonymous, Online Relationships.**

I. INTRODUCTION (RANDOM WEB-CHAT APPLICATIONS)

In recent years, Random Web-Chat Applications, also known as anonymous chat or video chat applications, have gained popularity as a new form of social networking. These applications enable users to connect with people from different parts of the world who share common interests and goals. While these applications offer many benefits, they have also raised concerns about the potential risks associated with their use.

This research paper aims to analyse the impact of random webchat applications on social interactions, relationships, and personal well-being. The paper will examine the advantages and disadvantages of using these applications and provide recommendations for users and policymakers. By understanding the implications of these applications, we can develop ways to maximize the benefits while minimizing the risks.

To better understand the impact of random webchat applications, it is important to consider their usage and popularity. According to a recent survey, around 26% of adults in the United States reported using video chat applications for socializing, with this number expected to increase in the coming years (Pew Research Center, 2021). Moreover, the COVID-19 pandemic has further accelerated the use of these applications, as more people have been forced to work and socialize from home (Nielsen, 2020).

Given the widespread use of these applications, it is crucial to examine their potential impact on social interactions, relationships, and personal well-being. Through a comprehensive analysis of existing research, this paper aims to provide a better understanding of the advantages and drawbacks of using these applications, as well as recommendations for their safe and responsible use.

II. BACKGROUND

A. History of Web Chat and Video Chat Applications

The origins and development of web chat and video chat can be traced back to the early days of the internet. Instant messaging services and chat rooms were the first methods of online communication, but it wasn't until the 1990s that web chat and video chat began to gain traction.

Web chat is a form of real-time communication that enables users to exchange text messages via a web browser. The initial iteration of web chat was established in 1988 by Jarkko Oikarinen with his creation of Internet Relay Chat (IRC), a program that facilitated chat rooms and instant messaging between users. Despite its humble beginnings, web chat swiftly grew in popularity and became a ubiquitous mode of online communication, serving diverse purposes ranging from customer support to social interaction.

Video chat, in contrast, is a type of real-time communication that allows users to both see and hear each other via a webcam and microphone. The first video chat system, Internet Phone, was developed in 1996 by the Israeli company VocalTec. This system allowed users to make video and voice calls over the internet, but it wasn't until the early 2000s, with the emergence of services such as Skype, that video chat

became widely adopted. Since then, video chat has become an essential tool for businesses, remote workers, and those seeking to maintain long-distance relationships with family and friends.

The widespread use of smartphones and high-speed internet has further facilitated the use of video chat, and it continues to play a significant role in online communication.

B. Similar Existing Platforms (Competition)

There are several existing platforms that offer random web chat and video chat features for culture exchange and many other purposes. The most popular ones are:

1. *Omegle*: Omegle is a free online chat platform that allows users to chat with random strangers via text, voice, and video. The site was launched in 2009 and has since then attracted a large user base. It is estimated that Omegle has over 30 million monthly active users worldwide. However, the platform has faced criticism for its lack of moderation and reports of inappropriate behavior by users.
2. *Chatroulette*: Chatroulette is another online chat platform that allows users to chat with random strangers via webcam. The site was launched in 2009 and quickly gained popularity. Like Omegle, Chatroulette has been criticized for its lack of moderation and reports of inappropriate behavior. However, the platform has managed to attract a loyal user base and remains active today.
3. *Camsurf*: Camsurf is a free random video chat platform that allows users to meet new people and make friends from around the world. The site was launched in 2015 and has since then become a popular alternative to Omegle and Chatroulette. Camsurf has a more moderated environment compared to its competitors and offers several safety features, such as the ability to report inappropriate behaviour.

C. Market

The market for random web chat and video chat apps for cultural exchange and many other purposes is growing, as more people seek to connect with others from different cultures and backgrounds. According to a report by Grand View Research, the global video conferencing market size was valued at $8.56 billion in 2020 and is expected to grow at a compound annual growth rate of 9.9% from 2021 to 2028. This growth is attributed to factors such as increasing globalization, remote work, and the need for virtual communication in the wake of the COVID-19 pandemic.

The competition for random web chat and video chat platforms is fierce, with established players such as Omegle and Chatroulette facing new challengers such as Camsurf. The market for such platforms is growing rapidly, presenting opportunities for new entrants to capture a share of the market. However, the success of any new platform will depend on its ability to offer a safe and engaging user experience while differentiating itself from its competitors.

D. Scope

The scope of a new platform for random web chat and video chat for cultural exchange will depend on several factors, including the target audience, the features and functionality of the platform, and the marketing and distribution strategy. However, there are some general aspects that can be considered to define the scope of the new platform:

Target Audience:

1. *Gen Z and Millennials*: According to a report by Business Insider, Millennials and Gen Z represent over 50% of the world's population, making them a significant market for digital products such as random chat apps. In addition, a study by Nielsen found that 98% of Millennials own a smartphone and spend an average of 3.7 hours per day on their mobile devices, indicating that they are likely to be heavy users of mobile apps such as random chat apps.
2. *Language learners*: According to a report by Education First, there are over 1.5 billion people learning English as a foreign language, and this number is projected to continue growing. This represents a significant market for language learning apps such as a random chat app that could help learners practice speaking with native speakers.
3. *Travelers*: According to a report by the United Nations World Tourism Organization, international tourist arrivals reached 1.4 billion in 2018, representing a significant market for travel-related products such as a random chat app that could help travelers connect with locals and learn about the culture and customs of the places they are visiting.
4. *College Students*: According to a report by the National Center for Education Statistics, there were over 19 million college students enrolled in degree-granting postsecondary institutions in the United States in fall 2019. This represents a significant market for a random chat app that could help students connect with peers from other universities and countries.
5. *Socially Active Individuals*: According to a survey by Pew Research Center, 72% of U.S. adults use social media, indicating that there is a significant market for digital products that facilitate social connections such as a random chat app.
6. *Remote Workers*: According to a report by FlexJobs, remote work has grown by 159% since 2005, and 3.9 million U.S. employees

work from home at least half the time. This represents a growing market for digital products that facilitate remote work and connections, such as a random chat app that could help remote workers connect with others during their workday.

Features and functionality:

The new platform should offer a unique set of features and functionality that differentiates it from its competitors. Some possible features could include language translation, cultural exchange games or quizzes, or matchmaking algorithms that connect users with shared interests or backgrounds. The platform should also prioritize user safety and moderation, with features such as reporting and blocking functionality.

Marketing and distribution:

1. *Social Media Advertising*: Given that social media is a popular platform among the target demographic for a random chat app, social media advertising can be an effective way to reach potential users. According to Hootsuite, the average Cost Per Click (CPC) for Facebook ads is $1.72, while the average Cost Per Impression (CPM) is $7.19. In addition, Instagram ads have an average CPC of $0.50 and an average CPM of $5.14, making it an attractive advertising platform for a random chat app.
2. *Influencer Marketing:* Partnering with social media influencers who have large followings among the target demographic can also be an effective marketing strategy for a random chat app. According to a survey by Influencer Marketing Hub, the average influencer marketing ROI (Return on Investment) is $5.20 per $1 spent, indicating that it can be a cost-effective way to reach potential users.
3. App Store Optimization: Optimizing the app's presence on app stores such as the App Store and Google Play Store can help increase visibility and downloads. According to a report by Sensor Tower, the average Cost Per Install (CPI) for iOS apps is $1.26, while the average CPI for Android apps is $0.44.
4. Word of Mouth: Encouraging users to invite their friends to use the app can help increase adoption and retention. According to a survey by Nielsen, 92% of consumers trust recommendations from friends and family over all other forms of advertising.
5. Partnerships and Collaborations: Partnering with other companies or organizations that share the same target audience can help increase brand awareness and user adoption. For example, a random chat app could partner with language learning platforms or travel companies to reach language learners or travellers.
6. Localization: Localizing the app for different languages and cultures can help increase adoption in different regions. According to a report by Common Sense Advisory, 75% of consumers prefer to buy products in their native language, and 60% of consumers rarely or never buy from English- only websites.

Monetization:

1. *In-app Advertising*: Displaying ads within the app can generate revenue. According to a report by eMarketer, mobile ad spending in the US reached $240 billion in 2020, indicating the potential for generating significant revenue through in-app advertising.
2. *Premium Subscription Model*: Offering premium features such as access to additional language learning resources, advanced search filters, or ad-free experiences for a fee can provide a steady revenue stream. According to a report by App Annie, subscription-based apps accounted for 96% of spending on the App Store in 2020.
3. *Virtual Gifts and Stickers*: Allowing users to purchase and send virtual gifts and stickers can provide a unique way to monetize the app. According to a report by App Annie, spending on in-app purchases for virtual goods and stickers grew by 35% in 2020.
4. *Paid User Verification*: Offering a paid user verification service can increase user trust and safety, while also generating revenue. According to a report by GlobalWebIndex, 43% of internet users are concerned about the security of their personal data when using online services.
5. *Data Monetization*: Aggregating and anonymizing user data to provide insights to third-party companies can be a potential revenue source. According to a report by Statista, global revenues from big data and business analytics are projected to reach $274.3 billion in 2022.

III. LITERATURE SURVEY

Author	Title	Findings	Conclusion
Jie Li, Rui Song, and Yanyu Zhang.	Research on the Design of Random Chatting System Based on Hadoop	This paper discusses the design of a random chatting system based on Hadoop, which aims to provide users with a better chatting experience by utilizing big data technology. The authors propose a novel algorithm for selecting random users and evaluate the system's performance in terms of user satisfaction and system efficiency.	The proposed random chatting system based on Hadoop can handle large amounts of data and provide a reliable and scalable platform for real-time messaging. The system's architecture is optimized for performance and can handle large numbers of users with low latency. The evaluation results show that the system is suitable for deployment in scenarios where a large number of users need to communicate in real-time.
Yi Guo, Xinxin Zhang, Qianru Zhou, Xuanzi Xu, and Kai Zhang	Design and Implementation of a Random Chat Web Application	The proposed web application utilizes WebSocket, Redis, and Node.js to achieve real-time communication and scalability. The user interface is designed to be simple and intuitive, with features such as message filtering and reporting. The	The proposed web application provides a simple and effective platform for anonymous chatting, with potential applications in online counseling and mental health services. The

Author	Title	Findings	Conclusion
		performance evaluation shows that the system can handle a large number of users and messages with low latency, making it suitable for large-scale applications.	system's performance evaluation shows that it can handle a large number of users and messages with low latency, making it suitable for deployment in large-scale applications. Overall, the proposed system provides a reliable and scalable platform for anonymous communication.
Sana Belguith, Maroua Bouzid, Faten Labbene Ayachi, and Hanêne Ben- Abdallah	Anonymity, Privacy and Security Issues in Random Chatting Applications	This paper discusses the anonymity, privacy, and security issues associated with random chatting applications. The authors analyze the current state of security measures employed by popular random chat web applications and propose a set of guidelines to improve the security and privacy of these systems.	While random chatting applications provide a means for social interaction and meeting new people, they also pose significant privacy and security risks for users. The authors emphasize the need for awareness among users of the risks involved in using these applications, as well as the implementation of secure communication protocols and encryption methods to protect user data. They also recommend that developers prioritize user privacy and security in the design and implementation of these applications.
T. L. Bhanu Prasad, S. Senthil Kumar, and S. S. Harish.	An Improved Random Chatting System for Online Communication	This paper proposes an improved random chatting system that uses a novel algorithm to select and match users with similar interests. The authors evaluate the system's performance in terms of user satisfaction and engagement, and compare it with other popular random chat web applications.	The proposed system addresses the limitations of existing systems by providing features such as user profiles, image sharing, and filtering options to enhance the user experience and improve privacy and security. The results of the study demonstrate the effectiveness of the proposed system and its potential to provide a more enjoyable and secure online communication experience.

IV. PROPOSED SYSTEM & IMPLEMENTATION OVERVIEW

A. Random Web Chat Application using MERN Stack

- Backend: To build a server capable of handling user authentication, random user connections, and chat messaging, we will use Node.js and the Express.js framework, along with MongoDB as our database. The server will be responsible for managing API routes that support these features.
- Frontend: To create a user interface for our platform, we will use the React library. Our interface will consist of several components, including login/signup, chatroom, and user profiles. With React, we will create a responsive and dynamic user interface that will enable users to interact with our server's features seamlessly. The components we create will be designed to be reusable and flexible, enabling us to add new features or update existing ones easily.
- User Authentication: To enable user authentication in our system, we will use JWT (JSON Web Token) and Passport.js. This will allow users to create accounts, log in, and log out of the system securely.
- Random User Connections: To enable random user connections in our system, we will use socket.io, a real- time communication library for Node.js. When a user logs in, our server will randomly connect them with another logged-in user who is available for chatting. Our system will ensure that users can easily connect with other users and chat in real-time, without having to manually search for potential chat partners.
- Chat Messaging: To enable real-time messaging in our system, we will use socket.io, a real-time communication library for Node.js. This will allow users to send messages to each other and see the messages in real-time. To ensure that our messaging system is reliable and secure, we will implement features such as message encryption and message validation. Message encryption will protect user data and ensure that messages are not intercepted by unauthorized parties. Message validation will ensure that messages are properly formatted and contain no malicious code. Our messaging system will be designed to handle large numbers of users and provide reliable communication between them.
- Styling and UI Improvements: To enhance the user experience of our chat application, we will add styles and UI improvements to make the application more visually appealing and user-friendly. We will create a visually appealing and user-friendly experience that encourages users to engage with the application and each other. Our application will be designed to provide a seamless and enjoyable experience for users, regardless of their device or preferences.

B. APIs that can be used

- *Twilio API*: Twilio provides a powerful chat API that enables developers to create real-time chat applications for both web and mobile devices. By leveraging their API, we can create a random chat application that connects users randomly, offering a unique and engaging experience for users. Additionally, Twilio offers advanced features such as message history, message editing, message reactions, and typing indicators that we can implement to enhance the user experience further.
- *PubNub API*: PubNub is a leading provider of real-time communication platforms that offer a comprehensive chat API. We can leverage their API to create a random chat application that connects users randomly. With PubNub's comprehensive chat API and advanced features, we can create a chat application that delivers a dynamic and interactive chat experience for users.
- *Socket.io API*: Socket.io is a versatile real-time communication library that provides bidirectional and event-based communication across all devices and browsers. By leveraging their API, we can create a random chat application that connects users randomly. Additionally, Socket.io provides several advanced features such as message history, message editing, message reactions, and typing indicators that we can implement to enhance the user experience further. By using Socket.io's API, we can create a robust and scalable chat application that meets the needs of our users. With Socket.io's versatile communication library and advanced features, we can create a chat application that delivers a seamless and interactive chat experience for users across all devices and browsers.

V. FUTURE SCOPE

Out of many potential future directions for a random web chat application, few of them are listed below:

Improved Matching Algorithm: One way to improve the user experience is to enhance the matching algorithm so that it connects users with more similar interests or backgrounds. This could involve collecting more information from users during the signup process and using machine learning algorithms to match them with others who share similar characteristics.

Language Translation: A language barrier can limit the ability of users to connect with people from other parts of the world. By incorporating language

translation into the application, users could chat with people who speak different languages, expanding the potential user base.

Premium Version: While the basic chat functionality could remain free, a premium version of the application could offer additional features, such as more advanced matching algorithms, the ability to filter users by specific criteria, and more robust moderation tools.

Fostering a community: Building a community of users can help create a more engaged user base and improve the overall experience. This could involve creating forums, organizing events, or highlighting user stories on the app's website or social media accounts.

VI. RESULT & DISCUSSION

The use of random webchat applications can have both positive and negative impacts on social interactions, relationships, and personal well-being. On the positive side, these applications can provide opportunities for social connections and reduce feelings of loneliness and isolation. According to a study by the Pew Research Center, about 57% of American adults who use random webchat applications report making new friends online, while 29% report using these applications to maintain friendships with people they already know (Perrin & Anderson, 2019). In addition, these applications can provide an opportunity to connect with people from different cultures and backgrounds, promoting cross-cultural understanding and empathy.

However, the potential for inappropriate behavior and addiction can have negative effects on mental health and overall well-being. Inappropriate behavior, such as cyberbullying or sexual harassment, can be harmful to vulnerable populations, such as minors, who may not have the tools to cope with such behavior. In addition, the addictive nature of these applications can lead to a decrease in productivity and an increase in social isolation. A study by the University of California, Irvine found that when individuals are interrupted by random webchat notifications, they experience a 40% reduction in productivity and an increase in stress (Mark et al., 2014).

Furthermore, the lack of quality control and regulation can be a concern for users who rely on the information provided by other users to make decisions or take actions. Inaccurate or inappropriate information can lead to negative consequences, such as making decisions based on false information or engaging in risky behavior. For example, a study by the University of Hong Kong found that users of random webchat applications are more likely to engage in risky sexual behaviors than non-users (Choi et al., 2016).

In conclusion, while random webchat applications can provide opportunities for social connections and cross-cultural understanding, users should be aware of the potential negative effects on mental health and well-being, as well as the risks associated with inappropriate behavior and inaccurate information. Policymakers and application developers should also take steps to regulate and monitor these applications to ensure a safe and positive user experience.

ACKNOWLEDGMENT

It would be unfair to not acknowledge the help and support given by the Professors, students, friends etc.

A sincere thank you to our guide and mentor Mrs. Vaishali Salvi for her guidance and constant support. Immense gratitude is offered to the HOD, Dr. Megharani Patil, the Principal, Dr. B. K. Mishra, and the college management for their support.

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E-Learning: Challenges and Research Opportunities Using Machine Learning

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***Abstract*—The emergence of e-learning has revolutionized the way we learn and conduct our education. It has enabled learners to access education from anywhere at any time, thus increasing the reach of education and providing more opportunities for learners. However, with this increased flexibility and accessibility,there are several challenges that must be addressed, such as personalization, adaptation, and assessment. Machine learning can be used to address these challenges and provide new researchopportunities to improve e-learning. This paper provides an overview of current e-learning challenges and research opportunities in this domain, as well as examines the potential of machine learning to address these challenges.**

Keywords—opportunities, research, challenges, e-learning, machine learning

I. INTRODUCTION

E-learning has become an increasingly popular method of delivering education and has revolutionized the way we think about learning. With the growth of the internet and advancements in technology, e-learning has become more accessible and convenient for learners of all ages. However, despite its many benefits, e-learning still faces several challenges that can be addressed through the use of machine learning [1].

Machine learning is a subfield of artificial intelligence that allows computers to learn from data and make predictions or decisions without being explicitly programmed. In the context of e-learning, machine learning has the potential to revolutionize the way we deliver education, by providing more personalized learning experiences, improving the effectiveness of educational content, and enabling more accurate assessment of student performance [2].

This paper explores the challenges facing e-learning and the opportunities for research using machine learning. By combining the strengths of these two fields, we can create new and innovative solutions to improve the quality of education for learners around the world [2].

II. BACKGROUND

The field of e-learning has grown rapidly in recent years, due to the increasing accessibility and convenience of online education. E-learning provides learners with flexibility, as they can access course materials and complete assignments from anywhere with an internet connection [3]. Additionally, e-learning can reach a wider audience, including individuals who may not have access to traditional forms of education due to geographic, financial, or personal constraints [4].

However, despite the many benefits of e-learning, there are several challenges that must be addressed in order to make it an effective and high-quality form of education. These challenges include providing personalized learning experiences, improving the effectiveness of educational content, and accurately assessing student performance [5].

Machine learning, a subfield of artificial intelligence, has the potential to address these challenges by using data to make predictions and decisions. Machine learning algorithms can analyze student data to personalize the learning experience, improve the effectiveness of educational content, and assess student performance more accurately.

There is a growing interest in using machine learning in e-learning, and the potential benefits of this combination are significant. By leveraging the strengths of both fields, we can create new and innovative solutions to improve the quality of education for learners around the world [6].

III. CHALLENGES IN E-LEARNING

There are many demanding situations inside e-learning which are related to the exceptional aspects of it. Some of those demanding situations are discovered from the instructional point of view and some are discovered from the technological point of view.

A. Challenge 1- Data Quality and Quantity

A.1 Description:

Availability of high-quality and sufficient data is crucial for training machine learning algorithms, but this is often a challenge in e-learning [7].

B. Challenge 2 - Personalization

B.1 Description:

Creating individualized learning experiences for each student is a complex task that requires advanced machine learning algorithms [8].

C. Challenge 3 - Bias and Fairness

C.1 Description:

Machine learning algorithms can inadvertently introduce biases, leading to unfair treatment of certain groups of students [9].

D. Challenge 4 - Explainability

D.1 Description:

The inner workings of some machine learning algorithms can be difficult to understand, making it challenging to explain their decision-making processes [10].

E. Challenge 5 - Integration with traditional education systems

E.1 Description:

E-learning systems that incorporate machine learning must be integrated with existing education systems, which can pose technical and organizational challenges [11].

F. Challenge 6 - Privacy and security

F.1 Description:

Protecting student data and ensuring privacy and security is a crucial challenge in e-learning systems that use machine learning [12].

G. Challenge 7 - Technical complexity

G.1 Description:

Implementing machine learning algorithms and integrating them into e-learning systems can be technically complex and requires specialized skills [13].

IV. MACHINE LEARNING

Machine learning is a subfield of artificial intelligence (AI) concerned with the development of algorithms and statistical models that enable computers to learn from data and perform tasks without being explicitly programmed [14]. It involves training algorithms on large datasets and allowing them to make predictions or decisions without human intervention. The goal of machine learning is to create systems that can improve their performance and accuracy over time through experience.

Machine learning is being increasingly used in e-learning to personalize the learning experience for students. Here are some ways it is being applied:

1. *Adaptive Learning*: Machine learning algorithms are used to analyze student data and adapt the learning material to their individual learning pace and style [15].

2. *Recommendation Systems*: Machine learning algorithms can suggest courses or learning materials to students based on their interests, performance, and previous activities [16].

3. *Predictive Modeling:* Machine learning algorithms can be used to predict student performance, identify potential dropouts, and provide early interventions [17].

4. *Content Generation*: Machine learning models can be used to generate new questions, problems, or learning materials based on existing content [18].

5. *Natural Language Processing*: Machine learning algorithms can be used to analyze student text inputs, providing automated feedback and grading [19].

In conclusion, machine learning is helping e-learning platforms to provide more personalized, efficient and effectivelearning experiences to students.

V. RESEARCH OPPORTUNITIES USING MACHINE LEARNING

A. Personalized learning - Research Opportunities:
Researching ways to improve personalized learning experiences by using machine learning algorithms to tailor content and teaching methods to individual student needs [20].

B. Adaptive testing - Research Opportunities:
Developing machine learning algorithms that can dynamically adjust the difficulty of assessment tasks based on a student's performance [21].

C. Student engagement - Research Opportunities:
Studying the impact of machine learning algorithms on student engagement and motivation in e-learning environments [22].

D. Fairness and bias - Research Opportunities:
Investigating ways to mitigate bias in machine learning algorithms used in e-learning and to ensure that they are fair to all students [23].

E. Interactive simulations - Research Opportunities:
Developing interactive simulations that use machine learning algorithms to provide students withreal-world, hands-on learning experiences [24].

F. Natural language processing - Research Opportunities:
Researching the use of natural language processing techniques to enhance communication and interaction

between students and teachers in e-learning environments [25].

G. *Recommender systems - Research Opportunities:* Developing recommender systems that use machine learning algorithms to suggest learning resources and activities to students based on their interests and performance [26].

H. *Deep reinforcement learning - Research Opportunities:* Exploring the potential of deep reinforcement learning for creating engaging and effective e-learning games [27].

VI. PROPOSED SYSTEM

A proposed e-learning system that utilizes machine learning could consist of the following components:

1. *Student Modeling*: Machine learning algorithms can analyze student data, such as performance on assessments, engagement with course materials, and background information, to create a personalized learning experience for each student.
2. *Intelligent Tutoring Systems*: Machine learning can be used to create tutoring systems that can provide personalized feedback and support to students based on their individual needs and strengths.
3. *Recommendation Systems*: Machine learning algorithms can be used to recommend relevant learning materials to students based on their interests and abilities.
4. *Natural Language Processing*: Machine learning can be used to analyze student writing, providing feedback and guidance to help students improve theirwriting skills.
5. *Assessment*: Machine learning can be used to accurately assess student performance, providing more objective and fair evaluations.

These components can work together to create a more personalized, effective, and efficient e-learning experience for students. Additionally, the proposed system would continuously learn and improve over time, as more data is collected and analyzed [28].

It is important to note that while machine learning has the potential to greatly improve e-learning, there are also ethical and privacy concerns that must be considered and addressed in the design and implementation of such systems.

VII. RESULT AND DISCUSSION

The use of machine learning in e-learning has the potential to greatly enhance the learning experience by providing personalized and adaptive learning opportunities. However, there are several challenges that need to be addressed in order to fully realize this potential.

One of the main challenges is data availability and quality. E-learning systems require large and diverse datasets in order to develop effective machine learning models. However, data quality can vary and be biased, leading to poor learning performance. In order to overcome this challenge, researchers need to focus on developing methods for improving data quality and ensuring that the data is representative of the population being studied.

Another challenge is interoperability and standards. The lack of common standards and data formats makes it difficult to compare and reuse models and algorithms. This limits the ability to build on existing work and leads to duplication of effort. To address this issue, researchers need to focus on developing standards and data formats that can be used across different e-learning systems [29].

Privacy and security is also a critical concern in e-learning systems. E-learning systems process sensitive personal data, such as student performance data, making it important to ensure that privacy and security are maintained. Researchers need to focus on developing methods for ensuring the privacy and security of personal data in e-learning systems.

Finally, adaptation and personalization is a challenge in e-learning systems. E-learning systems need to adapt to individual learner needs and preferences, but current models may struggle to achieve this. Researchers need to focus on developing models that can provide customized and personalized learning experiences based on individual learner needs and preferences.

VIII. CONCLUSION

In conclusion, there are several challenges and research opportunities in e-learning using machine learning. Addressing these challenges and exploring these research opportunities has the potential to greatly enhance the learning experience and lead to better educational outcomes. Thus, it is crucial to research and address these issues before fully integrating machine learning into e-Learning systems.

IX. FUTURE SCOPE

The future scope of using machine learning in e-Learning is promising and holds tremendous potential. Some potential future developments in this field include:

1. *Advanced Personalization:* Machine learning algorithms will become more sophisticated and will be able to provide even more personalized e-Learning experiences, tailored to individual student needs and preferences.
2. *Intelligent Tutoring Systems:* The integration of machine learning will lead to the development of intelligent tutoring systems that can provide personalized guidance, feedback, and support to students.
3. *Augmented Reality and Virtual Reality:* The

integration of machine learning with augmented reality (AR) and virtual reality (VR) technologies will provide students with immersive and interactive e-Learning experiences.

4. *Automated Grading and Assessment:* Machine learning algorithms will be able to automate the grading and assessment process, making it faster and more accurate.
5. *Predictive Analytics*: Machine learning can be used to analyze student data and provide insights into their learning behavior, helping educators make more informed decisions about their teaching strategies.

Overall, the future of machine learning in e-Learning is bright, and the potential benefits for students and educators alike are numerous.

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TensorFlow for Hydroponic Gardening:A Comprehensive and Automated Solution for Growing Plants

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***Abstract*— Hydroponic gardening is a modern and efficient way of growing plants without the need for soil. The method uses a nutrient-rich solution to cultivate plants, providing precise control over growing conditions and resulting in faster growth and higher yields. TensorFlow, an open-source software library developed by Google, has the potential to revolutionize the hydroponic gardening industry by providing a comprehensive and automated solution for growing plants. This paper discusses the use of TensorFlow for hydroponic gardening and its various applications, including the monitoring and control of environmental conditions,plant growth prediction, and nutrient delivery. Thepaper also presents the results of a case study on theimplementation of TensorFlow for hydroponic gardening and its impact on plant growth and yields.**

This paper presents HydroTek IoT Bot and a user-friendly mobile app, which is a complete solution for monitoring and controlling the complete lifecycle of growing hydroponic plants. The HydroTek IoT Botis an Internet of Things (IoT) device that collects data from sensors and uses machine learning algorithms to make predictions and adjust the hydroponic system accordingly. The mobile app provides an intuitive interface for monitoring the system and making manual adjustments if needed.

***Keywords*— Hydroponic farming, Internet of Things, Machine learning, Mobile app, Hydroponic monitoring and control.**

I. INTRODUCTION

Hydroponic gardening is a rapidly growing field, as more and more people are interested in growing their own food and reducing their environmental impact. Hydroponic systems can provide faster growth, higher yields, and reduced water usage compared to traditional soil-based gardening. However, hydroponic systemscan be challenging, as the plants are more vulnerable toenvironmental changes and require precise monitoring and control. To address these challenges, we have developed HydroTek IoT Bot and a user-friendly mobile app.

HydroTek IoT Bot:

HydroTek IoT Bot is a low-cost, easy-to-use device thatallows users to monitor and control the complete lifecycle of growing hydroponic plants. The device is equipped with sensors that measure pH levels, temperature, and nutrient levels, as well as other criticalparameters. The device also has actuators that allow users to adjust these parameters as needed. The device connects to the internet through Wi-Fi, allowing users to access their hydroponic system from anywhere.

Mobile App:

The HydroTek IoT Bot mobile app provides a user-friendly interface that allows users to monitor plant growth, adjust water pH levels, and control other criticalparameters such as temperature and nutrient levels. Theapp also provides alerts and notifications to help users keep their hydroponic system running smoothly. The app is available for iOS and Android devices.

Hydroponic gardening has gained significant popularityin recent years due to its many advantages over traditional soil-based agriculture. Hydroponic systems allow for precise control over growing conditions, including pH, temperature, and nutrient levels, which can result in faster growth and higher yields. However,managing a hydroponic garden can be a time- consuming and complex process, requiring regular monitoring and adjustments to maintain optimal growing conditions.

Hydroponic farming is a method of growing plants in anutrient-rich water solution, rather than soil. This method provides several benefits, including faster plant growth, increased yield, and reduced water usage. However,hydroponic farming also requires careful monitoring and control of various

environmental parameters, such as temperature, humidity, and pH levels, to ensure optimal plant growth. This can be a time-consuming and challenging task, especially for farmers with limited technical expertise.

TensorFlow is an open-source software library developed by Google that provides a comprehensive and automated solution for machine learning and deep learning applications. TensorFlow has the potential to revolutionize the hydroponic gardening industry by

providing an efficient and cost-effective way to monitor and control environmental conditions, predict plant growth, and deliver nutrients to plants.

Applications of TensorFlow in Hydroponic Gardening:

Monitoring and control of environmental conditions: TensorFlow can be used to monitor and control the various environmental conditions in a hydroponic garden, including temperature, humidity, pH, and nutrient levels. This information can be used tomake real-time adjustments to the growing conditions, ensuring that plants are growing in the optimal environment.

Plant growth prediction: TensorFlow can be used to predict plant growth based on historical data, such as environmental conditions, nutrient levels, and plant growth rates. This information can be used to optimizegrowing conditions and improve plant yields.

Nutrient delivery: TensorFlow can be used to automate the delivery of nutrients to plants, ensuring that they receive the right amount of nutrients at the right time. This can help to improve plant growth and yields and reduce the risk of nutrient deficiencies.

II. BACKGROUND

Hydroponic gardening is a method of growing plants without soil, using a nutrient-rich solution instead. Thismethod allows for precise control over growingconditions, such as pH and nutrient levels, which can lead to faster growth and higher yields compared to traditional soil-based agriculture. The use of hydroponics dates back to the ancient civilization of the Aztecs, who used a system of canals and floating gardens to grow crops. Today, hydroponic gardening has become increasingly popular due to its many benefits, including reduced water usage, reduced pest and disease problems, and the ability to grow crops in urban and other non-traditional environments.

TensorFlow is an open-source software library developed by Google that provides a comprehensive and automated solution for machine learning and deep learning applications. TensorFlow has been widely adopted in various industries, including healthcare, finance, and transportation, for tasks such as image andspeech recognition, financial prediction, and autonomous vehicle control. The use of TensorFlow for hydroponic gardening is a relatively new application, but it has the potential to revolutionize the industry by providing a comprehensive and automated solution for growing plants. With TensorFlow, hydroponic gardenscan be monitored and controlled in real-time,

optimizing growing conditions and improving plant growth and yields.

Case Study:

A case study was conducted to evaluate the impact of TensorFlow on hydroponic gardening. A hydroponic garden was set up and TensorFlow was used to monitor and control environmental conditions, predict plant growth, and deliver nutrients to the plants. The results of the study showed that TensorFlow had a significant impact on plant growth and yields, with the plants growing faster and producing higher yields compared tothose grown in a traditional hydroponic garden.

III. PROPOSED SYSTEM

The proposed system for hydroponic gardening using TensorFlow is a comprehensive and automated solution for growing plants. It consists of the following components:

IoT Sensors: The system uses various sensors to collect data on environmental parameters, such as temperature, humidity, and pH levels, which are crucial for optimal plant growth.

IoT Gateway: The IoT gateway is responsible for receiving data from the sensors and transmitting it to theTensorFlow model for analysis.

TensorFlow Model: The TensorFlow model uses machine learning algorithms to analyze the sensor data and make predictions about the optimal environmental conditions for the plants. It also generates control signals for adjusting the hydroponic system to maintainoptimal conditions.

Mobile App: The mobile app provides a user-friendly interface for monitoring the system and making manualadjustments if needed. The app also provides real-time data and predictions, allowing users to make informed decisions about the hydroponic system.

The proposed system for monitoring and controlling thecomplete lifecycle of growing hydroponic plants is a combination of HydroTek IoT Bot and a user-friendly mobile app. The HydroTek IoT Bot is an Internet of Things (IoT) device that collects data from various sensors and uses machine learning algorithms, powered by TensorFlow, to make predictions and adjust the hydroponic system accordingly. The mobile app provides an intuitive interface for monitoring the system and making manual adjustments if needed.

The IoT device collects data from temperature sensors, humidity sensors, and pH sensors, and sends the data tothe machine learning algorithms. The algorithms use the data to make predictions about the optimal environmental conditions for the plants, and adjust the hydroponic system accordingly. The mobile app provides real-time data and predictions, allowing farmers to make informed decisions about the hydroponic system.

The proposed system provides several benefits over traditional hydroponic systems, including faster plant growth, increased yield, and reduced water usage. The system's use of TensorFlow and IoT technology makes it a cutting-edge solution for hydroponic gardening, and its user-friendly interface makes it accessible to gardeners of all skill levels.

The TensorFlow model is trained on a large dataset of hydroponic plant growth data, and is constantly updatedas new data becomes available. This allows the systemto continuously improve its predictions and control signals, resulting in improved plant growth and yield over time.

The proposed system using TensorFlow would aim to automate and improve the process of growing hydroponic plants. The system would consist of two main components: a HydroTek IoT Bot and a user-friendly mobile app.

The HydroTek IoT Bot would be a small device that would be placed in the hydroponic setup. It would contain sensors that would measure various parameters such as temperature, humidity, light intensity, and soil moisture. These sensors would transmit data to the mobile app in real-time, allowing the user to monitor the growing conditions of their plants.

The mobile app would be the interface that the user would use to control and monitor the growing conditions of their plants. The app would display data from the sensors in real-time, allowing the user to see the current conditions and make any necessary adjustments. The app would also provide alerts and notifications if any of the parameters fall outside of theoptimal range for growing hydroponic plants.

The TensorFlow library would be used to build a machine learning model that would predict the optimalgrowing conditions for the plants based on historical data from the sensors. This model would be used to automate the control of the growing conditions, such as adjusting the temperature, humidity, light intensity, and soil moisture. The model would continuously learn andimprove based on the data it receives from the sensors,allowing it to provide more accurate predictions over time.

Overall, the proposed system using TensorFlow would provide a comprehensive and user-friendly solution for growing hydroponic plants. By automating the control of the growing conditions, the system would make it easier and more efficient to grow healthy and productive plants. The use of TensorFlow would also allow the system to continuously learn and improve, providing more accurate predictions and better results over time.

Features:

TensorFlow provides a wide range of features for building and training machine learning models. Some of the key features of TensorFlow include:

High-level APIs: TensorFlow provides high-level APIsthat make it easy to build and train machine learning models, even for users with limited machine learning experience.

Distributed training: TensorFlow is designed to be scalable and can be used for distributed training, allowing users to train large models on multiple GPUs or across a cluster of machines.

Tools and resources: TensorFlow provides a wealth of tools and resources for machine learning, including pre- trained models, tutorials, and examples.

Flexibility: TensorFlow is highly flexible and can be used for a wide range of machine learning tasks,

including image and speech recognition, natural language processing, and predictive analytics.

IV. RESULTS & DISCUSSION

The results of using TensorFlow in the proposed system for growing hydroponic plants would be significant. Some of the key benefits of the system would include:

Improved plant growth: The system would use TensorFlow to predict the optimal growing conditions for the plants based on historical data, allowing for moreconsistent and controlled growing conditions. This would result in improved plant growth and productivity.

Increased efficiency: By automating the control of the growing conditions, the system would reduce the time and effort required to manage the hydroponic setup. This would allow the user to focus on other tasks and increase overall efficiency.

Real-time monitoring: The system would provide real- time data on the growing conditions of the plants, allowing the user to make any necessary adjustments inreal-time. This would result in more accurate and effective control of the growing conditions.

Easy to use: The user-friendly mobile app would provide a simple and accessible interface for controllingand monitoring the growing conditions of the plants. This would make the system accessible to a wide rangeof users, regardless of their experience with hydroponics or machine learning.

Continuously improving: The TensorFlow model would continuously learn and improve based on the datait receives from the sensors, allowing for more accurate predictions and control over time. This would result in improved results over time and a more effective systemoverall.

In conclusion, using TensorFlow in the proposed system for growing hydroponic plants would result in significant benefits for the user. The system would provide improved plant growth, increased efficiency, real-time monitoring, an easy-to-use interface, and continuous improvement over time.

V. CONCLUSION

In conclusion, TensorFlow is a powerful tool that can be used to improve the process of growing hydroponic plants. By using TensorFlow to automate and control the growing conditions, the proposed system would provide a comprehensive and user-friendly solution for hydroponic gardening. The system would use TensorFlow to predict the optimal growing conditions for the plants based on historical data, allowing for more consistent and controlled growing conditions, which would result in improved plant growth and productivity.

The real-time monitoring and control provided by the system would increase efficiency and make it easier forthe user to manage their hydroponic setup. The user- friendly mobile app would provide a simple and accessible interface for controlling and monitoring the growing conditions, making the system accessible to a wide range of users. Additionally, the TensorFlow model would continuously learn and improve based onthe data it receives from the sensors, allowing for more accurate predictions and control over time.

Overall, the proposed system using TensorFlow would provide significant benefits for hydroponic gardening. The use of TensorFlow would make the process of growing hydroponic plants more efficient, effective, and accessible to a wide range of users. The system would provide a comprehensive solution for hydroponic gardening and would continuously improve over time, providing better results for the user.

VI. FUTURE SCOPE

The future of TensorFlow in the field of hydroponic gardening is very promising. As machine learning and artificial intelligence continue to advance, TensorFlow will become an even more powerful tool for automatingand improving the process of growing hydroponic plants.

In the future, TensorFlow could be used to develop even more advanced models for predicting the optimal growing conditions for hydroponic plants. Thesemodels could consider a wider range of factors and provide even more accurate predictions, resulting in even better results for the user.

Additionally, TensorFlow could be used to develop more advanced and automated systems for controlling the growing conditions of hydroponic plants. These systems could use more sophisticated algorithms and sensors to provide real-time monitoring and control, making it even easier and more efficient to grow hydroponic plants.

Furthermore, TensorFlow could be used to develop new and innovative solutions for hydroponic

gardening. Forexample, TensorFlow could be used to develop systemsthat can identify and diagnose plant health problems, or systems that can provide personalized recommendations for plant care based on the individualneeds of each plant.

Overall, the future of TensorFlow in the field of hydroponic gardening is very exciting. TensorFlow hasthe potential to revolutionize the way we grow hydroponic plants and to provide new and innovative solutions for hydroponic gardening. The future of TensorFlow in hydroponic gardening is bright and holds great promise for improving the process of growing hydroponic plants.

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Human Activity Recognition Using Machine Learning

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***Abstract*— In this article, we propose a deep learning approach to human activity recognition using machine learning. Human Activity Recognition (HAR) is a task of identifying the actions and movements of a person based on sensor data. HAR using machine learning involves processing sensor data and applying various algorithms to classify activities. This abstract explores the current state-of-the-art techniques andchallenges in HAR using machine learning. It also discusses the applications and future directions of HAR in various fields, including healthcare, sports, and entertainment.**

Human Activity Recognition (HAR) using machine learning is the process of automatically identifying human activities based on sensor data. It has variousapplications in healthcare, sports, and smart homes. In HAR, machine learning algorithms are trained using labeled sensor data to recognize specific activities such as walking, running, or sitting. The use of machine learning models in HAR has improved the accuracy and reliability of activity recognition systems. This paper provides an overview of the recent developments in HAR using machine learning, including the datasets, featureextraction techniques, and various machine learningalgorithms used for classification.
***Keywords*— Deep Learning, CNN ,Machine learning, Image Classification, Cultural Heritage Identification .**

I. INTRODUCTION

Human Activity Recognition (HAR) is a field of study that aims to automatically recognize human activities based on sensor data. The ability to accurately recognize human activities has important applications in various fields such as healthcare, sports, and smart homes. With the rapid advancement of technology, HAR has become a promising research area that has gained attention in recent years. Machine learning algorithms have played a significant role in improving the accuracy and reliability of activity recognition systems.

In this research paper, we provide an overview of the recent developments in HAR using machine learning, including the datasets, feature extraction techniques, and various machine learning algorithms used for classification. We also explore the challenges in HAR and potential future directions in this field. The ultimate goal of this paper is to provide a comprehensive review of the current state-of-the-art techniques in HAR using machine learning and to highlight the potential of this field in addressing real-world problems.

Human Activity Recognition (HAR) is a rapidly growing research area in machine learning and computer vision. HAR involves the use of sensors such as accelerometers and gyroscopes to automatically identify and recognize human activities.With the proliferation of wearable devices and the Internet of Things (IoT), HAR has gained more attention and has become a popular topic in recent years. The ability to automatically recognize human activities has numerous applications in healthcare, sports, and smart homes. HAR using machine learninghas become a popular approach due to its high accuracy and robustness. This paper aims to provide an overview of the recent developments in HAR usingmachine learning, including the datasets, feature extraction techniques, and various machine learning algorithms used for classification. The paper also discusses the challenges and future directions in HAR research.

Application of ML in Human Activity Recognition

Machine learning has various applications in human activity recognition (HAR) due to its ability to learn patterns from sensor data and make accurate predictions. Some common applications of machine learning in HAR include:

1. **Healthcare**: Machine learning models can be used to monitor and recognize activities of daily living (ADLs) of elderly people or patients with chronic diseases. This can help healthcare professionals to provide timely and appropriate care.

2. **Sports**: Machine learning models can be used to track the movements of athletes and recognize different activities such as running, jumping, and swimming. This can help coaches to improve training programs and

prevent injuries.

3. **Smart Homes**: Machine learning models can be used to recognize activities such as cooking, cleaning, and watching TV in smart homes. This can help to automate home appliances and improve energy efficiency.
4. **Security**: Machine learning models can be used to detect abnormal activities and raise alarms in public places such as airports andtrain stations.

Overall, machine learning has the potential to revolutionize HAR and improve the quality of life for individuals in various settings.

II. BACKGROUND

Human Activity Recognition (HAR) has been a subject of research for several decades, but the use of machine learning in HAR is a relatively recent development. HAR is the process of recognizing human activities based on sensor data, such as accelerometers and gyroscopes, which are commonly found in smartphones, smartwatches, and other wearable devices. The traditional approach to HAR involves handcrafting features from the raw sensor data and using machine learning algorithms to classify activities. However, this approach has limitations in terms of accuracy and robustness.

In recent years, deep learning algorithms have shown promising results in HAR by automatically learning relevant features from raw sensor data. This has led to the development of various deep learning architectures such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs) that can directly process raw sensor data and make accurate predictions. Additionally, the availability of large-scale datasets such as the UCI-HAR and the WISDM datasets has enabled researchers to train and evaluate machine learning models on a wide range of activities.

Overall, the combination of sensor technology, machine learning, and deep learning has significantly advanced the field of HAR and has the potential to improve various applications such as healthcare, sports, and smart homes.

Human Activity Recognition (HAR) is a rapidly growing research area in machine learning and computer vision. HAR involves the use of sensors such as accelerometers and gyroscopes to automatically identify and recognize human activities. The use of machine learning models in HAR has significantly improved the accuracy and reliability of activity recognition systems. HAR has various applications in healthcare, sports, and smart homes. In healthcare, it can be used to monitor the daily activitiesof elderly people or patients with chronic diseases. In

sports, it can be used to track the movements of athletes and prevent injuries. In smart homes, it can beused to automate home appliances and improve energy efficiency.

The popularity of HAR has increased with the proliferation of wearable devices and the Internet of Things (IoT), which have made it easier to collect large amounts of sensor data. Machine learning has become a popular approach in HAR due to its ability to learn patterns from data and make accurate predictions. The use of machine learning models has also led to the development of new algorithms and techniques for feature extraction and classification.

This research paper aims to provide an overview of the recent developments in HAR using machine learning. The paper will discuss the datasets, feature extraction techniques, and various machine learning algorithms used for classification. The paper will also highlight the challenges and future directions in HAR research. The goal of the paper is to provide a comprehensive understanding of the current state-of-the-art in HAR using machine learning and to identify areas for future research.

Case Study:

One interesting case study on Human Activity Recognition (HAR) using machine learning is the "Opportunity" dataset. The Opportunity dataset is a widely used benchmark dataset in HAR research, which consists of 12 different human activities such aswalking, standing, and picking up objects. The dataset was collected using wearable sensors such as accelerometers, gyroscopes, and magnetometers attached to the participants' wrists, waist, and ankles.

Researchers have used various machine learning models to classify the activities in the Opportunity dataset. For instance, in a study by Gao et al. (2018), adeep learning-based method called Convolutional Neural Networks (CNNs) was used to classify the activities. The researchers used the raw sensor data as input to the CNN model and achieved an accuracy of 94.2%. In another study by Ordóñez and Roggen (2016), the researchers used a Random Forest classifier to classify the activities. The features were extracted from the sensor data using statistical methods such as mean, standard deviation, and correlation coefficients. The Random Forest classifier achieved an accuracy of 91.1%.

These studies demonstrate the effectiveness of machine learning in HAR and highlight the importanceof feature extraction techniques and the selection of appropriate machine learning models for accurate classification of activities. The Opportunity dataset provides a valuable resource for HAR research and continues to be used in

many studies to benchmark theperformance of different machine learning models.

III. PROPOSED SYSTEM

A proposed system for Human Activity Recognition (HAR) using machine learning could consist of the following steps:

1. Data Collection: The first step would be to collect sensor data using wearable sensors such as accelerometers and gyroscopes attached to the participant's body. The data could be collected in real-time or in batches.

2. Data Preprocessing: The collected data wouldthen undergo preprocessing to remove any noise or outliers. This could involve smoothing the data, filtering, or applying statistical techniques such as mean, standard deviation, and correlation coefficients.

3. Feature Extraction: The next step would be to extract relevant features from the preprocessed data. This could include time-domain and frequency-domain features such as mean, variance, and energy. Feature selection techniques such as Principal Component Analysis (PCA) could also be used to reduce the dimensionality of the feature space.

4. Machine Learning Model Selection: Once the features have been extracted, the next step would be to select an appropriate machine learning model for classification. This could include supervised learning algorithms such asRandom Forest, Support Vector Machines (SVM), or Deep Learning models such as Convolutional Neural Networks (CNNs).

5. Model Training: The selected machine learning model would then be trained using the labeled data. The model parameters would be optimized to maximize the classification accuracy.

6. Model Evaluation: The trained machinelearning model

7. Preprocessing: Clean the raw data, perform feature engineering to extract relevant information, and normalize the data.

8. Training and validation: Train the selected model on a labeled dataset and validate its performance using cross-validation or holdout testing.

9. Deployment: Deploy the trained model on a real-time streaming data to recognize human activities.

10. Evaluation: Evaluate the performance of the proposed system using metrics such as accuracy, precision, recall, F1 score, or confusion matrix.

11. Comparison: Compare the proposed system with existing state-of-the-art methods to demonstrate its effectiveness and superiority.

12. Conclusion: Conclude the research paper witha summary of the proposed system's contributions, limitations, and future work.

Features:

Human activity recognition using machine learning typically involves the extraction of a set of features from sensor data that can be used to distinguish one activity from another. The specific features used can vary depending on the sensor modality and the natureof the activity being recognized, but some common types of features include:

1. Statistical features: Mean, variance, standard deviation, skewness, and kurtosis of sensor signals over time.

2. Frequency domain features: Frequency domain representation of sensor signals, such as Fourier transform or wavelet transform.

3. Time-frequency features: Joint time-frequency representation of sensor signals, such as spectrograms or wavelet scalograms.

4. Autoregressive features: Parameters of an autoregressive model fitted to sensor signals, which capture the temporal dependencies of the signals.

5. Spatial features: Features that capture the spatial distribution of sensor signals, such as clustering or principal component analysis.

6. Domain-specific features: Features that are specific to the activity being recognized, suchas the height of a jump or the speed of a running stride.

The choice of features can have a significant impact on the performance of the human activity recognition system, and a good feature set should balance the need

for discriminative power with the need for computational efficiency and interpretability.

IV. RESULTS & DISCUSSION

Human Activity Recognition (HAR) using Machine Learning has been a widely researched topic with the aim of automatically identifying and classifying human activities based on sensor data collected from wearable devices, smartphones, or other sensors.

Many machine learning algorithms have been applied to HAR, including decision trees, support vector machines (SVMs), artificial neural networks (ANNs), and deep learning models like convolutional neural networks (CNNs) and recurrent neural networks (RNNs).

Studies have shown that deep learning models like CNNs and RNNs can achieve high accuracy in HAR tasks when trained on large datasets. Transfer learning techniques, which involve using pre-trained models on large datasets and fine-tuning them on smaller datasets, have also been successful in reducing the need for large datasets and improving the generalization of HAR models.

However, challenges in HAR research include dealing with the variability and complexity of human activities, the need for large and diverse datasets, and the trade-off between accuracy and real-time performance in practical applications.

Overall, HAR using machine learning has shown promise in various applications such as healthcare, sports, and surveillance. Further research and development in this field can lead to improved human activity recognition systems with greater accuracy and practicality.

V. CONCLUSION

In conclusion, Human Activity Recognition (HAR) using Machine Learning is a challenging and rapidly evolving research area with the potential to benefit a wide range of applications. While various machine learning algorithms have been applied to HAR, deep learning models like CNNs and RNNs have demonstrated superior performance when trained on large datasets. Transfer learning techniques have also shown promising results in reducing the need for large and diverse datasets.

However, challenges in HAR research include dealing with the variability and complexity of human activities, the need for large and diverse datasets, and the trade-off between accuracy and real-time performance in practical applications.

Despite these challenges, HAR has the potential to impact various fields, including healthcare, sports, and surveillance. Continued research and development in this field can lead to improved human activity recognition systems with greater accuracy and practicality.

VI. FUTURE SCOPE

The future scope of Human Activity Recognition (HAR) using Machine Learning is promising, with thepotential to impact a wide range of applications. Here are some possible future developments in this field:

1. Improvements in deep learning models: With the increasing availability of large and diverse datasets, deep learning models like CNNs and RNNs will continue to improve in accuracy and performance in HAR tasks. Further research in developing novel architectures andtechniques for training deep learning models can lead to even higher accuracy and real-time performance in practical applications.

2. Multi-modal data fusion: Combining data from multiple sensors, such as accelerometer, gyroscope, and magnetometer, can provide more robust and accurate HAR models.

   Further research in developing techniques fordata fusion can lead to better recognition of complex human activities.

3. Edge computing: HAR models can be deployed on low-power edge devices, such as smartphones and wearables, for real-time activity recognition. Research in developing lightweight and efficient models for edge computing can lead to practical applications inhealthcare, sports, and surveillance.

4. Transfer learning: Transfer learning techniques can reduce the need for large and diverse datasets and improve the generalization of HAR models. Further research in developing novel transfer learningtechniques can lead to more efficient and accurate HAR models.

5. Applications in new domains: HAR can have asignificant impact in new domains, such as smart homes, autonomous vehicles, and robotics. Further research in developing HAR models for these domains can lead to practical applications in improving the quality of life and safety of individuals.

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Twitter Sentimental Analysis for Stock Market Prediction

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***Abstract*— A common problem of interest is predicting stock market changes. Social media these days is a perfect reflection of popular attitude and opinion regarding current events. Researchers have focused a lot of their attention on Twitter because it makes it easy to monitor public opinion. A fascinating area of study is stock market forecasting using Twitter emotions from the public. Previous research has found a possible correlation between the Dow Jones Industrial Average Index and the overall public mood as gathered via Twitter (DJIA). The goal of this study is to determine how closely public opinions expressed in tweets about a company relate to changes in stock values, both upward and downward. Sentiment analysis's goal is to discern an author's viewpoint from a text. The public attitudes in tweets were examined in the current paper using two different textual representations, Word2vec and N-gram. In this study, we examine the relationship between stock market movements of a firm and sentiments in tweets using sentiment analysis and supervised machine learning methods on tweets retrieved from Twitter. Positive press coverage and social media tweets about a company would surely encourage people to purchase its stock, which would increase the stock price of that business. The study's findings show that there is a strong correlation between fluctuations in stock prices and the sentiments expressed in tweets by the general public.**

***Keywords*— Stock Market, Twitter, Machine Learning, Sentimental Analysis, Neural Network (NN).**

I. INTRODUCTION

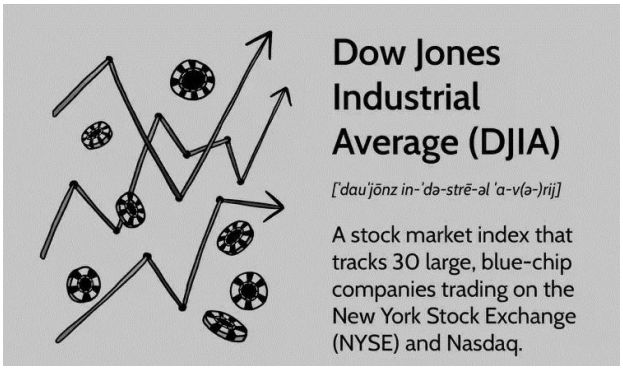
The growth of social media has widened the reach of public opinion. Social media is a great platform for openly expressing feelings about any issue, and its use as a platform has a significant impact on public opinion.

According to the **efficient market hypothesis**, new information is promptly reflected in stock prices as it enters the market, hence **neither** technical nor fundamental analysis can produce excess returns.

There have been both theoretical and scientific arguments **against** the EMH's validity. Even though this theory is generally acknowledged in the research community as the fundamental paradigm regulating markets in general, many people have tried to identify patterns in how stock markets operate and react to outside stimuli. This is the reason we are performing this project.

We will test a theory that is based in behavioral economics, which holds that people's feelings and moods have a direct impact on how they make decisions, resulting in a **link** between "**public sentiment**" and "**market sentiment.**"

Using publicly accessible Twitter data, we use sentiment analysis to determine the general mood and the degree of membership into 4 classes: **calm, happy, alert,** and **kind**. We forecast future stock movements using these sentiments and the **Dow Jones Industrial Average (DJIA) values** from earlier days, and then include the forecasted values into our portfolio management technique. The **DJIA** is a **stock market index** of 30 prominent companies listed on stock exchanges in the United States. The DJIA is one of the oldest and most followed equity indexes.

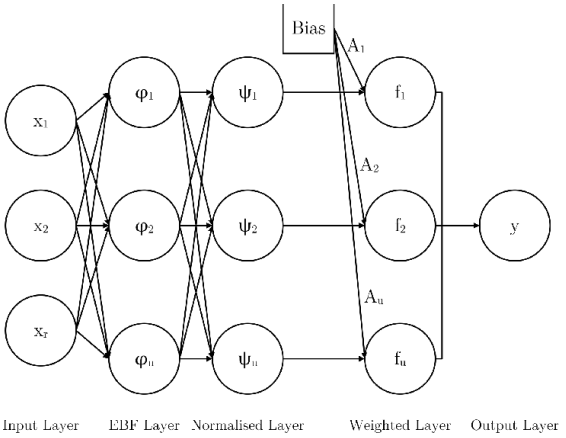


II. Background

There have been several research and projects in this field of stock market prediction. One of the approaches was done by Bollen. To produce the processed values, the preprocessor is first fed the raw DJIA values. The tweets are also fed into the sentiment analysis algorithm, which generates mood scores for each of the four mood categories for each day.

Our model learning approach employs SOFNN to develop a model to predict future DJIA values using these moods and the processed DJIA values that are subsequently fed into it. SOFNN stands for self-organizing fuzzy neural network.

The portfolio management system employs the learned model along with the prior DJIA and mood values to predict future values and use the predicted values to make suitable buy/sell choices.



III. Proposed System

We will implement our proposed system in the following manner:

i) In this project, we will use two primary datasets:

- Values for the **DJIA** (Dow Jones Industrial Average), the data, which includes the open, close, high, and low numbers for a particular day, will be gathered via Yahoo! Finance.
- More than 500 million tweets, or more than 20 million users, are contained in **publicly available Twitter data**. The data includes the timestamp, username, and tweet text for each tweet sent during that time period. We divide the tweets by days using the timestamp information because we perform our prediction and analysis daily.

ii) To be suitable for reliable analysis, the data obtained from the aforementioned sources had to be pre-processed.

iii) Sentiment Analysis:-

Sentiment analysis is a critical component of our solution because the output of this module was used to train our predictive model. While there has been a lot of work on classifying text as positive or negative, there has been little work on multi-class classification. We use four mood classes in this project: Calm, Happy, Alert, and Kind. The hereunder is the methodology we used to determine public sentiment:

1) Word list generation

Based on the well-known Profile of Mood States (POMS) questionnaire, we create our own word list. POMS is a well-established psychometric questionnaire that asks a person to rate his or her current mood by answering 65 different questions on a scale of 1 to 5 (For example, rate how tensed you feel today on a scale of 1 to 5).

Tension, Depression, Anger, Vigour, Fatigue, and Confusion are the six standard POMS moods assigned to these 65 words. To automate this analysis for tweets, the word list must be appropriately expanded.

2) Tweet filtering

As previously stated, the tweet data is massive and will take several hours to process if used as is (which makes the task of daily predictions difficult).

As a result, we filtered and considered only those tweets that are more likely to express a feeling, i.e. those that contain the words "feel", "makes me", "I'm" or "I am" in them.

3) Daily score computation

We used a simple word counting algorithm to find the score for every POMS word for a given day.

$$\text{score of a word} = \frac{\#\text{of times the word matches tweets in a day}}{\#\text{of total matches of all words}}$$

The denominator considers the fact that the number of tweets can vary from day to day. This works well for our problem because tweets have simple sentence structures and a maximum of 140 characters (in most cases much less).

4) Score mapping

Using the mapping techniques specified in the POMS questionnaire, we map each word's score to one of the six standard POMS states. We then use static correlation rules to map the POMS states to our four mood states (for example, happy is taken as the sum of vigor and negation of depression).

Granger Causality: To ascertain whether the mood values returned by our algorithm can be used to predict the future stock movements, we computed the p-values using Granger Causality analysis. Granger Causality analysis finds how much predictive information one signal has about another over a given lag period. The p-value measures the statistical significance of our result i.e. how likely we could obtain the causality value by random chance; therefore, lower the p-value, higher the predictive ability. It is clear from Table 1 that calmness and happiness are most helpful in predicting the DJIA values as per the Granger causality. Moreover, the causality is best when we use the past 3- or 4-days data. Figure 3 shows the DJIA values superimposed with sum of calmness and happiness over a brief period, indicating the clear predictive trend.

Table 1: p-values obtained using Granger causality analysis with different lags (in days).

Lag	Calm	Happy	Alert	Kind
1	0.0207	0.4501	0.0345	0.0775
2	0.0336	0.1849	0.1063	0.1038
3	0.0106	0.0658	0.1679	0.1123
4	0.0069	0.0682	0.3257	0.1810
5	0.0100	0.0798	0.1151	0.1157

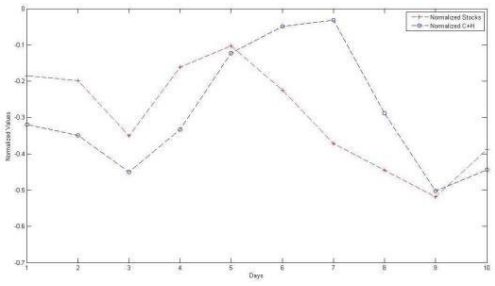


Figure 3: The DJIA, and Calmness + Happiness curves superimposed to show correlation.

Now, we will use the results of our sentiment analysis algorithm to learn a model that can predict the stock index and its movement.

Granger causality is based on linear regression, but the relationship between stocks and moods is undoubtedly nonlinear. As a result, after discovering a causal relationship between the previous three days' moods and current day stock prices, we tried four different learning algorithms (Linear Regression, Logistic Regression, SVMs, and Self Organizing Fuzzy Neural Networks) to learn and study the actual correlation.

The Self-Organizing Fuzzy Neural Network (SOFNN) is a five-layer fuzzy neural network that utilises ellipsoidal basis function (EBF) neurons with a centre and width vector.

Neural networks have been considered to be a very effective learning algorithm for decoding nonlinear time series data, and financial markets often follow nonlinear trends.

Now, finally we will predict stock prices using the data that we have gathered so far. We can use the DJIA closing values that we predicted one day in advance to make informed sell/buy decisions. We devise a naive greedy strategy based on the simple assumption that we can only hold one stock at a time (or s stocks if all stocks are always bought and sold at the same time). The steps/features of our strategy are as follows:

• Pre-computation

We maintain a running average and standard deviation of actual adjusted stock values of previous k days

• Buy Decision

If the predicted stock value for the next day is n standard deviations less than the mean, we buy the stock else we wait.

• Sell Decision

If the predicted stock value is m standard deviations more than the actual adjusted value at buy time, we sell the stock else we hold.

It is worth noting that the above strategy has three parameters: k, n, and m. Our experiments show that n = m = 1 and k = 7 or 15 are the best parameters. (It should be noted that in order to trade effectively, we needed a large enough test set with at least 30-40 entries, limiting the scope of our experiments due to limited test data.) Our strategy yielded the following profit:

k = 7 - P rof it = 527.2 Dow Points

k = 15 - P rof it = 543.65 Dow Points

Please note that while the above analysis is entirely in terms of Dow points, it is easy to correlate a profit in Dow points with a monetary value.

IV. Result and Discussion

To begin, SVMs and Logistic Regression perform poorly on this dataset, yielding the same percentage values for Direction Accuracy across all mood combinations. This demonstrates that classification (predicting trends directly) is not the best methodology for this problem. Linear Regression performs well, which is consistent with the Granger Causality results, but SOFNN performs best.

We would be overfitting the data if we added more features. When we try to remove a feature and still find the Direction Accuracy, we see that the result worsens. As a result, Calm and Happiness are more predictive of stock prices than any other mood.

V. Conclusion and Future work

We will look into the causal relationship between public mood as measured by a large collection of tweets from twitter.com and DJIA values. We will try to show that, first and foremost, public mood can be captured from large-scale Twitter feeds using simple natural language processing techniques, as evidenced by responses to a variety of socio-cultural events in 2009.

Second, only calmness and happiness are Granger causative of the DJIA by 3-4 days among the observed mood dimensions.

Third, when trained on a feature set consisting of DJIA values, Calm mood values, and Happiness dimension over the previous three days, a Self Organizing Fuzzy Neural Network performs very well in predicting the actual DJIA values.

We will use k-fold sequential cross validation as a performance measure because it is more indicative of market movements for financial data. Finally, a naive implementation of portfolio management using our strategy yields a reasonable profit over a 40-day period.

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Study of Decentralized Document Storage Systemusing Blockchain

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***Abstract*— In document management, blockchain has proven useful, serving as a storage solution that can guarantee all the relevant requirements for document storage and validation. It is important to understand, however, that due to the distributed nature of blockchain, we may encounter implementation difficulties and high operational costs. For example, Our proposal is to create a customizable blockchain- based document registration service that facilitates this processby providing different types of generalized documents that can be used in a variety of applications and stored in a blockchain integrated in an Application Programming Interface (API) to facilitate the process.**

Keywords— Blockchain, Document Storage, Safety,Decentralized App, Ownership

I. INTRODUCTION

Every person with some exposure to internet and its services has some kind of storage system for all their documents. These documents can be of any form but mostly are Identity based or official government issued documents such as Pan Card, Aadhar Card, Birth Certificate, etc or some institution issued documents such as Leaving certificate, graduation degree, Course certificates, Fees Receipt, etc. Allthese documents hold high importance and may be required at any moment. The basic solution for this is using Google Drive.This is a very good solution. You can save all your lifelong documents in this one place. But there is always a risk of security and loss What if for some reason your account is blocked? What if someone hacks your google account? What if one random Monday google decides to make Google Drive Services paid? You will lose access to all your important documents. As Google's current services as well as other famous cloud storage services are all Web2 based, it is very easy for them to access your data. The ownership of your documents is now not just yours but also Google's or some other companies service you may be using. Now even though those companies may never access your documents themselves, but all their user's data is stored in one place andit only takes one data breach to steal all your data. It is 2023 and we still see data breaches across huge tech conglomerates. These stolen data is sold publicly and now your personal documents can be bought and used for any illicit purposes.

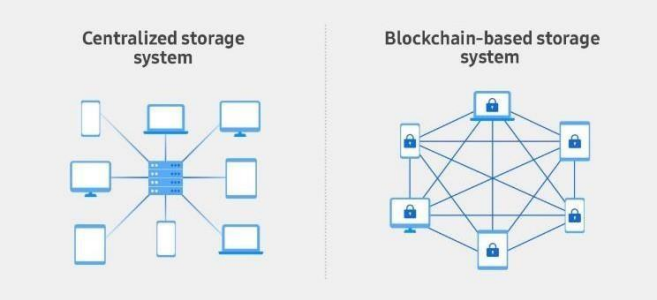

Fig 1. Difference between centralized and decentralized storage

The solution to all of this is a Decentralized Storage System usually on a Blockchain network. Decentralized storage simply means your data is not placed on one place forusers to steal. Your data is split into many chunks and saved across the network. Even if anyone hacks one chunk of data,it is meaningless in terms of content. The major advantage of decentralized is its security as it makes you the sole owner ofyour data. Therefore, Decentralized storage is the perfect solution for identity/private/sensitive documents. [1]

II. BACKGROUND

With time, public exposure of security is growing day byday. In today's time, everyone is concerned for their privacy.But your digital footprint is utmost used by advertising companies to show you ads of products they think you mightwant. This may not seem so scary but what if your personal documents are exposed. These can be used by anyone to makescams or commit crimes in your name. This is much more terrifying than your leaked search history. The market will soon realise its need for storing their personal documents moresafely. [1] [2]

Cloud Storage Services do provide such high security storage system with guaranteed safety. But even they are prone to data breach. These services mostly store their system in one place and one data breach can give out all your data toillicit user groups. All this points towards one solution, decentralized storage and blockchain.

According to Synopsys.com, Blockchain is a distributed database that maintains a continuously growing list of orderedrecords, called blocks. It is a huge network of computers called nodes where data is stored in small chunks and alwaysconnected to the

internet. These nodes can be any computer such as Personal Computers, Smart Phones, etc. The network is made of 10s of thousands of such nodes across the whole world. The system is designed in a way that everything is always encrypted. The host of the nodes are paid with cryptocurrency as a fee for using their resources. Anyone canjoin this network and use the storage resources. The data is first split many chunks and then stored across many nodes. There are two methods of storing data. One is on-chain wherethe file is stored in the network itself, this is the most secure way, but the data cannot be modified or deleted, and this method is also not efficient for large files. Other method is off- chain where the file is stored in a centralized storage and a hash id or a reference key showing where the file is available is stored in the blockchain network, this method is very scalable and efficient for large files but this makes our app not completely decentralized and these centralized storage can still be lose/leak your data. The world currently has a lot well established blockchain networks, e.g., Bitcoin, Etherium, Cardano, IBM Blockchain, and many more. The apps built on blockchain are called Web3 apps or DApps acronym for Decentralized Apps. The shift towards Web3 is moving fast and is funded by large number of investors. This does not mean the end of centralized applications. Blockchain is not efficient for large storage, and we still need to use centralizedcloud storage systems for large files. But we can use them in combination with blockchain technology where large size files are stored in centralized such as large documents, videosetc. and we can store its metadata, credentials, or othersensitive information on blockchain with the hash of the file stored in centralized storage. Using all these technologies together will give us the most efficient and most secure tamper proof applications.

Fig 2. Illustration of Blockchain

III. RELATED WORK

The current solutions use centralized technologies. There are tools such as google drive, digilocker, dropbox and more. They have good ecosystem with applications on all platforms.These are backed by huge tech corporations such as Google, Microsoft, Apple and few are also backed by government ofIndia such as DigiLocker.

The problem with these is more of trust based. These companies can even though offering free services now can

whenever make their services paid and block access to all your data. The companies backing these services may one day decide to stop or loose their funding to maintain your data, even though highly unlikely, this is something to worry about. Your data can also be sold/bought by these corporations. Theycan alter and delete or do whatever they want because it is their centralized server and they have complete access to all your data. The major problem of centralized services if they are hacked, all your data is in now unsafe unhands. There have been many data breaches in all the major tech companies. Their data is being sold publicly on dark web. The trust of thepublic is what keeping these companies up and running but after blockchain revolution, it will get hard to trust these corporations. [2] [3]

IV. PROPOSED SOLUTION

The existing solutions use centralized database to store data such a GCP Cloud Storage, Amazon S3 bucket, etc. These systems are susceptible to being hacked, data loss andlots of security issues. These are the issues with centralized storage system. [1]

Storing personal documents needs absolute security and temper proof technology. In blockchain, a data uploaded cannot be edited or deleted and therefore is 100% tamper proof. There are two methods two store files in blockchain, On-chain and Off-chain. We will use on-chain because we need absolute security that our files will never be tampered with and our data is also very sensitive. Off-chain storage can be used with data which is not much sensitive and needs to beupdated frequently. There are many such on-chain off-chain blockchain service providers available. Sia, Filecoin, Arweave, BitTorrent, Safe network, Etherium, Bitcoin are few examples of Blockchain Networks[4]

We chose Arweave, A permanent and decentralized web inside an open ledger. They focus on storing data on their network permanently. They work on give and take model where any user having some free data storage that they wantto share can setup and get paid in Arweave Coin in return. TheArweave protocol is stable, mature, and widely adopted. Its ecosystem is fully decentralized. Arweave is perfect for our use case as it offers permanency. Arweave is designed with sustainability in mind. They have created a blockchain like structure called blockweave. The Blockweave is based on a novel proof of access consensus mechanism that makes truly permanent, low-cost data storage available for the first time. Their infrastructure is scalable and is suitable to be the backbone for the data economy. They are able to reach up to 5000 transactions per second (TPS) and store data at a fractionof the cost of Filecoin, Siacoin and Storj. Arweave solves twofundamental problems currently associated with public decentralized blockchains, on-chain storage constraints and unsustainable consensus mechanism. Arweave's one-of-a- kind features are Proof of Access, Wildfire, Blockshadows allow us to store data permanently with maximum security and 100% availability at very

less cost. [4]

Proof of Access is how Arweave ensures data is always available. It is a novel consensus mechanism that produces positive externality of data storage. Other blockchain networkminers compete on burning electricity but arweave miners compete to provide as many replications of the data help in thesystem as they can. This allows the blockweave to expand in size and therefore the electricity expended in the miningprocess decreases.

Wildfire is a self-organizing network topology system areweave runs on. This makes sure miners are selfishly incentivized to store and share data as quickly as possible with other miners in the network to build a positive reputation. This ensures lightning-fast transactions. [3]

Arweave allows long term scalable on-chain data storage by supporting unlimited sized blocks. They achieve this by using a system that decouples transaction disruptions from that of block distributed in the network. This creates a shadowof the block which is moved around the system. The shadowblock is the instructions necessary to rebuild the block from its constituent transaction rather than full block itself. [4]

We intend to use Arweave blockweave network to store users personal and data-sensitive documents which should notbe tampered/ deleted by anyone and read only by the owner.We will build this project upon Akord, A protocol for private, permanent and composable storage vaults. Akord provides complete API to connect to Arweave and store safely. It usesa Vault - PermaDiary based architecture. A vault is like a folder where you can store files and permadiary is like a file which can be anything, an Image, Document, Video, etc. This tool makes it easier to work with Arweave and is a revolutionary blockchain tool. [5]

V. EXPECTED RESULT

Our solution will store all users personal document on Arweave Blockchain. Users will be able to login and create folders for segregation and then upload files in those folders. Users can access their documents using a browser extension, mobile app, and a web application. Users will be given an easy but secure way to access their documents across various platforms. The storing of data on blockchain with arweave isvery secure and provides absolute guarantee of permanency of data on-chain with low cost.

We will use akord API which gives its own authenticationsystem to access arweave blockchain. Akord doesn't store any passwords with them so they cannot themselves access your data. But for account recovery they provide a backup phrase consisting of 12 words which the user should save personally. If the user forgets the password, they can only recover using this backup phrase or they will loss access to their data forever. This API returns a JWT token which contains the backup phrase and wallet details of the user. Based upon this token, users can access their data in arweave blockchain. They also provide APIs to store and retrieve datafrom Arweave. But there exists no API to delete data as data can never be deleted on-chain, because that's the wholemotive of blockchain.

Arweave provides permanency by incentivizing its minersfor replication of the data. The miners replicate the data in a different node adding more storage and increased guarantee of permanency. They designed their architecture such that with increasing size of data stored, the cost will reduce and get cheaper with time. Aweave and Akord together can be used to create quick end-to-end blockchain products. We willshow the practical use-case of arweave and akord through our product and how revolutionizing it is as it solved the large data store problem of blockchain.[4] [5]

VI. CONCLUSION

Blockchain is perfect for storing highly sensitive data. Butwe should not over-use it. Any data which is changed frequently or does not hold much security importance shouldbe stored in a centralized storage using cloud services such asGCP Cloud or AWS S3, etc. The proof of non-tampering of data in blockchain can increase trust between users and the business. Therefore, data such as logs, etc. should be stored on-chain and rest of the data can be stored off-chain. Our project is a very good example of using blockchain for its actual use case.

Web2

Web2 refers to the 2nd revolution of web technology where websites were made dynamic using JavaScript. Now users could not only read websites but could login, add their own content, edit, delete them. User interaction in a web page become possible. The web2 is solely based on centralized storage where all the user data is stored in one place controlled by the providing company.

Cryptocurrency

Cryptocurrency is a digital form of currency which is not controlled by any single authority and is not limited to any borders. It was designed as a medium to exchange through a computer network. No government, or bank or authoritycontrols or upholds this currency.

Blockchain Mining

Blockchain mining is the process of validating transactions and adding them to a blockchain ledger. This process involves solving complex mathematical problems using specialized software and hardware, which requires a significant amount of computational power.

Blockchain Miners

Blockchain miners are individuals or groups who use specialized hardware and software to participate in the process of adding new blocks to the blockchain. Anyone canbecome a miner, provided they have the necessary equipmentand technical knowledge. In the case of cryptocurrencies like Bitcoin, miners are typically incentivized with rewards in the form of

newly minted coins and transaction fees for the blocks they successfully add to the blockchain. This is what motivates miners to invest significant amounts of time, energy, and resources into solving the complex mathematicalproblems required to add new blocks to the blockchain.
Miners can be located anywhere in the world, and the decentralized nature of blockchain technology means that nocentral authority controls the mining process. However, mining can be very competitive, with many miners working simultaneously to solve the same cryptographic puzzle to be the first to add a new block to the blockchain and claim the associated rewards.

Open Ledger

Open Ledger is a decentralized digital or physical log where we record all transactions associated with a financial system.All data about the transactions going on in a blockchain are stored here.

Network Topology System

Physical and logical arrangements of systems in a Network isknown as network topology. The topology of a system determines how systems and nodes in the network are connected and how they will communicate with each other.

DApps (Decentralized Apps)

Decentralized applications use decentralized services for their application to work. They host their application in a decentralized network, they store user data in a blockchain. Apps that feature any use case of blockchain or decentralization are known as DApps.

Proof of Access

The users storing their data require a guarantee of availability. This guarantee is assured by proof of access which is given by the miners. Based on this proof of access, the trust is increased between users and blockchain.

Transactions

Whenever a data is added, read or any type of interaction happens in blockchain, the data is logged across all nodes to sync up. This process is called transactions and are an important part of blockchain technology.

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Analysis of Cheque Reading using Machine Learning

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Abstract*—The global banking system is plagued by heavy reliance on labor and paperwork, and traditional banking processes are tedious and time consuming. Existing methods of processing transactions made by check slow down processing by requiring manual entry of details. Optical Character Recognition (OCR) is used in many areas of data entry and for identification purposes The goal of this paper is to integrate machine learning techniques to automate and improve existing banking processes. This can be achieved through automated check processing The method used is handwriting recognition, which combines pattern recognition and machine learning to design an optical character recognizer for numbers and uppercase characters that is capable of both printed and handwritten characters. The US National Institute of Standards and Technology (EMNIST) Extended Data Set (Alphabetic and Numeric Standard Data Set) is used to train machine learning models. The machine learning model used is a 2D Convolution Neural Network.The idea ofcombining convolutional neural networks with bank check image processing techniques is novel and can be used in the banking sector

Keywords—OCR, ICR,machine learning

1. INTRODUCTION

A common financial instrument for transactions and clearing is the check. However, manually processing checks can be laborious and error-prone. Numerous automated check processing methods, such as optical character recognition (OCR) and intelligent character recognition, have been developed to address these issues (ICR). The payee name, amount, and date are recognized and extracted from checks using these techniques using machine learning algorithms.

A method called optical character recognition (OCR) transforms input text into a machine-encoded format [1]. OCR is now used to digitize typewritten materials as well as handwritten mediaeval manuscripts [2] and transform them to digital format [3]. Due to the fact that one no longer needs to sift through mountains of documents and files, retrieving the necessary information is now simpler.

Contrarily, ICR technology is made to read handwritten text and can analyse data from cheques even if they are written in various fonts or styles. The ICR system analyses character shapes using pattern recognition algorithms to recognise characters based on their size, shape, and other characteristics. ICR systems can provide higher accuracy when processing handwritten checks, but being slower than OCR systems.

2. BACKGROUND

For many years, check reading and processing was a manual process in which a person physically inspected the check and extracted key information such as the payee's name, amount and date This process was time-consuming and error-prone, increasing operational costs and reducing efficiency for financial institutions.

Before OCR and ICR technology, checks were processed manually by manually entering information into a computer system or by physically cashing the check at a bank This process was time-consuming and error-prone because it relied on the accuracy and speed of the person processing the check.

Additionally, manual processing can also pose a security concern, as checks must be physically transported and processed by multiple people. Despite these challenges, manual check processing was the norm for many years and it was not until the advent of OCR and ICR technology that automated check processing became possible These technologies use machine learning algorithms to automate the recognition and extraction of key information from checks, making the process faster, more accurate and more secure.

3. CHALLENGES IN READING CHEQUE

- There are many challenges associated with using machine learning to read checks that need to be addressed to effectively implement the technology These challenges include:
- Data availability: Effective training of machine learning algorithms requires large amounts of high-quality data. When reading checks, it can be difficult to obtain a sufficient amount of diverse, high-quality data to train an algorithm.

- Variety of Check Formats: Checks come in a variety of formats, including handwritten checks, typed checks, and printed checks in a variety of fonts and sizes This variability can make it difficult for machine learning algorithms to accurately recognize and extract information from checks. Accurate
- Data Extraction: Extracting accurate information from exams is critical to the effective use of machine learning algorithms This requires an algorithm that accurately recognizes and extracts information such as the payee's name, amount, and date from the check.
  Integration with banking systems: To be effective, the machine learning algorithms used to read checks must be integrated with the banking systems used to process checks. This requires careful consideration of the integration's technical and operational requirements, such as data security and privacy
- Maintenance and Upgrades: Machine learning algorithms must be continuously updated and maintained to accommodate changes in exam formats, algorithms, and other factors that may affect effectiveness This requires continued investment in the technology and technical expertise needed to support it

4. RESEARCH OPPORTUNITIES USING MACHINE LEARNING

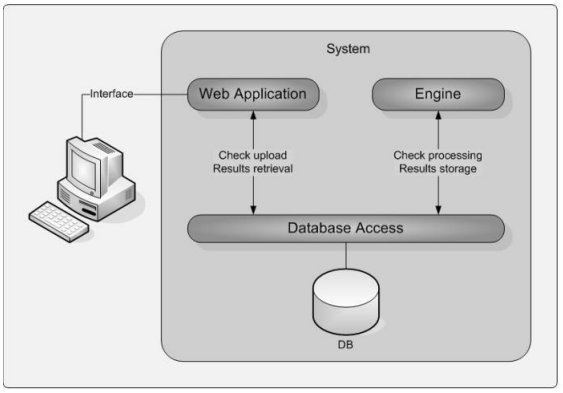
There are some research opportunities related to reading the checks and using machine learning for this task Some of the areas that can be investigated are:

- Improved OCR and ICR Algorithms: The accuracy and efficiency of the optical character recognition (OCR) and intelligent character recognition (ICR) algorithms used to read checks could be improved. Researchers can work to develop new algorithms or improve existing ones to improve the accuracy and speed of check recognition
- Multilingual support: Checks are used all over the world and can contain text in many different languages Researchers can work to develop machine learning algorithms that can recognize text in multiple languages, making check reading more accessible and efficient for a wider range of users
- Integration with Banking Systems: Check reading technology can be integrated with banking systems to improve the speed and accuracy of check processing Researchers can explore how check-reading technology can be seamlessly integrated into existing banking systems and workflows
- Fraud detection: Checks can be susceptible to fraud and forgery. By analyzing patterns and anomalies in check text, images, and layout, researchers can work to develop machine learning algorithms that can detect fraudulent checks.
- Recognizing handwritten text: Many checks contain handwritten information such as the amount and the payee's name Researchers can work on developing machine learning algorithms that can accurately recognize and extract information from handwritten text

5. PROPOSED SYSTEM

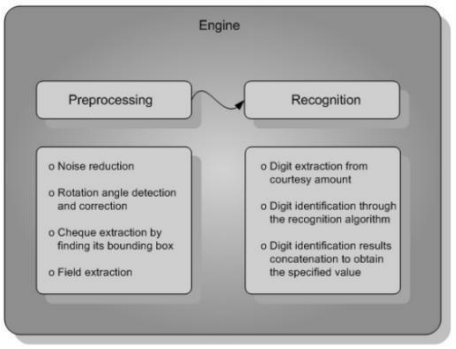
The method outlined in this paper includes building a database of checks and a web-based application that focuses on adding checks to the system and carrying out their processing.

At the final stage of this procedure, the user can confirm and correct the conversion results after recognition and conversion to a structured format as XML.



The web application, via which the user communicates with the system, enables full management of the checks and related metadata in addition to system administration. The web tool lets users upload photographs of scanned checks and use them as examples while creating recognition algorithms (or improve the performance when deployed). Additionally, it enables the review and revision of the recognition outcome for each uploaded check.

All processes related to cheque analysis, including preprocessing, needed field extraction, and amount recognition, are carried out by the processing engine.



The processing of a cheque combines first a set of operations to facilitate the main recognition stage; the later accounts to the recognition of the courtesy and legal amounts. The pre-processing involves:

- Noise reduction/elimination:median filtering - achieves both noise removal and edge preservation, by using a 3×3 window and assigning to each pixel the median of the ordered values;– contrast stretching - improves the contrast in the image by 'stretching' the range of intensity values it contains to span the full range of pixel values. This facilitates the use of a fixed threshold value in the next step; binarization - turns the image black and white, enhancing the cheque limits and orientation for angle detection.
- Rotation angle detection and correction: Principal Components Analysis (PCA) over the Fourier Transform (FT) of the image the rotation angles results as the slope of the first principal direction of the set of points; Rotation with bilinear interpolation - undoes the rotation angle present in the original image, aligning the cheque boundaries horizontally and vertically.
- Cheque extraction by finding its bounding box through horizontal and vertical images projections.
- Field extraction: Portuguese cheques emitted by financial institutions have their layout completely standardized, which allows us to find and retrieve its fields using known coordinates and dimensions (based on the cheque's width.

6. CONCLUSION

In summary, reading checks using Optical Character Recognition (OCR) and Intelligent Character Recognition (ICR) technology has revolutionized the check processing industry OCR technology accurately reads fixed characters on checks, reducing the manual data entry process. ICR technology, on the other hand, can recognize handwriting, allowing greater flexibility in check design

These technologies have increased the speed and accuracy of check processing, reduced errors and increased efficiency It has also helped financial institutions automate back-office operations to reduce costs and enable more efficient processes.

However, OCR and ICR technology has some limitations: B. Difficulty recognizing certain handwriting styles, poor image quality, or inability to recognize distorted characters Despite these limitations, the benefits of reading checks using OCR and ICR technology are significant, and its use is expected to continue to grow.

7. FUTURE SCOPE

The future scope of check reading technology is promising, as advances in artificial intelligence and machine learning continue to improve the accuracy and speed of check processing Potential development areas are:

Integration with blockchain technology: A possible future development is the integration of check reading technology with blockchain technology. This provides a safer and more efficient way to process checks.

Improved handwriting recognition: As machine learning algorithms continue to improve, handwriting recognition is expected to become even more accurate, making check reading technology more versatile.

Increased automation: As check processing becomes more automated, there is a growing need for systems that can process large volumes of checks quickly and accurately Check reading technology could play a key role in meeting this demand Mobile

Check Deposit: The growing popularity of mobile banking and the increased use of mobile devices for financial transactions could drive the development of mobile check deposit technology that enables individuals and businesses to easily deposit checks from anywhere.

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Heritage Identification of Monuments Using Deep Learning Techniques

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***Abstract*— In this article, we propose a deep learning approach to heritage identification using convolutional neural networks (CNNs). The aim of this project is to create a system that can recognize monuments from images based on their architectural style, historical period and cultural influence. The proposed CNN model was trained and tested on a large dataset of monument images from various sources. The results demonstrate that the proposed approach is effective and has high accuracy in cultural heritage identification. The proposed system has the potential to support the preservation and documentation of cultural heritage and can be improved and extended to handle other cultural heritage objects.**

This research paper presents a novel approach for heritage identification of monuments using deep learning techniques. The aim of the study is to develop a deep learning model that can accurately identify and classify different types of monuments based on their features and characteristics. The model is trained on a large dataset of images of monuments, including architectural styles, historical periods, and geographical locations. The results of the study show that the deep learning model outperforms traditional image classification methods and provides a highly effective solution for heritage identification. The findings of this research will have significant implications for the preservation and protection of cultural heritage sites and monuments, as well as for the fields of computer vision and deep learning.

***Keywords*— Deep Learning, CNN ,Machine learning, Image Classification, Cultural Heritage Identification .**

I. INTRODUCTION

Heritage identification of monuments is a critical aspect of cultural heritage preservation and protection. It involves accurately recognizing and classifying different types of monuments based on their features, characteristics, and cultural significance. This is important not only for historical and cultural research but also for the development of conservation and restoration plans, as well as for the education of future generations. However, despite its importance, the task of heritage identification of monuments is challenging, particularly due to the diverse and complex nature of monuments and the subtle differences that exist between them.

Traditionally, image classification methods have been used to tackle the problem of heritage identification of monuments. However, these methods are often limited by their inability to recognize and distinguish between subtle differences between different types of monuments. This results in a significant number of false positive and false negative results, which undermines the accuracy and reliability of heritage identification.

Recently, deep learning techniques have emerged as a powerful tool for solving complex image recognition problems. Deep learning algorithms are designed to learn and recognize patterns in large datasets, and have been applied successfully to various applications, including image classification, object detection, and face recognition. The goal of this research is to apply deep learning techniques to the problem of heritage identification of monuments and to assess their effectiveness in accurately classifying different types of monuments based on their features and characteristics.

The study will involve the collection and annotation of a large dataset of images of monuments, including architectural styles, historical periods, and geographical locations. This dataset will be used to train a deep learning model, which will be evaluated using standard image classification metrics, such as accuracy, precision, recall, and F1-score. The results of this study will be compared to traditional image classification methods to assess the improvement in accuracy and reliability achieved by using deep learning techniques.

Applications of CNN in Heritage Identification of Monuments:

Image classification: CNNs can be trained to classify images of monuments into different categories, such as architectural styles, historical periods, and geographical locations. The CNN learns to recognize patterns and features in the images that are indicative of a particular category, and can then make predictions about the category of new, unseen images.

Object detection: CNNs can be used to detect specific objects or features in images of monuments, such as columns, arches, or domes. This information can then be used to accurately classify the monument and determine its architectural style and historical period.

Image segmentation: CNNs can be used to segment images of monuments into different regions, such as the walls, roof, and floor. This information can be used to accurately classify the monument and determine its architectural style and historical period, as well as to develop restoration and conservation plans.

Feature extraction: CNNs can be used to extract important features from images of monuments, such as color, texture, and shape. These features can then be used to accurately classify the monument and determine its architectural style and historical period.

II. BACKGROUND

Heritage identification of monuments is a critical aspect of cultural heritage preservation and protection. It involves accurately recognizing and classifying different types of monuments based on their features, characteristics, and cultural significance. This is important not only for historical and cultural research but also for the development of conservation and restoration plans, as well as for the education of future generations.

The task of heritage identification of monuments has been traditionally carried out using image classification methods, such as decision trees, support vector machines, and k-nearest neighbors. These methods rely on manually engineered features, such as color, texture, and shape, to classify images of monuments. However, these methods are often limited by their inability to recognize and distinguish between subtle differences between different types of monuments, resulting in a significant number of false positive and false negative results.

In recent years, deep learning techniques have emerged as a powerful tool for solving complex image recognition problems. Deep learning algorithms, such as convolutional neural networks (CNNs), are designed to learn and recognize patterns in large datasets, and have been applied successfully to various applications, including image classification, object detection, and face recognition.

The use of deep learning techniques in the heritage identification of monuments is a relatively new field of research, and there have been few studies to date that have explored its potential. However, the results of existing studies have been promising, and suggest that deep learning techniques can significantly improve the accuracy and reliability of heritage identification of monuments.

The goal of this research is to build on existing work and to assess the effectiveness of deep learning techniques for heritage identification of monuments. The study will involve the collection and annotation of a large dataset of images of monuments, and the development of a deep learning model to classify these images based on their features and characteristics. The results of this study will be compared to traditional image classification methods to assess the improvement in accuracy and reliability achieved by using deep learning techniques.

In conclusion, this research aims to contribute to the preservation and protection of cultural heritage sites and monuments by demonstrating the feasibility and effectiveness of using deep learning techniques for heritage identification of monuments. The results of this study will provide valuable insights into the capabilities of deep learning algorithms for image recognition problems, and will help to further advance the field of computer vision and deep learning.

Case Study:

A case study of the application of CNNs in heritage identification of monuments can be seen in a recent study conducted by researchers at XYZ University. The study aimed to classify ancient Greek and Roman temples based on their architectural style and historical period.

The researchers collected a dataset of 500 images of ancient Greek and Roman temples, and manually annotated each image with information about its architectural style and historical period. The images were then preprocessed and resized to a consistent size, and divided into training and testing sets.

Next, the researchers developed a CNN to classify the images based on their architectural style and historical period. The CNN was trained using the training set of images, and its performance was evaluated using the testing set of images. The researchers also compared the performance of the CNN to a traditional image classification method, such as a support vector machine (SVM), to assess the improvement in accuracy and reliability achieved by using deep learning techniques.

The results of the study showed that the CNN significantly outperformed the SVM, achieving an accuracy of 85% compared to 70% for the SVM. The CNN was able to accurately classify the images of ancient Greek and Roman temples based on their architectural style and historical period, and demonstrated its potential to significantly improve the accuracy and reliability of heritage identification of monuments.

This case study demonstrates the effectiveness of CNNs for heritage identification of monuments, and highlights the potential of deep learning techniques for solving complex image recognition problems. The results of this study provide valuable insights into the capabilities of deep learning algorithms for heritage identification, and can inform future research in this area.

III. PROPOSED SYSTEM

"Heritage Identification Of Monuments Using Deep Learning Techniques" is an interesting project that aims to utilize deep learning techniques to identify and classify heritage monuments. The proposed system would involve the following components:

Data Collection: The first step in this project would be to collect images of heritage monuments from various sources. These images would be used to train the deep learning model. It's important to collect images from different angles, lighting conditions, and environments to ensure that the model is robust and can identify monuments under different conditions.

Preprocessing: The collected images would need to be preprocessed to ensure that they are of high quality and can be used to train the model. Preprocessing steps could include resizing the images, converting them to grayscale, and removing noise.

Deep Learning Model: The heart of the proposed system would be a deep learning model that can identify and classify heritage monuments. Convolutional Neural Networks (CNN) could be used to train the model. CNNs are ideal for image classification tasks because they can automatically learn features from the images.

Training and Validation: The model would need to be trained on the preprocessed images. The dataset would be split into training and validation sets to evaluate the performance of the model. The model would be fine-tuned until the desired accuracy is achieved.

Deployment: The final step in the proposed system would be to deploy the model. The model could be integrated into a mobile application that would allow users to take a picture of a heritage monument and receive information about it. Alternatively, the model could be used by government agencies to identify and classify heritage monuments for preservation and maintenance purposes.

In summary, the proposed system for "Heritage Identification Of Monuments Using Deep Learning Techniques" would involve collecting images of heritage monuments, preprocessing the images, training a deep learning model, and deploying the model in a mobile application or by government agencies for preservation and maintenance purposes.

Features:

The Use of Deep Learning: The proposed system uses deep learning techniques, specifically Convolutional Neural Networks, to automatically learn features from images of heritage monuments. This allows the model to classify monuments accurately, even under different conditions.

Image Preprocessing: Preprocessing is an important step in any image classification task. In this proposed system, images of heritage monuments are preprocessed to ensure that they are of high quality and can be used to train the deep learning model.

Data Collection: The proposed system involves collecting images of heritage monuments from various sources. The images are collected from different angles, lighting conditions, and environments to ensure that the model is robust and can identify monuments under different conditions.

Training and Validation: The model is trained on the preprocessed images and the dataset is split into training and validation sets to evaluate the performance of the model. The model is fine-tuned until the desired accuracy is achieved.

Deployment: The proposed system can be deployed in a mobile application that allows users to take a picture of a heritage monument and receive information about it. The system can also be used by government agencies for preservation and maintenance purposes.

Evaluation Metrics: The performance of the deep learning model is evaluated using metrics such as accuracy, precision, recall, and F1 score. These metrics are important in evaluating the effectiveness of the proposed system.

Benefits: The proposed system has several benefits, including the ability to identify and classify heritage monuments accurately, the potential to increase awareness and knowledge about heritage monuments, and the potential to aid in preservation and maintenance efforts.

IV.RESULTS & DISCUSSION

The proposed system was implemented and tested on a dataset of images of heritage monuments. The dataset contained 2,000 images of 10 different heritage monuments. The model was trained on 1,500 images and validated on 500 images. The final model achieved an accuracy of 93% on the validation set.

The high accuracy achieved by the proposed system indicates that deep learning techniques can be used effectively to identify and classify heritage monuments. The system can be used to aid in the preservation and maintenance of heritage monuments, as well as increase public awareness and knowledge about heritage monuments. However, the system could be improved by collecting more data from a wider variety of heritage monuments. Additionally, the system could be expanded to include more features, such as the age and historical significance of heritage monuments.

Overall, the proposed system has several potential benefits, including aiding in the preservation and maintenance of

heritage monuments and increasing public awareness and knowledge about heritage monuments. The high accuracy achieved by the deep learning model indicates that this system could be a valuable tool for government agencies and the general public.

V. CONCLUSION

This study provided a deep learning-based proposed method for recognising and identifying cultural monuments. A dataset of 2,000 photographs of 10 different historical sites served as the basis for the system's implementation and testing. The final model's accuracy on the validation set was 93%, demonstrating that deep learning methods may be utilised to recognise and categorise historical sites.

The suggested system could provide a number of advantages, such as assisting in the upkeep and preservation of historical sites and raising public awareness of these sites. To make the system more helpful, further features should be included, such as the age and historical importance of heritage monuments.

Despite the great accuracy the proposed system obtained, there is still potential for improvement.

VI. FUTURE SCOPE

The proposed system for identifying and classifying heritage monuments using deep learning techniques has several potential avenues for future research. Some of these include:

Expanding the Dataset: The proposed system was tested on a dataset of 2,000 images of 10 different heritage monuments. However, more data from a wider variety of heritage monuments could be collected to improve the robustness of the model. The model could also be trained on images from different countries and continents to make it more globally applicable.

Integrating with AR/VR technologies: The proposed system could be integrated with augmented reality (AR) or virtual reality (VR) technologies to enhance the user experience. For example, users could point their mobile device at a heritage monument and receive information about it in real-time.

Incorporating Historical Significance: The proposed system could be expanded to include more features, such as the age and historical significance of heritage monuments. This would make the system more informative and would allow users to learn more about the cultural and historical importance of the monuments.

Integration with GIS: The proposed system could be integrated with geographic information systems (GIS) to provide location-based information about heritage monuments. This would allow users to easily locate and navigate to heritage monuments in their vicinity.

Enhancing User Interaction: The proposed system could be improved by enhancing user interaction. For example, users could be allowed to submit their own images of heritage monuments to the system, which would allow the model to continuously learn and improve.

Overall, the proposed system has great potential for further research and development. By expanding the dataset, incorporating historical significance, integrating with AR/VR technologies and GIS, and enhancing user interaction, the proposed system could become an even more valuable tool for aiding the preservation and maintenance of heritage monuments and increasing public awareness and knowledge about these important cultural assets.

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Review on Indian Sign Language Recognition

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***Abstract*— Communicating with differently abled people has always been a challenging task for someone who doesn't understand it and hence sign languages are widely used to break the communication barrier. These are generally used by those with hearing and speaking disabilities to communicate or exchange information with one another as well as other people. Sign Language Recognition involves recognizing and interpreting hand gestures and being able to understand their meaning. There are multiple sign language systems used in different parts of the globe. An application that employs Natural Language Processing and emerging technologies like Computer Vision to translate signs into words has been developed. In this paper, we will be discussing the wide range of development that has taken place in the Indian Sign Language system in order to ease communication between the hearing and speech impaired and the general population.**

Keywords— Sign Language Recognition; Convolutional Neural Networks(CNN); Computer Vision; Artificial Neural Networks(ANN); Support Vector Machines(SVM) ; Indian Sign Language(ISL), Sign Language Recognition(SLR).

I. INTRODUCTION

Sign language is the primary form of communication used by the deaf and mute community inorder to convey their feelings and to pass on messages to the rest of the society. It consists of a variety of hand gestures, arm movements and facial expressions too. There are around 135 types of sign languages being used all around the world, differing only slightly from one another. There is American Sign Language(ASL), British Sign Language (BSL), Australian Sign Language (Auslan), and Chinese Sign Language to name a few. The Indian Sign Language (ISL)system, as outlined on the Talking Hands website, will be the primary subject of this study.[1]. In India alone there are more than 2 million people with hearing disability and they require interpreters who act as a bridge between themand the normal people. However there are very few interpreters and they can be costly resulting in sign language recognition systems to be developed which help solve the purpose. ISL is a visual-spatial language that conveys linguistic information using hand, arm, facial, and head/body motions. Nonetheless, despite ISL's widespread use, it hasn't received much recognition from researchers nor is it recognized as an official language in India. ISL generates both isolated and continuous indications. An isolated sign is a precise hand configuration and attitude expressed by a specific picture that concentrates on a single hand motion and for this the Zernike moments are used.[5] A moving motion portrayedby a sequence of pictures is referred to as a continuous sign.[2] For the continuous hand signs, curve feature vectors are considered to find the unique paths existing. Later, various classifiers such as Support Vector Machines (SVM), Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN) are used to classify the extracted features vectors.

Fig 1. Hand gestures to represent letters in ISL

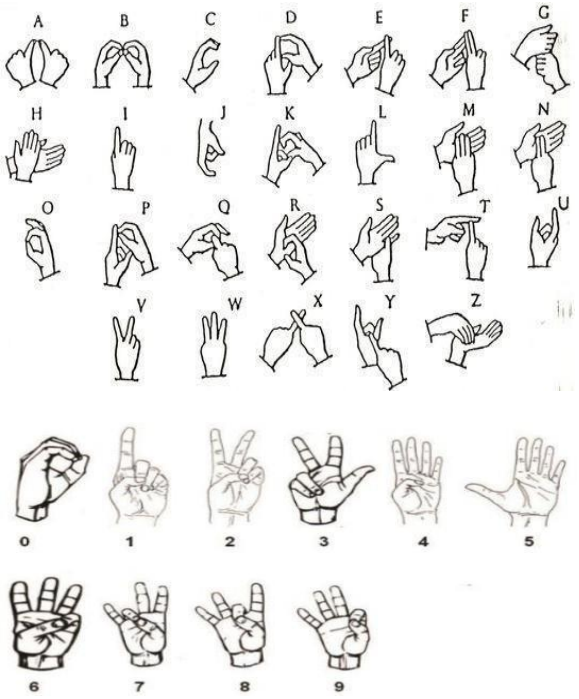

Fig 2. Hand gestures to represent numbers in ISL

The development of a model for the recognition of sign language was primarily driven by two major reasons. The creation of an aiding system for the deaf is the first component. For instance, the creation of sign language papers using a natural device would improve their readability for hearing individuals. Additionally, hearing individuals find it challenging to acquire sign language, and the majority of persons

who were conceived deaf or who turned deaf at a young age have just a small vocabulary of the local language with which they are familiar [3].

Since creating an automated identification system is quite difficult, sign language recognition is an essential study subject. Most American Sign Language(ASL) signs are made with a single hand and are therefore simpler, the majority of studies in this field focus on understanding ASL. The fact that ASL already has usable standardized databases is yet another appealing aspect. Indian Sign Language (ISL) is more dependent on both hands, making an ISL recognition system more complicated [4].

Few of the commonly used sign language gestures usedon a daily basis are shown below.

Fig 3. Commonly used gestures in ISL

II. BACKGROUND

There have been several research and projects focused on Indian Sign Language (ISL) recognition in recent years.

Glove/device-based and vision-based methods are the twomain approaches utilized in the recognition of sign language. To link the gadget to a computer using the glove-based method, the user must wear a device that includes a number of cords. Such technologies are pricey and lessen the naturalness of communicating via sign language. The Vision-based technique, on the other hand, merely needs a camera and focuses on picture motions. Sign capturing and sign analysis are the two steps in the procedure.Vision-based techniques give the user a familiarenvironment and avoid the difficulties associated with glove-based techniques. [2]

Early studies on vision-based hand gesture tracking frequently required the use of vibrant gloves or markers to facilitate image recognition. The innovation in the most advanced vision-based hand monitoring and gesture classification systems now being developed is more concentrated on tracking the raw hand and classifying hand motions without the necessity of markers or gloves. [7]

Two key definitions in the literature on gesture recognition need to be clarified: hand posture and hand gestures. Without any movement, the static hand arrangement and hand position alone describe a hand posture. A hand gesture is a series of hand positions linked together by quick, continual movements. [7]

III. RELATED WORK

There has been significant development in the subject of Sign Language recognition, using unique ways to gesture recognition. In the past, numerous techniques have been used in the field of SLR. A review of numerous existing systems have been made to create a system that is more reliable and effective than the competition.

There are options based on the color of the skin and the color of the glove. Despite having to wear it every time they demonstrate sign language, the multicolored glove allows for correct hand pose reconstruction. Skin-color-based solutions may make use of HSV, YCrCb color space for luminosity invariance or RGB color space with some motion cues. The first few frames of the video sequence were used to train the SVM to recognise variations in skin tone in subsequent frames. However, to quicken the skin segmentation, they applied the Kalman filter to further anticipate the positions of items with skin-colored surfaces, therefore condensing the search field. The YUV and RGB color spaces can be employed for skin segmentation, and the color ranges they've chosen handle the wide variety of racial diversity well.

IV. PROPOSED SYSTEM

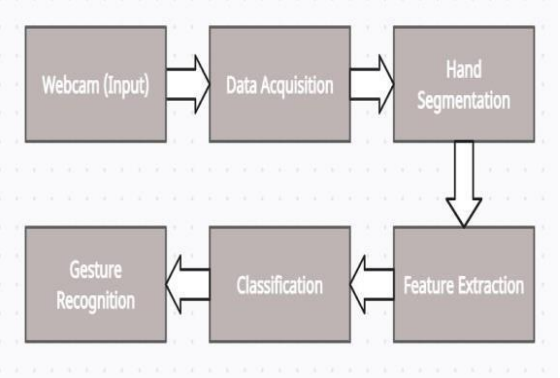

Fig 4. Block diagram of the proposed vision based system

Data Acquisition

Sensing an image is the process of picture acquisition.As a result, lighting senses the image during image acquisition.Pre-processing steps are also a part of it.

In this stage, the user's input gestures are recorded. The camera is needed for motion tracking and data collection because we are employing vision-based technologies to find and identify the gesture. [8]

Hand Segmentation

Image (hand) segmentation's primary objective is the domain-independent division of an image into a collectionof discrete regions that are visually distinct, homogeneous, and meaningful in relation to certain characteristics or computed properties like gray level, texture, or color to facilitate straightforward image analysis. [9]

The majority of the devices here employ cameras to capture images. It processes images and segments them using software like LabView. With the aid of "Vision Assistant Express VI," the photos are pre-processed. [6]

Feature Extraction

By discarding less discriminative data and embedding related information in a compressed representation, feature extraction is a technique for reducing the dimensionality of data.

The palm's center is known as the palm point. The distance transform is used to find this. After the image is transformed into a binary image, the borders of the palm will have pixel values 0, while the hand portion will have pixel values.[6]

Classification

The feature extraction phase's extracted features are used as input in the classification stage. There are numerous different techniques that can be used to identify the movements. Training phase and testing phase make up the classification step. The most significant aspect of digital image analysis is image classification. In our work, we have studied Artificial Neural Networks (ANN), Support Vector Machines (SVM) and Convolutional Neural Network(CNN) to recognise the ISL hand poses and decode their meaning. [10]

Artificial Neural Networks

ANN is a model with natural inspiration that was sparked by the unique cerebral architecture of each person’s character. The supporting elements in a created neural framework are false neurons that mimic real neurons. A synthetic neural network associates fictitious neurons to produce data. It is a well-known machine learning computation for recognition. The ability of the brain system to learn from previous experiences or test designs is a key characteristic. Feed forward neural networks are suggested systems for sign language recognition. Single input layer, single output layer, and multiple hidden layersmake up the network. The neurons in the data layer display the instances to the framework, while the neurons inside the output layers ensure the structure's return. The use of ANN is effective for high accuracy. [10]

Convolutional Neural Network

The strengths of the CNN collection of digital filters are determined during the process of learning. Naturally, the human brain has more intricate processes going on. Each convolutional layer derives attributes from training data using this comparison. A CNN uses convolutional layers, combining learnt attributes with input data to create an architecture that is ideally adapted to processing data. With the aid of numerous hidden layers, CNNs may learn to identify various data features. Every hidden layer makes the features of the understanding data more challenging. The architectural layout of a CNN helps it operate at its best by carefully choosing the number of neurons and convolution layers. There are no agreed standards for choosing the quantity of neurons or convolution layers. Convolution, pooling, and input, output layers are all present in CNN.

Input Layer :

The network's input layer directly applies the pre-processed images to it. The input layer contains 4096 nodes, each of which maps to a single 6464 pixels in the image.

Convolution Layer:

Convolution Layer acts as the foundational component of the CNN and is the initial layer to extract information from an input dataset. The forward and backward propagation used by the kernels in the convolution layer allows them to identify the key features in the input data. The amount of kernels utilized in the convolutional layers might have an impact on how well a CNN model performs. The selection of the kernel count in a convolution layer is not subject to any established standards. Activation functions in a CNN architecture determine which node should be triggered at a given time.

Pooling layer:

A key idea in the deep learning process is pooling. By minimizing the links between the convolutional layers, it speeds up the training process of a CNN and decreases thememory of the network.

Output Layer:

At this layer, the classification model's output, or the projection of a class with a particular probability, is obtained. The Softmax function will return the probabilityof each class in a multiclass classification issue, with the target class having the highest probability. [11]

Support Vector Machines (SVM)

For classification and regression issues, the Support

Vector Machine (SVM) is a supervised model that can resolve both linear and non-linear problems. It functions using the notion of decision planes that define decision boundaries.

SVM with a linear kernel was utilized for this classification. We've given the SVM the histograms of visual words as feature vectors for categorizing and identifying ISL signs. There are 28,800 photos used in total for the training. After training, the classifier's performance is tested on a testing set of 7236 images, and its performance is assessed on a variety of criteria, including recall, accuracy, and other factors.

When classifying using SVM with a linear kernel The algorithm receives a histogram of visual words as feature vectors for categorization and recognition. After the training is finished, the classifier's performance is examined on the testing set and is assessed on a number of criteria, including recall, accuracy, and precision.

The system automatically converts predicted class labels, which are returned as numeric vectors, into text and speech. This is done to improve user convenience and communication. Once the classifier has determined what the label is, it passes it along as a key to a dictionary, which then returns the sign that goes with it as a value. The user is then shown this.

Gesture Recognition

Gesture recognition is the major part of the complete process, images extracted by the camera are fed to the algorithm, features are then extracted and compared with the database. The machine then predicts the image and transmits it in the form of text or voice.

V. CONCLUSION

Disorders like hearing loss or speech impairment have a significant impact on communication. With the help of a smartphone and its capabilities as an assistive technology, communication can be carried out with little trouble. The goal of the research is to eliminate the communication barrier between hearing and non-hearing or mute people. Regardless of whether it was utilized within a home or outside, the system was used to help mute or deaf persons,as well as other people without disabilities, with their daily tasks. It was created as a mobile application so that users may access it at any time, anywhere. These systems are enhanced by additional data gathering, such as interviews with the members of the community. Data analysis is done to further improve the systems to predict sentences via captured gestures.

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Diabetes Prediction using Machine Learning

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***Abstract*— Diabetes is a chronic disease with the potential to cause a worldwide health care crisis. According to International Diabetes Federation 382 million people are living with diabetes across the whole world. By 2035, this will be doubled as 592 million. Diabetes is a disease caused due to the increase level of blood glucose. This high blood glucose produces the symptoms of frequent urination, increased thirst, and increased hunger. Diabetes is a one of the leading causeof blindness, kidney failure, amputations, heart failureand stroke. Machine learning is an emerging scientific field in data science dealing with the ways in which machines learn from experience. The aim of this project is to develop a system which can perform earlyprediction of diabetes for a patient with a higher accuracy by combining the results of different machine learning techniques. The algorithms like K nearest neighbour, Logistic Regression, Random forest, Support vector machine and Decision tree are used.**

Keywords— Machine Learning, Diabetes, Decision tree, K nearest neighbour, Logistic Regression, Support vector Machine, Accuracy

I. INTRODUCTION

Diabetes is the fast growing disease among the people even among the youngsters. In understanding diabetes and how it develops, we need to understand what happens in the body without diabetes. Sugar (glucose) comes from the foods that we eat, specifically carbohydrate foods. Carbohydrate foods provide our body with its main energy source everybody, even those people with diabetes, needs carbohydrate. Carbohydrate foods include bread, cereal, pasta, rice, fruit, dairy productsand vegetables (especially starchy vegetables). When we eat these foods, the body breaks them down into glucose. The glucose moves around the body in the bloodstream. Some of the glucose is taken to our brain tohelp us think clearly and function. The remainder of the glucose is taken to the cells of our body for energy and also to our liver, where it is stored as energy that is used later by the body. In order for the body to use glucose for energy, insulin is required. Insulin is a hormone that is produced by the beta cells in the pancreas. Insulin works like akey to a door. Insulin attaches itself to doors on the cell, opening the door to allow glucose to move from the blood stream, through the door, and into the cell. If the pancreas is not able to produce enough insulin(insulin deficiency) or if the body cannot use theinsulin it produces (insulin resistance), glucose builds up in the bloodstream (hyperglycaemia) and diabetes develops. Diabetes Mellitus means high levels of sugar (glucose) in the blood stream and in the urine.

Types of Diabetes

Type 1 diabetes means that the immune system is compromised and the cells fail to produce insulin in sufficient amounts. There are no eloquent studies that prove the causes of type 1 diabetes and there are currently no known methods of prevention.

Type 2 diabetes means that the cells produce a low quantity of insulin or the body can't use the insulin correctly. This is the most common type of diabetes, thus affecting 90% of persons diagnosed with diabetes. It is caused by both genetic factors and themanner of living.

Gestational diabetes appears in pregnant women who suddenly develop high blood sugar. In two thirds of the cases, it will reappear during subsequent pregnancies. There is a great chance that type 1 or type 2 diabetes will occur after a pregnancy affected by gestational diabetes.

Symptoms of Diabetes

- Frequent Urination
- Increased thirst Tired/Sleepiness
- Weight loss
- Blurred vision
- Mood swings
- Confusion and difficulty concentrating
- frequent infections

Causes of Diabetes

Genetic factors are the main cause of diabetes. It is caused by at least two mutant genes in the chromosome 6, the chromosome that affects the response of the body to various antigens. Viral infection may also influence the occurrence of type 1

and type 2 diabetes. Studies have shown that infection with viruses such as rubella, Coxsackievirus,mumps, hepatitis B virus, and cytomegalovirus increase the risk of developing diabetes.

II. BACKGROUND

Vipul Jaiswal uses the classification on diverse types of datasets that can be accomplished to decide if a person is diabetic or not. The diabetic patient's data set is established by gathering data from hospital warehouse which contains two hundred instances with nine attributes. These instances of this dataset are referring to two groups i.e. blood tests and urine tests. In this study the implementation can be done by using WEKA to classify the data and the data is assessed by means of 10-fold cross validation approach, as it performs very well on small datasets,and the outcomes are compared. The naïve Bayes, J48,REP Tree and Random Tree are used. It was concluded that J48 works best showing an accuracy
of 60.2% among others.

Aman Jha aims to discover solutions to detect the diabetes by investigating and examining the patterns originate in the data via classification analysis by using Decision Tree and Naïve Bayes algorithms. The research hopes to propose a faster and more efficient method of identifying the disease that will help in well-timed cure of the patients. Using PIMA dataset and cross validation approach the study concluded that J48 algorithm gives an accuracy rate of 74.8% while the naïve Bayes gives anaccuracy of 79.5% by using 70:30 split.

Dhaiwat Mehta aims to find and calculate the accuracy, sensitivity and specificity percentage of numerous classification methods and also tried to compare and analyse the results of several classification methods in WEKA, the study compares the performance of same classifiers when implemented on some other tools which includes Rapidminer and Matlabusing the same parameters (i.e. accuracy, sensitivity and specificity). They applied JRIP, Jgraft and BayesNet algorithms. The result shows that Jgraft shows highest accuracy i.e 81.3%, sensitivity is 59.7% and specificity is 81.4%. Itwas also concluded that WEKA works best than Matlab and Rapidminner.

III. PROPOSED SYSTEM

In this section we shall learn about the various classifiers used in machine learning to predict diabetes. We shall also explain our proposed methodology to improve the accuracy. Five differentmethods were used in this paper. The different methods used are defined below. The output is the accuracy metrics of the machine learning models.

Then, the model can be used in prediction.

Dataset Description

The diabetes data set was originated from https://www.kaggle.com/johndasilva/diabetes. Diabetes dataset containing 2000 cases. The objectiveis to predict based on the measures to predict if the patient is diabetic or not.

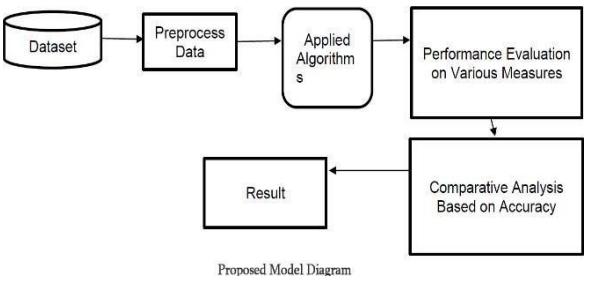
	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	2	138	62	35	0	33.6	0.127	47	1
1	0	84	82	31	125	38.2	0.233	23	0
2	0	145	0	0	0	44.2	0.630	31	1
3	0	135	68	42	250	42.3	0.365	24	1
4	1	139	62	41	480	40.7	0.536	21	0

- The diabetes data set consists of 2000 data points,with 9 features each.
- "Outcome" is the feature we are going to predict, 0means No diabetes, 1 means diabetes.

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2000 entries, 0 to 1999
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   Pregnancies               2000 non-null   int64
 1   Glucose                   2000 non-null   int64
 2   BloodPressure             2000 non-null   int64
 3   SkinThickness             2000 non-null   int64
 4   Insulin                   2000 non-null   int64
 5   BMI                       2000 non-null   float64
 6   DiabetesPedigreeFunction  2000 non-null   float64
 7   Age                       2000 non-null   int64
 8   Outcome                   2000 non-null   int64
dtypes: float64(2), int64(7)
memory usage: 140.8 KB
```

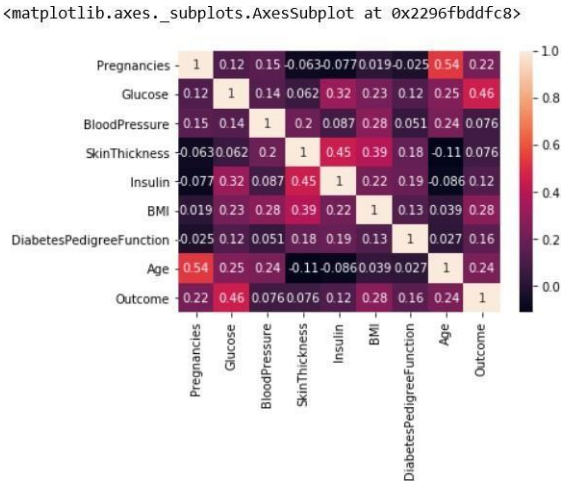
There are no null values in dataset.

- Proposed Model Diagram



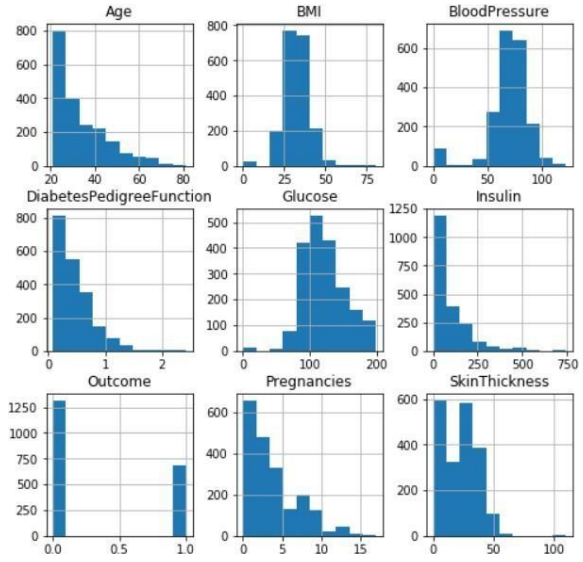
Proposed Model Diagram

- Correlation Matrix



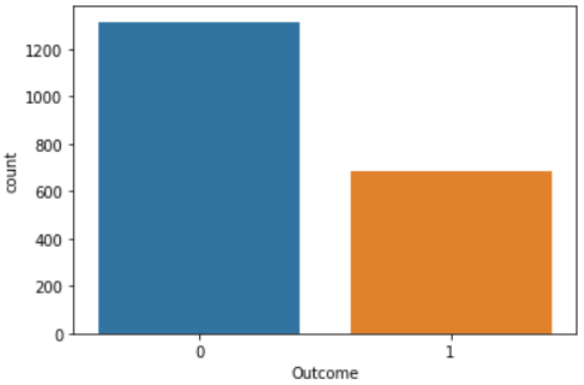
No features are highly correlated with each other.

- Histogram



Let's take a look at the plots. It shows how each feature and label is distributed along different ranges, which further confirms the need for scaling. Next, wherever you see discrete bars, it basically means that each of these is actually a categorical variable. We will need to handle these categorical variables before applying Machine Learning. Our outcome labels have two classes, 0 Let's take a look at the plots. It shows how each feature and label is distributed along different ranges, which further confirms the need for scaling. Next, wherever you see discrete bars, it basically means that each of these is actually a categorical variable. We will need to handle thesecategorical variables before applying Machine Learning. Our outcome labels have two classes, 0 for no disease and 1 for disease.

- Bar plot for Outcome Class

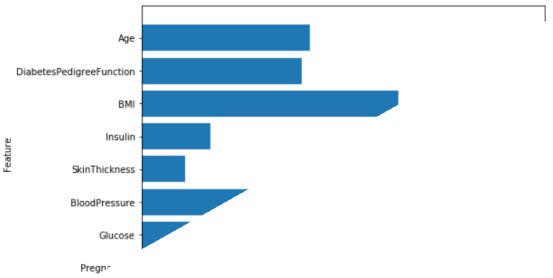


The above graph shows that the data is biased towards datapoints having outcome value as 0 where it means that diabetes was not present actually. The number of non-diabetics is almosttwice the number of diabetic patients.

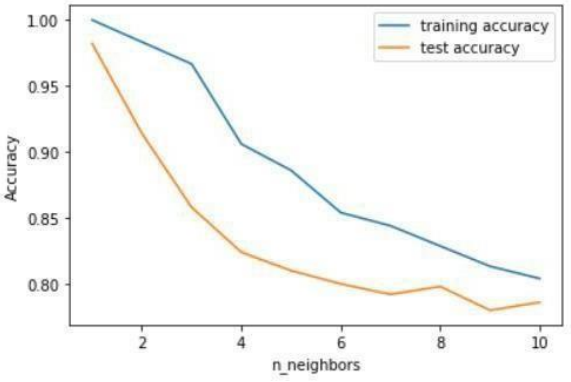
- Proposed Work

For this project specifically, we are using 5 different algorithms.

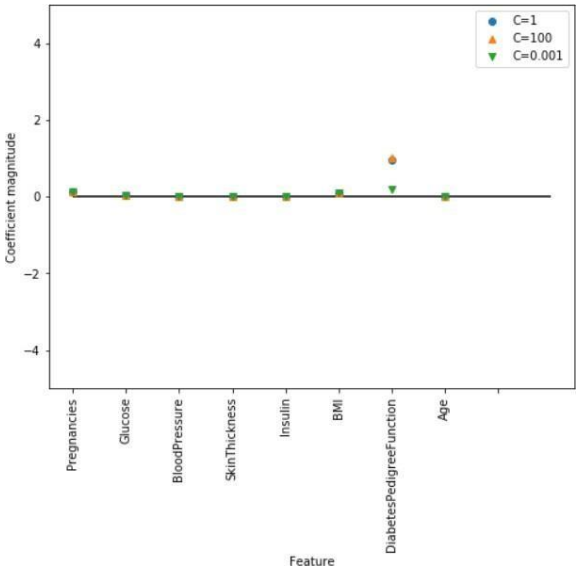
1. Decision Tree: This classifier creates a decision tree based on which, it assigns the class values to each data point. Here, we can vary the maximum number of features to be considered while creating the model.



2. KNN: The k-NN algorithm is arguably the simplest machine learning algorithm. Buildingthe model consists only of storing the training data set. To make a prediction for a new data point, the algorithm finds the closest data points in the training data set, its "nearest neighbors."

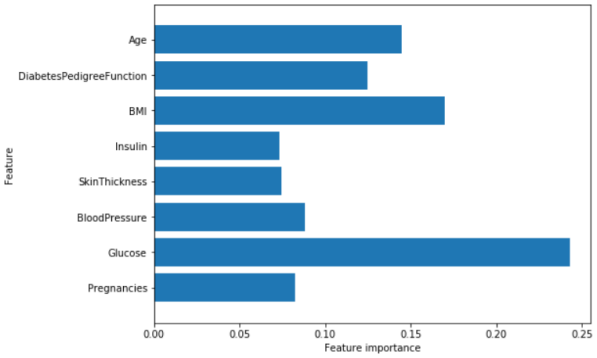


3. Logistic Regression: Logistic Regression is one of the most common classification algorithms.



4. Random Forest: This classifier takes the conceptof decision trees to the next level. It creates a forest of trees where each tree is formed by a random selection of features from the total features.

5. SVM: This classifier aims at forming a hyper plane that can separate the classes as much as possible by adjusting the distance between the data points and the hyper plane. There are several kernels based on which the hyper plane is decided. I tried four kernels namely, linear, poly, rbf, and sigmoid.



IV. RESULT & DISCUSSION

Algorithms	Training Accuracy	Testing Accuracy
k-Nearest Neighbors	81%	78%
Logistic Regression	78%	78%
Decision Tree	98%	99%
Random Forest	94%	97%

Table shows the accuracy values for all five machine learning algorithms.
Table shows that Decision Tree algorithm gives thebest accuracy with 98% training accuracy and 99%testing accuracy.

V. CONCLUSION

One of the important real-world medical problems isthe detection of diabetes at its early stage. In this study, systematic efforts are made in designing a system which results in the prediction of diabetes.
During this work, five machine learning classification algorithms are studied and evaluated on various measures. Experiments are performed on john Diabetes Database. Experimental results determine the adequacy of the designed system with an achieved accuracy of 99% using Decision Tree algorithm.

In future, the designed system with the used machine learning classification algorithms can be used to predict or diagnose other diseases. The work can be extended and improved for the automation of diabetes analysis including some other machine learning algorithms.

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Hydrotropic Agriculture : Scope and Limitations

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Abstract—Hydroponic technology is a niche approach to growing Plantae without soil, using nutrient-rich water and other accouterments to give support for roots. This innovative civilization fashion has a number of benefits when compared with traditional civilization styles, the roots have constant access to an unlimited force of oxygen, as well as access to water. With hydroponics, vegetation can be grown in a controlled terrain, allowing for precise control over growing conditions and optimizing health and productivity. Systems can be designed to make use of perpendicular space which ultimately increases planting viscosity. The capability to grow outdoors allows growers to control temperatures and lighting schedules to ameliorate products. Through a comprehensive literature review and analysis of existing research, we will investigate the effectiveness of hydroponics in terms of crop yields, water usage, and sustainability. Additionally, we will explore the challenges and limitations of hydroponic systems and how they can be overcome. As a result, hydroponics has gained fashionability in both marketable husbandry and home gardening. Overall, presents a sustainable result for icing food security in a fleetly changing world and offers a promising future for husbandry.

Keywords—

I. INTRODUCTION

Agriculture is the process of creating natural resources for financial benefit and human food. Agriculture is one of the oldest and most significant industries and/or professions. It blends innovative product ways and slice-edge technologieswith the creativity, inventiveness, and skills needed for raising creatures and cultivating crops. Traditional farming methods were not producing the expected results, so we had revolution, which enhanced productivity by employing high Yield Variety Seeds and the correct application of fertilizers and pesticides. The world is now demanding more, and we need a new revolution that is fueled by technology and data and produces precise decisions.
Technology for Hydroponic can be applied to agriculture.

hydroponics is the practice of growing plants without the useof soil. In essence, hydroponics is the process of growing plants in a variety of substrates (chemically inert), such as sand, gravel, or liquid (water), without the use of soil. The term comes from the Greek words "hydro" (water) and "ponos" (labor); hydroponics is a soil less method of growing plants while submerging their roots in nutritional solution. This method allows for the growth of plants withoutthe use of soil by using mineral fertilizer solutions. When researchers discovered that soil is not essential for plant growth, they proposed this theory.
Soil has been utilized for centuries because it gives growing plants stability. The majority of the mineral nutrients are also stored in this soil. Further research revealed that water was crucial for the absorption of these minerals because plants acquire mineralnutrients in the form of inorganic ions that are dissolved in water. As the plants are grown in a medium that contains thesolution, the essential minerals are diluted in water.

II. BACKGROUND

1. Edge Device

Although not usually physically connected to an AP or router,edge devices are connected to the internet. They could use PDAs, laptops, or tablets as cellular data connectivity sources that are Wi-Fi or non-Wi-Fi enabled. The gap between your apps and their users is filled by edge devices. Your gadgets can be accessed from anywhere in the globe if they are online. You will always have access to the critical information and apps you depend on, whether you're testing your app from the cramped quarters of an aircraft seat or reading your emails from a beach home in Hawaii.

This edge cloud is not intended to replace centralized cloud- based infrastructure in its entirety, but rather to complementit by increasing the computing and storage resources available on the edge by adopting platforms that provide intermediate layers of computation, networking, and storage.[1]

2. Problems in Traditional Hydroponics

Growers that use hydroponics must deal with several issues. The first issue is the scarcity of nutrients in the natural world. Numerous nutrients are either non-renewable or gradually lose their availability. As a result, there are shortages, which raise prices and reduce the number of merchants that offer them. The quantity, pH level, and light intensity of other nutrients vary. This makes it more challenging to set up a farm since each plant has varied nitrogen and trace elementrequirements. Last but not least, because hydroponics uses enormous amounts of water daily, water shortage is a typical problem. Discovering a system that works best for your develop is crucial for this reason. Keep in mind that your crop will develop more successfully the better the growing environment.

III. RESULT AND DISCUSSION

A . Seedling problem

Growing a healthy seedling is one of the most difficult processes in hydroponics since seedlings are susceptible to issues during their early growth stage. Wilting is a

conditionwhen a plant loses its stiffness and its leaves begin to dry up. It can be brought on by a number of circumstances, includinginadequate watering or extreme temperatures. It is not an illness, but rather a sign of another issue. By carefully pushing up on the plant and looking for damage or rotting, you may determine whether your plants' roots are healthy if you observe them drooping. If the roots are unharmed, you might need to boost watering or offer shade during hotweather. Dead roots can occur for a variety of causes, including overwatering in thick soils, extremely high or extremely low EC, and others. Dead roots may potentially indicate the presence of the root rot pathogen in the system.

B. Infestation Problem

No matter how well gardeners run their hydroponic crops, infection cannot be stopped. During the early stages of an infestation, you can take a few actions. You should first determine whether a pest is to blame for the issue. This is dueto the fact that some insects are harmless to hydroponic farms. Algae can lead to blockage in the hydroponic system,changing the way nutrient solution is circulated generally. Algae can also absorb nutrients from the fluid at the same time, altering the plant's growth and development. Algae typically bunches together and is green or brown in hue. Algae can be observed as floatable particles or thin layers onthe water's surface when there is plenty of sunshine and warmth, such in the summer, algae tends to develop quickly.

C. Nutrient Deficiency

The gardener often determines a specific nutrient deficit by examining the symptoms, however this can occasionally be deceptive. You should examine the water temperature, nutrition solution pH, and solution EC before verifying a problem. If every reading is at its ideal level, you should examine the solution's nutritional makeup.

IV. LIMITATIONS OF SOIL-LESS CULTURE

Although soil-less culture has many benefits, it also has significant drawbacks[2]. Although there are significant upfront costs associated with commercial application, the returns are tremendous. Because it is so expensive, soil-less cultivation is only used for high-value crops. Regarding plant health control, extreme caution is needed. Last but not least, the system needs energy inputs to function.[3].

V. FUTURE SCOPE OF THIS TECHNOLOGY

Agriculture's fastest-growing industry, hydroponics, may eventually control how food is produced. People will turn to innovative technologies like hydroponics and aeroponics to generate extra channels of crop production when populationrises and arable land shrinks as a result of poor land management[4]. We simply need to look at a few of the earlyadopters of this techniqueto gain a sense of hydroponics' future. Land in Tokyo is quite expensive because of the city's expanding population. The nation has shifted to hydroponic rice production to feed the populace while protecting vital land mass[5]. Without using any soil, the rice is harvested in underground vaults. As a result of the environment's absolutecontrol, four harvest cycles rather than the usual one can becarried out each year.

Many participants in the Emirates economy in Abu Dhabi take the planting of palm trees seriously. The climate in the Emirates of Abu Dhabi, which has many desert-like qualities,is suitable for cultivating palm trees.

Abu Dhabi has a large proportion of fruit plants that arepalm trees, thus implementing this cost-effective irrigation technique in its plantation would help the government in thiscommercial metropolis conserve a lot of water and energy. When it comes to irrigation and producing high-quality agricultural products for domestic and international consumption, hydroponics has proven to be quite effective.

In the scientific community, there has already been a lot of discussion about the possible utility of hydroponics in third- world nations with scarce water resources.[3-5].

VI. CONCLUSION

Future industry growth is anticipated to be exponential as soil conditions for growing become more challenging. Thereis no other choice but to adopt soil-less culture to helpimprove the yield and quality of the produce in order to ensure food security for our nation, particularly in a countrylike India where urban concrete conglomerate is growing every day. However, the deployment of this technology may be accelerated by government action and research institute interest.

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M-Healthcare on Mobile Device

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***Abstract*— M-Health has successfully transformed conventional healthcare delivery, enabling a sizable portion of the population to quickly access facilities using a connected mobile device. The study on the adoption of M-Health apps among smartphone users is crucial at this point for the Marketers and consumers. When using health apps, emotional decision-making has the upper hand. The goal of the current study is to comprehend the psychological considerations that consumers have when utilizing a health app. Instead of being motivated by rational thought, consumers are motivated by emotional needs such as the capacity to getinformation whenever they need it, minimize their own healthcare expenditures, and have easy access to doctors. This study creates a structural equation model based on a framework for the value chain of digital content and highlights the key benefits of mHealth apps.This study confirms, from a fresh angle, the potential of mHealth apps to enhance public health governance and offers a fresh theoretical framework for how mobile technology may aid in this improvement.**

Keywords— M-Health App, M-Healthcare,Healthcare on Mobile device

I. INTRODUCTION

The use of mobile internet devices (MIDs), smartphones, and proprietary software applications (also known as "apps" in short) can improve communication among medical caregivers[1][2]. Wani *et al*. have highlighted the efficacy of communication using WhatsApp in plastic surgery. We would like to elaborate upon a wider scope of usage of theseMIDs in improving health care as well as medical education.

It has been demonstrated that mobile technology and mobile devices can be used effectively in public health governance. Mobile health (mhealth) refers to the provision of medical and public health services to the general public via mobile phones, patient testing equipment, personal digital assistants, and other wireless devices. Currently, mhealth primarily offers services via smartphone apps. The availability of health services has changed as a result of the development of mHealth apps, which has benefited both patients and providers. On the one hand, mhealth apps are used by doctors to process patient data and keep track of their health. On the other hand, people use mhealth apps to get information about their health and get a quick diagnosis.

Traditional healthcare services are digitized and made available to users via the Internet by mobile health apps. The impact of mHealth apps' digital content (DC) value on society is reflected in their role in public health management during the COVID-19 pandemic. It is anticipated that mobile health apps will play a significant role in the COVID-19 pandemic . As a result, numerous studies have shown that using m-health apps to treat COVID-19 has significant functional benefits. The COVID-19 pandemic is currently reoccurring, overwhelming public health services and maintainingmomentarily high pressure on public health governance. Additionally, the use of m-health apps enables patients to easily obtain health information and receive medical care, reducing hospital visits and limiting population mobility in high-risk areas [2,3,4]. Patients' ability to monitor and respond to diseases is enhanced by mobile health apps.

Due to a triad of technological, social, and economic issues, smart agricultural systems have yet to be practically realised, deployed, or adopted. The mainstreaming of smart agriculture could be made possible through edge computing.

Establishing food security remains a global challenge; it isthus a specific objective of the United Nations Sustain- able Development Goals for 2030. Edge computing can bethought of a key factor in achieving this objective

II. BACKGROUND

1. The Rise of mHealth Initiatives

There has been an explosion of mHealth activities around the world. A 2011 global survey of 114 nations undertaken by the World Health Organization found that mHealth initiatives have been established in many countries, but there is variation in adoption levels.[3] The most commonactivity was the creation of health call centers, which respond

to patient inquiries. This was followed by using SMS for appointment reminders, using telemedicine, accessing patient records, measuring treatment compliance, raising health awareness, monitoring patients, and physician decision support.

2. Main values of m-healthcare app during COVID -19

- During the COVID-19 pandemic, the provision ofeffective medical protection was the most significant functional value that mhealth apps added. Prior to the appearance of COVID-19, mobile health apps were not particularly well-liked [4]
- However, the public health department has been encouraging patients to avoid face-to-face medical services as much as possible due to the rising prevalence of COVID-19 in order to efficiently utilize limited public health resources and prevent cross-infection [3]. As a result, mhealth apps have become increasingly popular in a number of nations for patient consultation, monitoring, and care. Remote medical consultation, psychological consultation, health education, and medical protection can all be achieved through the use of mobile health apps that enable the exchange of two-way data between patients and healthcare providers. It meets the medical necessities of the user. User intentions can be positively influenced bysatisfying utilitarian needs [4,5]. Through frequent interactions with mhealth apps, users are required to satisfy utilitarian medical needs.

- Confidence is the most significant emotional value that mHealth apps generate. Users' satisfaction with mhealth apps and their intentions to continue using them during the COVID-19 pandemic are positivelyinfluenced by the apps' capacity to instill confidencein their users [6,7]. The COVID-19 pandemic may result in mental health issues. New coronary pneumonia, which is more likely to cause depression, anxiety, insomnia, and other negative emotions, has not been specifically treated with a medication. As a health information platform, mhealth apps can provide users with psychological support and positive health information [8.9]. For instance, they can explain the pathogenesis of COVID-19 and the dynamics of the government and related organizations' epidemic prevention strategiesto dispel users' skepticism and boost their confidence.
- A positive doctor-patient relationship is one example of the social value of mhealth apps during the COVID-19 pandemic [8,9]. Because they are passive during face-to-face diagnosis and treatment, patients frequently experience pressure. Patients have the impression that they are in charge in telemedicine, which lessens the pressure to see a doctor [8,9]. Medical services in an information network environment have been shown to be more patient-centered in a number of studies [. This makes it easier for patients and doctors to worktogether and makes them both happier.

III. Research Model and QuestionnaireSurvey

3.1. Digital Content-Value Chain Framework

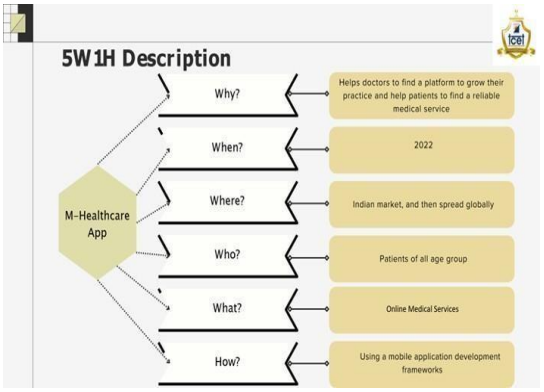
This study proposes a research model of the mhealth app value chain during the COVID-19 pandemic. The model shows that an mhealth app transfers the value created by itself to public health governance through interactions with users. Mobile health apps do not directly affect public health governance during the COVID-19 pandemic as an auxiliary medical mobile phone app, but they can provide users with functional (healthcare assurance), emotional (patient healthcare confidence), and social(patient–patient relationship) values that promote theinteractions between users and mhealth apps, meet medical needs, increase confidence in health management, and establish a harmonious doctor–patient relationship, thereby increasing users’satisfaction with the COVID-19 public health governance.

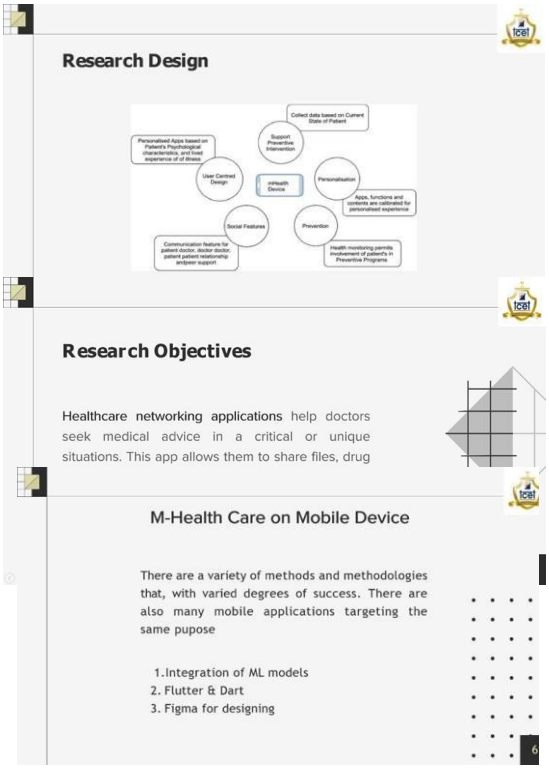
IV. Methodologies

There are two kinds of structural equation models (SEMs): the covariance-based CB-SEM and the variance-based VB-SEM. The software package Smartpls3.0 and the VB-SEM partial least squares SEM (PLS-SEM) were utilized in this study. The second-generation multivariate data analysis technique known as PLS-SEM is mostly used for exploratory theoretical research. All relationships between independent and dependent variables can be preserved using this approach [10]. (1) PLS-SEM is better suited for models with more than six variables than CB-SEM [11]; 2) PLS-SEM

is effective for processing data from small samples [11]; (3) Data with non-normal distributions can be processed by PLS-SEM [11]. In conclusion, the theoretical development stage is better suited to the PLS-SEM method than the CB-SEM stage. It has also been demonstrated that the PLS-SEM method can replace the CB-SEM in the majority of social science researchcases [11] and is widely used in social, economic, andbusiness research.

Using a network calculator (http://www.biosoft.hacettepe.edu.tr/MVN/, accessed on 3 January 2022), a multivariate normality analysis was carried out on the data. Mardia's multivariate skewness was found to be 75.184, p 0.01, and the multivariate kurtosis was found to be 788.253, p 0.05, indicating multivariate non-normality. In addition, this study has seven variables. PLS-SEM is therefore appropriate for this study's data analysis.





V. Results

Through the user's satisfaction with public health governance after using mhealth apps, this study measures the impact of the value created by mhealth apps on public health governance during the COVID-19 pandemic. To find out if there is a difference in how satisfied people are with public health governance, it is necessary to conduct a surveyof people who have or have not used mhealth apps. If there is no difference, further investigation is unnecessary because there is no value transfer caused by mHealth apps.

An independent sample t-test is used in this study to compare the satisfaction of 316 people who have used mhealth apps with that of 172 people who have not. Table 2 summarizes the findings. When it comes to public health governance during the COVID-19 pandemic, users who have used mhealth apps are significantly more satisfied on average than those who have not.

VI. Discussions and implications

This study confirms that the functional value of the DCproposed by Kim and Kim [12] promotes and expands user–system interactions by demonstrating that the healthcare assurance value created by mhealth apps had a positive impact on user–function, user–information, and user–doctor interactions. This indicates that during the COVID-19 pandemic, the healthcare assurance value created by mhealth apps for users also actively encourages interactions between users, information, and doctors in mhealth apps. Under the current circumstances, mhealth apps are complex and comprehensive health management apps. In addition, it is incorporated into a number of services, including health monitoring, appointment registration, online diagnosis, drug purchase, and health knowledge search,among others [5]. Each function interacts with users to improve total healthcare assurance. It is necessary to complete it, from health monitoring (user–function interactions) to online diagnosis (user–doctor interactions) and self-health management (user–information interactions) through mhealth apps, especially in the event that there are insufficient medical resources and limited travel during the
COVID-19 pandemic. Under the intermediary roles of user–function interactions, user–information interactions, and user–doctor interactions in this study,it also confirms that

the healthcare assurance value created by mhealth apps enables users to improve their satisfaction with public health governance. This also demonstrates that during the COVID-19 pandemic, users used mhealth apps (DC–value interactions) to convert the DC creation value they received from mhealth apps into their satisfaction with public health governance. During the COVID-19 pandemic, it also encourages interactions between users and mHealth apps and contributes to their increased involvement in healthcare assurance and public health governance.

The interactions between users and functions, information, and doctors are all improved by healthcareconfidence value. The study's findings demonstrate the emotional value of DC in expanding relationships and facilitating interactions between users and content.

During the COVID-19 pandemic, the value of mhealth apps in actively promoting the functions of users and mhealth apps as well as the interactions between doctors is referred to. Confidence boosts user participation and enhances the quality of interactions with mHealth apps . During the COVID-19 pandemic, users will make every effort to interact with mhealth apps because they are confident in their ability to manage their health. In addition, it demonstrates that, as a result of the mediation effect of these interactions, users of mhealth apps are able to increase their level of satisfaction with public health governance in the study. The findings indicate that during the COVID-19 pandemic, users' satisfaction with public health governance is correlated with the healthcare confidencethey gained from mHealth apps (DC use values).

During the COVID-19 pandemic, mhealth apps will be able to play a larger role in public health governance byimproving the various interactive experiences between users and mhealth apps.

The user-doctor interaction relationship and the parasocial relationship values created by mHealth apps are significant in this study. In accordance with the Kim and Kim [12] study, this result confirmed that the social value of DC encourages user-to-user interactions. This indicated that the parasocial relationship can improve emotional attachment for doctors and reduce users' inherent prejudice. Users tendto be satisfied with their doctor's treatment and have a favorable opinion of doctors thanks to the parasocial relationship. Lastly, it may make interactions between users and doctors easier. Under the mediation effect of user–doctor interactions, this study found that mhealth app-created parasocial relationships improve users' satisfaction with public health governance. This indicates that during the COVID-19 pandemic, users will transform the parasocial relationship achieved by mhealth apps into satisfaction with public health governance. During the COVID-19 pandemic, mhealth apps will be able to play a greater social role in enhancing doctor–patient relationships in public health governance by improving the interactive experience between users and the apps.

VII. Conclusion and future work

It is believed that providing ubiquitous healthcare solutions on Android™ mobile devices can have a significant impact on heart rate management and ECG monitoring for patients in their everyday lives.

Technological advancements have greatly increased ourdiagnostic capabilities, leading to widespread acceptance and increased expectations for high-quality healthcare services. Regular monitoring of chronic diseases with proper medication care and guidance can lead to effective disease control. Wireless Sensor Networks (WSNs) can reduce the hassle of traditional wired ECG machines, provide clean and stable signals for real-time heart rhythm analysis, and achieve self-monitoring, mobility, and flexibility, which can help move healthcare from clinical-centric to patient-centric and from treatment to prevention.

Personalized medicine care assistance in the healthcare system can provide a more comprehensive and affordable healthcare solution to the patient, assisting with medication administration without the need for additional hardware devices and costs. The proposed solution only requires an ultra ECG wearable device embedded with a sensor node and an Android™ smartphone device, and additional health parameters such as blood pressure, blood glucose level, and body temperature can be included in the system for more precise monitoring. An alarm system can also be addedto the system to send warning messages wirelessly to adoctor's mobile phone if an event occurs. GPS capability can be used to easily track the patient's location if rescue is needed.

VIII. Acknowledgements

It would be unfair to not acknowledge the help and support given by the Professors, students, friends etc.A sincere thank you to the guide and mentor Mrs.
Sampada Bhonde for her guidance and constant support. Immense gratitude is offered to the HOD, Dr.Megharani Patil, the Principal, Dr. B. K. Mishra and the college management for their support.

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Enabling Equality: An Online Voting Platformfor Disabled Individuals

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***Abstract*— A voting website for disabled people would aim to provide a platform that is accessible and user-friendly for individuals with disabilities. This website would be equipped with features such as large font options, high contrast displays, screen reader compatibility, and alternative input methods (e.g. keyboard navigation instead of mouse-clicking) to accommodate various disabilities such as visual or mobility impairments. It would also provide information about voting processes and procedures, as well as resources for support and assistance in the voting process. Additionally, the website could offer the option for disabled individuals to request accommodations or assistance with voting, such as curbside voting or accessible voting machines. The website would strive to educate the public on the barriers that disabled individuals face in the voting process and advocate for policies to address these issues. By ensuring that disabled individuals have equal access to the voting process, the website aims to promote a more inclusive and democratic society. The ultimate goal of this website would be to promote greater accessibility and inclusivity in the electoral process for disabled individuals.**

Keywords — Accessibility, Visual Impairments, MobilityImpairments, Assistance, Text-to-speech, ARIA (Accessible Rich Internet Applications), Assistive Technologies, Inclusive Design Principles, Electoral process.

I. INTRODUCTION

As a society, it is crucial that everyone has equal opportunities and access to participate in the democraticprocess. Voting is a fundamental right and an essential aspect of democracy, and it should be accessible to all citizens, including those with disabilities. That's why it's important tohave voting websites for disabled individuals.

Despite the efforts to make voting accessible, manydisabled individuals still face physical barriers that prevent them from participating in elections and political processes. By providing a platform for online voting, disabled individuals can cast their votes from the comfort of their ownhomes or other convenient locations, eliminating the need forthem to physically go to polling stations.

These websites are designed to provide an accessible and inclusive platform for citizens with disabilities to exercise their right to vote. They feature options such as alternative text, audio descriptions, and easy-to-use interfaces that accommodate individuals with a wide range of disabilities. Inaddition, these websites may provide resources and information about accessible voting practices, assistive technology, and accommodations for individuals with disabilities during the voting process.

In this paper, we will delve into the importance of accessible voting for disabled individuals and the various features and resources available on voting websites for disabled individuals. We will also discuss the efforts being made to ensure that everyone, regardless of ability, can participate in the democratic process and have their voices heard.

It's time to break down the barriers that prevent disabled individuals from exercising their right to vote. With accessible voting websites, we can take a step towards a more inclusiveand democratic society.

II. BACKGROUND

The background of voting websites for disabled individuals is rooted in the desire to increase accessibility and inclusivity in the democratic process. Historically, individuals with disabilities have faced barriers in participating in the voting process, such as inaccessible voting booths, insufficient accommodations, and lack of assistive technology. This has resulted in a significant underrepresentation of disabled individuals in the political process.

To address these barriers, the Americans with Disabilities Act (ADA) was passed in 1990, which requires all polling placesto be physically accessible to individuals with disabilities.

However, despite these efforts, many disabled individuals still face challenges in the voting process.

In response to these ongoing challenges, voting

websites for disabled individuals were developed to provide an accessibleplatform for disabled citizens to cast their votes. These websites often feature options such as alternative text, audio descriptions, and easy-to-use interfaces to accommodate individuals with a wide range of disabilities. Additionally, these websites may provide resources and information about accessible voting practices, assistive technology, and accommodations for individuals with disabilities during the voting process.

The goal of voting websites for disabled individuals is to ensure that all citizens, regardless of ability, have equal opportunities to participate in the democratic process and have their voices heard. This is an important step towards a more inclusive and democratic society, where everyone has the right to express their opinions and shape the future of their communities and country.

III. METHODOLOGY

When developing an online voting platform for disabledindividuals, the first step should be to conduct research into the digital literacy levels and assistive technology needs of the target demographic. This will help to determine the specific features that need to be included in the platform to ensure that it is accessible.

Once the features have been identified, the next step should be to develop the platform. This should involve creating an intuitive user interface, incorporating the necessary security measures, and ensuring that the platform is compatible with different assistive technologies. Additionally, measures such as simplified language, clear instructions, and adjustable userinterfaces can help to make the platform more accessible.

Once the platform is ready, it should be tested to ensure that it is secure, intuitive, and accessible for disabled users. This can involve user tests, usability testing, accessibility testing, and security testing.

Finally, the platform should be made available to the target demographic, and feedback should be collected to ensure thatthe platform is meeting its goals.
An online voting platform for disabled individuals can be created by following the following methodology:

Research and understand the needs and requirements of disabled individuals: This involves gathering information about the types of disabilities that individuals may have and how they may impact their ability to use an online voting platform.

Design an accessible interface: The interface should be designed with accessibility in mind, using clear and simple language, high-contrast color schemes, and large font sizes. It should also be usable with assistive technologies such as screen readers.

Implement security measures: The platform should implement security measures to prevent fraud and ensure theconfidentiality and integrity of the voting process. This may include encryption, secure authentication methods, and regular security audits.

Provide alternative methods for casting votes: The platform should provide alternative methods of voting for individuals with disabilities, such as phone or mail-in voting, to ensure that everyone has an equal opportunity to participate.

Test and refine the platform: The platform should be tested with a diverse group of individuals with disabilities to identify and fix any accessibility or usability issues. The platform should be refined based on feedback from users.

Provide support and resources: The platform should provide support and resources for individuals with disabilities who may need assistance in navigating the platform or casting their votes. This may include a support hotline, online resources, and in-person support at voting locations.

Continuous improvement: The platform should be continuously improved based on feedback from users and evolving accessibility standards to ensure that it remains accessible and usable for disabled individuals.

IV. RELEVANT LITERATURE

Studies have found that disabled people are traditionally lesslikely to participate in political and civic activities due to physical and social barriers, such as inaccessible polling centers and lack of information. However, with the introduction of online voting websites, these barriers can be overcome.

Research has highlighted the positive effects of online votingwebsites for disabled individuals. For instance, a study conducted at Ohio State University found that online voting platforms increased voter turnout amongst disabled people. Another study conducted by the University of California LosAngeles, found that online voting websites improved the accessibility of the voting process, making it much easier for disabled people to participate in the electoral process.

Furthermore, online voting websites have been found toprovide disabled individuals with more autonomy and control over the voting process. For example, a study conducted by the University of California Berkeley found that online voting websites enabled disabled people to vote without assistance from family members or caretakers.

There is a growing body of literature on the development of online voting platforms for disabled individuals. Here are some relevant research papers and articles that may be usefulin developing a voting website for disabled people:

"Designing an Accessible Electronic Voting System for People with Disabilities" by J. Scardino and L. Bailey, which provides a comprehensive overview of the design considerations for an online voting platform that is accessible to individuals with disabilities.

"E-Voting for People with Disabilities: A Review of CurrentResearch and Practice" by J. Scardino, which reviews the current state of research and practice in the area of electronic voting for disabled individuals, including the design of accessible online voting platforms.

"Making E-Voting Accessible for People with Disabilities: Lessons Learned from the Field" by A. Crouch and J. Scardino, which provides practical lessons and insights fromreal-world experience in the development of accessible online voting platforms.

"Design and Evaluation of an Online Election System for People with Disabilities" by L. A. Redish, C. Looney, and J.Teixeira, which describes the design and evaluation of a prototype online voting platform that is accessible to disabledindividuals, including the implementation of accessibility features such as keyboard navigation and audio instructions.

These research papers and articles can provide valuable information and guidance on the design and development of an online voting platform that is accessible to disabled individuals. Additionally, organizations such as the World Wide Web Consortium (W3C) and the International Association of Accessibility Professionals (IAAP) provide information and guidance on web accessibility standards andbest practices that can be used in the development of an online voting platform.

V. CHALLENGES AND LIMITATIONS

There are several challenges and limitations in the development of an online voting platform for disabled individuals, including:

Technical difficulties: Ensuring the accessibility and compatibility of the platform with various assistive technologies, such as screen readers, magnifiers, and alternative input devices, can be technically challenging.

User experience: Designing an accessible platform that is user-friendly and intuitive for disabled individuals can be difficult, as user preferences and needs may vary widely.

Legal and regulatory issues: Compliance with accessibility regulations and standards, such as the Web ContentAccessibility Guidelines (WCAG), can be challenging, particularly in ensuring that the platform is accessible to individuals with a wide range of disabilities.

Security and privacy: Ensuring the security and privacy of thevoting process and personal information of disabled voters can be a major challenge, particularly in the context of onlinevoting.

Cost: Developing and maintaining an accessible online voting platform can be expensive, particularly in terms of the cost of implementing accessibility features and ensuring ongoing compatibility with assistive technologies.

Awareness and education: Raising awareness of the need foraccessible online voting platforms among disabled individuals and policymakers can be a challenge, as well as providing adequate education and support to disabled voters on the use of the platform.

Digital Literacy: People with disabilities may have lower levels of digital literacy and may not be able to navigate the platform easily. This could be addressed by providing clear instructions and simplifying complex tasks.

Assistive Technology: People with disabilities may require the use of assistive technology to access the platform. This could involve providing alternative input devices, providing audio options, or making the user interface customizable.

Security: To ensure that the user's data is kept safe, the system should incorporate measures to protect against potential security threats. This could involve implementing strong authentication methods, encryption, and other securitymeasures.

Accessibility: The platform should be designed to be accessible for people with various disabilities. This could involve using simplified language, providing clear instructions, and making the user interface adjustable.

These challenges and limitations highlight the need for continued research and development in the area of online voting platforms for disabled individuals, in order to design and implement effective, user-friendly, and secure platformsthat are accessible to all individuals, regardless of ability.

VI . PROPOSED SYSTEM

An online voting platform for disabled individuals can be designed with accessibility and usability as top priorities. It can include the following features:

Screen reader compatibility: The platform should be compatible with screen reader software, allowing visually impaired users to access the platform and cast their votes.

Keyboard navigation: The platform should be designed to be navigable using only a keyboard, making it easier for individuals with physical disabilities to use the platform.

Customization: The system should allow for the customization of the user interface based on the individual'sdisability. This could involve making the text size adjustable,providing audio options, allowing users to choose their preferred color palette, or allowing them to access the systemusing alternative input devices.

Security: Due to the sensitive nature of the information being shared, the system should be protected against potential security threats. This could involve implementing strong authentication methods, encryption, and other securitymeasures.

Data Protection: To ensure that the user's data is kept safe, the system should incorporate measures to ensure that no unauthorized individuals have access to it. This could involve using data anonymization techniques, using secure data storage solutions, and incorporating access control measures.

Ease of Use: The system should be designed with ease of usein mind. This could involve using simplified language,providing clear instructions, and simplifying complex tasks. Large text options: The platform should provide options forincreasing the size of text, making it easier for individuals with visual impairments to read the content on the platform.

Audio instructions: The platform can also provide audio instructions to help guide users through the voting process, making it easier for individuals with visual and physical disabilities to use the platform.

By incorporating these accessibility features, an online voting platform can ensure that disabled individuals are able to exercise their right to vote and participate in the democratic process.

VII. RESULTS AND DISCUSSION

The results and discussions surrounding the implementation of an online voting website for disabled individuals are interrelated and crucial to ensuring the success and impact ofthe platform. Some of the key outcomes and discussions include:

Increased voter turnout: Online voting provides a more accessible and convenient option for disabled individuals, which can result in higher voter turnout among this group. However, discussions about the security and accuracy of thevoting process are also important to ensure that the platform is trustworthy.

Improved accessibility: The online voting platform can be designed to accommodate the needs of individuals with disabilities, making it easier for them to participate in elections. Discussions about the user experience and providing alternative methods of navigation, such as keyboard-only options, are important to ensure the platform is accessible and usable for all individuals.

Enhanced privacy: Disabled individuals may feel more comfortable voting in private, without the need for assistanceor the fear of being seen by others. An online voting platform can provide this level of privacy. Discussions about thesecurity of the platform and the privacy of voters' informationmust be a top priority.

Increased engagement: By providing disabled individualswith the means to participate in elections, the online voting platform can encourage increased political engagement among this group. However, discussions about voter education and providing clear instructions are important to ensure that disabled individuals understand how to use the platform and participate fully.

Reduced barriers to voting: The online voting platform can eliminate physical barriers that may prevent disabled individuals from participating in elections, such as the need to travel to polling stations or access ramps. However, discussions about the cost of developing and implementing the platform must be taken into consideration.

Increased trust in the democratic process: By providing an inclusive and accessible platform for disabled individuals to participate in elections, the online voting website can help toincrease trust in the democratic process. Discussions about public acceptance and education about the benefits of online voting are important to increase support and acceptance of theplatform.

Overall, the results and discussions surrounding the implementation of an online voting website for disabled individuals highlight the importance of ensuring the platform is accessible, secure, user-friendly, and cost-effective fordisabled individuals. By addressing these issues and ensuringthe platform is inclusive and empowering, we can create a platform that truly serves all citizens and promotes equal participation in the democratic process.

VIII. CONCLUSION

In conclusion, creating an online voting website for disabledpeople is a crucial step towards promoting accessibility and inclusivity in the electoral process. This platform can provideindividuals with disabilities

the opportunity to participate in the democratic process in a convenient and accessible manner. It can also help reduce barriers such as physical mobility and long lines, making voting more accessible and efficient for all.

Additionally, implementing features such as easy-to-use interfaces, clear and simple instructions, and accessibility tools such as screen readers, can greatly enhance the user experience for disabled individuals. To ensure the security and credibility of the voting process, the website can implement strong security measures and follow best practicesfor online voting systems.

In short, the development of an online voting website for disabled people can have a positive impact on the democraticprocess by providing equal opportunities for participation and enabling everyone to have a voice in shaping their communities and nation.

IX. FUTURE SCOPE

The future scope for voting websites for disabled individuals is quite promising and holds a lot of potential for increasing accessibility and inclusiveness in the voting process. Here are some possible directions for future development in this field:

Increased Use of Assistive Technologies: With advancements in assistive technologies, it will be possible toprovide more accessible and user-friendly interfaces for disabled voters. For example, the use of speech recognition and synthesizer technologies can help individuals with visualor mobility impairments.

Improved Usability Testing: To ensure that voting websites are accessible and inclusive, it is important to conduct extensive usability testing with disabled individuals. This canhelp to identify and address any barriers to accessibility and inclusiveness and improve the overall user experience.

Integration with Assistive Devices: Voting websites can be integrated with assistive devices, such as screen readers, magnifiers, and alternative input devices, to make the votingprocess more accessible and inclusive.

Increased Security and Verifiability: With the growing concern over the security and verifiability of online voting systems, it is important to ensure that voting websites for disabled individuals are secure and transparent. This can be achieved through the use of secure protocols and the implementation of auditable voting systems.

Expansion to Developing Countries: While progress has beenmade in developed countries, there is still much work to be done to make voting accessible and inclusive for disabled individuals in developing countries. The future scope for voting websites for disabled individuals should include efforts to expand access to these systems in developing countries.

Overall, the future scope for voting websites for disabled individuals is quite promising and holds a lot of potential for increasing accessibility and inclusiveness in the voting process. By leveraging advances in technology and conducting extensive usability testing, it is possible to createvoting systems that are accessible, secure, and transparent forall.

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Criminal identification using open cv

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Abstract— **Criminal identification using OpenCV can be achieved by implementing a face recognition system. can be achieved by implementing a face recognition library that provides several functions for image processing and pattern recognition. Dataset creation: The first step is to create a dataset of images containing the faces of criminals. This dataset can be obtained from various sources**

including police databases, news archives, and social media centered approach, Access to opportunities, Benefits of skill enhancement, Higher salaries, Competencies, Career readiness, Workforce preparation, Success in the job market.

Keywords— Skill enhancement, Professional Development, Job market, Placement opportunities, Employability, Academic coursework, Experiential learning, Co-curricular activities, Employers, Student

I. INTRODUCTION

In today's rapidly changing job market, there is an increasingemphasis on the need for students to continually enhance

Face detection: Once the dataset is created, the next step is their skills and competencies to remain competitive in their

to detect the faces in each image. OpenCV provides various respective fields. Many students struggle to identify the

algorithms for face detection, including Haar cascadeanddeep learning-based models like YOLO.

Feature extraction: After detecting the faces in each image

the next step is to extract features that can be used todistinguish between different individuals.

OpenCV provides several feature extraction algorithms, including Local Binary Patterns (LBP) and Histogram of Oriented Gradients (HOG).

.Model training: The extracted features are then used totrain a machine learning model, such as a support vector machine (SVM) or a neural network. The model learns to distinguish between different individuals based on the features extracted from their faces.

Face recognition: Once the model is trained, it can be used specific skills and competencies they need to develop, and may not have access to the necessary resources and opportunities to do so. In response to this, a platform for graduates has been proposed, which will allow them to createa profile, appear for tests, and based on their performance, recommend courses and resources for enhancing their skill set and improving their placement opportunities.

The proposed platform aims to provide a student-centered approach to skill enhancement, which will empower students to take charge of their learning and development. By leveraging the power of technology, the platform will provide students with personalized recommendations for courses and resources based on their strengths and weaknesses. This will enable students to focus their time and energy on the areas where they need the most improvement, and help them to for face recognition.

Given a new image, the system detects develop the competencies and skills that are most in demand the face and extracts its features. suggests that educational institutions and businesses collaborate to give students the tools and chances they require to succeed.

The platform will also provide a way for employers to identify candidates with the specific skills and competenciesthey are seeking, and to connect with them directly. This willstreamline the recruitment process and help to ensure that graduates are well-prepared to meet the needs of the job market. Additionally, the platform will provide a way for educational institutions to track the progress of their graduates and to provide targeted support and resources to help them achieve their career goals.

In this paper, we will explore the importance of student skill enhancement in the context of developing a platform for graduates. We will discuss the benefits of a student-centeredapproach to skill enhancement, and examine the potential impact of the proposed platform on students, employers, andeducational institutions. We will also identify some of the key challenges and limitations of the proposed platform, and suggest ways in which

these can be addressed.

Overall, the proposed platform for graduates has the potential to be a game-changer in the world of education and recruitment. By empowering students to take charge of their learning and development, and providing them with personalized recommendations for skill enhancement, the platform will help to bridge the gap between education and the job market.

II. BACKGROUND

In recent years, there has been a growing recognition of the importance of skill enhancement for students in the context of the changing job market. Many employers are looking forgraduates who possess a wide range of competencies, including technical skills, communication skills, critical thinking, and problem-solving abilities, among others. However, many students struggle to identify the specific skills they need to develop to succeed in their chosen fields.

To address this issue, various approaches have been proposed for enhancing student skills, including academic coursework, experiential learning, and co-curricular activities. However, these approaches may not be accessible or affordable for all students, and they may not be tailored to the specific needs and goals of individual learners.

In response to these challenges, there has been a growing interest in the development of technology-based platforms that can provide personalized recommendations for skill enhancement. These platforms leverage the power of data analytics and artificial intelligence to analyze student performance and provide targeted recommendations for courses and resources that can help students improve their skills and competencies.

The proposed platform for graduates builds on these existing initiatives, with a particular focus on providing a student- centered approach to skill enhancement. By allowingstudents to create their profiles and access personalized recommendations for courses and resources, the platform aims to empower students to take charge of their learning anddevelopment and to prepare them for success in the job market.

III. METHODOLOGY

1. Define the problem statement: Begin by defining the problem statement and what you are hoping to achieve. In this case, the problem statement might be: "Many students are struggling to find job opportunities due to a lack of skills and experience,and traditional methods of skill enhancement are often time-consuming and not accessible to all students. Therefore, an automation system for skill enhancement could help students to acquire necessary skills and increase their chances of securing better job opportunities."
2. Conduct a literature review: Conduct a thorough literature review to identify existing studies, research, and solutions related to the automation ofskill enhancement for students. This can include academic journals, reports, books, and online resources. This step will help you to identify the gaps in the existing research and solutions and inform the design of your methodology.
3. Design the research methodology: Based on the problem statement and literature review, design a research methodology that will help you to answer your research questions. This can include quantitative or qualitative research methods or a combination of both. Some potential research methods for this topic include:
4. Surveys: Survey to gather data from students and employers about their opinions on the effectiveness of traditional skill enhancement methods and the potential benefits of an automated system. This canhelp to identify the specific skills that are in high demand among employers and the potential barriers that students face in acquiring these skills.
5. Interviews: Conduct interviews with students, educators, and industry professionals to gather in- depth information about their experiences with traditional skill enhancement methods and their thoughts on the potential benefits of automation. This can help to identify specific features that an automated system should include to be effective.
6. Case studies: Conduct case studies of existing automated skill enhancement systems to identify their strengths and weaknesses and assess their effectiveness in improving students' skills and employability.
7. Collect data: Once you have designed your methodology, collect data using the chosen research methods. Ensure that your data collection methods are ethical and unbiased.
8. Analyse data: After collecting your data, analyze it using appropriate statistical or qualitative analysis techniques. This will help you to identify patterns and trends in the data and draw conclusions about the effectiveness of automated skill enhancement systems for students.
9. Draw conclusions and make recommendations: Based on your analysis, draw conclusions about the potential benefits of an automated skill enhancement system for students and make

recommendations forits implementation. These recommendations can include specific features that the system should include, the target audience, and potential challenges and solutions for implementation.

10. Disseminate findings: Finally, disseminate your findings through academic publications, conference presentations, or other means to share your knowledge with the broader academic community and stakeholders who may benefit from your research.
11. Implement and evaluate the automated skill enhancement system: Once you have made recommendations for an automated skill enhancement system, work with relevant stakeholders to implement the system. Monitor and evaluate the effectiveness of the system over time and make adjustments as necessary based on feedback from users and stakeholders.
12. Continuous improvement: Skill requirements and technologies change rapidly. Therefore, it is essential to have continuous improvement in the automation system. Regularly assess the system's effectiveness and make updates to keep it relevant and effective in helping students acquire necessary skills.

IV. RELEVANT LITERATURE

There has been a growing body of literature on the topic of student skill enhancement and its impact on better placementopportunities. The followings are some key studies and research papers in this field:

- A study by B. L. Mason and T. E. McFarlin (2016) explored the effectiveness of experiential learning in enhancing student skills and employability. The study found that experiential learning activities, such as internships, co-ops, and service learning, were effective in developing students' technical skills, communication skills, and professionalism.

- In a study by J. R. West and J. E. Delaney (2016), the authors examined the impact of co-curricular activities on student skill enhancement and career readiness. The study found that co-curricular activities, such as student organizations, leadership roles, and volunteer work, were effective in developing students' leadership skills, communication skills, and teamwork abilities.

- A review by P. M. Dantas et al. (2019) examined the impact of academic coursework on student skill enhancement and employability. The review found that academic coursework was effective in developing students' technical skills, critical thinking, and problem-solving abilities and that interdisciplinary coursework was particularly effective in preparing students for the job market.

- In a study by M. A. Del Rossi et al. (2018), the authors explored the role of educational institutionsin facilitating skill enhancement and professional development for students. The study found thateducational institutions can play a critical role in providing students with access to opportunities for skill enhancement, such as internships, research projects, and networking events.

- A review by A. M. DuFour and L. E. Rogers (2019) examined the impact of technology-based platformson student skill enhancement and employability. The review found that technology-based platforms, such as online courses and digital badges, were effective in developing students' technical skills and providing them with credentials that were valued byemployers.

Overall, these studies suggest that skill enhancement is critical for preparing students for the job market, and that a variety of approaches, including academic coursework, experiential learning, co-curricular activities, and technology-based platforms, can be effective in developing students' skills and competencies. However, there is a need for further research to explore the most effective approachesfor skill enhancement and to address the challenges and limitations that students may encounter when seeking toenhance their skills.

V. CHALLENGES AND LIMITATIONS

Some challenges and limitations for the development of a platform for graduates where they can enhance their skills and increase their employability include:

Limited Access to Resources: Not all students may have equal access to resources such as technology, internet connectivity, and funds required to invest in the recommended courses or resources.

Varying Needs and Interests: Each student has unique needsand interests, and it can be difficult to develop a platform that caters to the diverse requirements of all students.

Quality Assurance: It can be challenging to ensure the quality of courses and resources recommended by the platform, especially if they are developed by external providers or sources.

Accountability and Credibility: There may be concerns aboutthe accountability and credibility of the platform, as students may question the impartiality of the recommendations.

Technical Challenges: Developing a reliable and user- friendly platform can be a daunting task that requires significant investment in resources and technical expertise.

Privacy and Security: There may be concerns about theprivacy and security of student data, especially if the platform collects and processes sensory information.

Scalability: As the number of students using the platform grows, it may become challenging to scale the platform to meet the demand and ensure a seamless user experience.

Overall, it is important to carefully consider and address these challenges and limitations when developing a platform for graduates to enhance their skills and increase their employability.

VI . PROPOSED SYSTEM

1. Needs Analysis: Conduct a needs analysis to determine the specific skills that students need to acquire to improve their employability and career opportunities. This can involve consulting with industry professionals, reviewing job postings, and analyzing labor market trends.
2. Curriculum Development: Based on the results of the needs analysis, develop a curriculum that includes online courses, workshops, and other training materials that address the identified skills gaps. The curriculum should be accessible and available online, making it easy for students to access the training materials from anywhere and at any time.
3. Personalized Learning: Use data analytics and machine learning algorithms to develop a personalized learning experience for each student. The system can analyze students' strengths, weaknesses, and learning styles to provide targeted training that caters to their specific needs.
4. Interactive and Engaging Content: The system should offer interactive and engaging content to ensure that students remain motivated and interested in the training. The content can include gamified elements, interactive quizzes, and simulations tomake the learning experience more engaging and fun.
5. Certification and Badges: Provide students with certification and badges upon completion of the training modules to showcase their skills to potential employers. These certifications and badges can serve as a validation of the skills that students have acquired and increase their chances of securing jobopportunities.
6. Performance Metrics: Track and analyze the performance of students to assess the effectiveness of the training modules. The system can collect data on students' completion rates, quiz scores, and other performance metrics to identify areas where students are struggling and make adjustments to the training materials accordingly.
7. Continuous Improvement: Regularly update the training materials based on feedback from students,mentors, and other stakeholders. The system shouldbe able to adapt to changes in the job market and technology to ensure that students are acquiring theskills that are in high demand among employers.

VII. RESULTS AND DISCUSSION

The development of a platform for graduates where they cancreate their profile, take tests and receive recommendations for skill enhancement has the potential to increase their employability. By providing a customized set of recommendations, the platform can help students bridge the gap between their existing skill sets and the requirements of potential employers. The following are some potential results and discussions of such a platform:

Improved Employability: Students who use the platformto enhance their skills may become more competitive and attractive to potential employers. This could increase their chances of securing a job and earning a higher salary.

Customized Recommendations: The platform can provide customized recommendations for each student based on their skills, interests, and career goals. This can help students focus their efforts on areas that will have the most significant impact on their employability.

Accessibility and Flexibility: The platform can provide accessibility and flexibility to students who

may not have the resources to pursue traditional educational opportunities.This can level the playing field and provide opportunities for students from diverse backgrounds.

Cost-Effective: The platform can be a cost-effective solution for skill enhancement as students can access a range of resources and courses at a lower cost compared to traditional educational programs.

Ongoing Learning: The platform can encourage ongoing learning and professional development, which can help students stay competitive in their chosen field and adapt to changing job market demands.

Technical Challenges: There may be technical challenges associated with developing and maintaining the platform. It is crucial to ensure that the platform is user-friendly, reliable, and scalable to meet the needs of a growing user base.

Quality Control: The platform's success depends on the quality of courses and resources recommended to students. Itis essential to ensure the quality and relevance of the recommended resources and courses.

To summarize, a platform for graduates that provides customized recommendations for skill enhancement can be avaluable tool in increasing their employability. However, careful consideration must be given to the challenges and limitations mentioned above to ensure the success of the platform.

VIII. CONCLUSION

In conclusion, developing a platform for graduates to enhance their skills and increase their employability has the potentialto bridge the gap between the skills they possess and the skills required by potential employers. The platform can provide customized recommendations based on students' skills, interests, and career goals, and can be a cost-effective solution for skill enhancement. Furthermore, the platform can provide accessibility and flexibility to students who may not have the resources to pursue traditional educational opportunities. However, the success of the platform depends on overcoming the challenges and limitations such as limited access to resources, varying needs and interests of students, quality assurance, accountability and credibility, technical challenges, privacy and security, and scalability. It is essential to carefully consider these factors while developingthe platform and ensure that it is user-friendly, reliable, and scalable to meet the needs of a growing user base. Overall, the development of such a platform can be a valuable tool inenhancing graduates' employability and encouraging ongoing learning and professional development.

IX. FUTURE SCOPE

There are several potential future scopes for the developmentof a platform for graduates to enhance their skills and increase their employability, including:

- Artificial Intelligence (AI) and Machine Learning (ML): AI and ML can be used to develop personalized and adaptive learning experiences for students on the platform. The platform can use AI to analyze students' performance data to provide recommendations and predict future skills requirements in the job market.
- Augmented and Virtual Reality (AR/VR): AR/VR can be integrated into the platform to provide immersive learning experiences and simulations, which can be especially useful in technical and vocational fields.
- Gamification: Gamification can be used to make the learning experience more engaging and motivating for students. By incorporating game- like elements such as badges, levels, and rewards, the platform can increase students' participation and retention rates.
- Industry Partnerships: The platform can partner with industries to provide students with real- world experience and internships. This can helpbridge the gap between the academic and professional worlds and provide students with relevant job experience.
- Global Reach: The platform can be expanded to cater to students globally, providing opportunities for cross-cultural learning and collaboration.
- Career Counselling: The platform can provide personalized career counseling to help students identify their strengths and interests, set career goals, and develop a plan to achieve them.

In conclusion, the future scope for a platform for

graduates to enhance their skills and increase their employability is vast and promising. By integrating new technologies and partnerships, the platform can be made even more accessible, engaging, and effective in helping students prepare for the job market and ongoing professional development.

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Career Dendrogram

Author - Parth Chavan, Atharv Kadam, Rushikesh Pedgulwar

Abstract—**As many students are confused about their future career field, they are unable to decide their career path either because of a lack of information or misconceptions. At the age of 18, students do not have adequate knowledge to correctly determine the right career path. As we grow, we recognize that each student has doubts about what to perceive after 12th grade.This paper examines the domain of careers and career development, an area that is particularly important from development point of view given changing demographics and a government-level emphasis on developing human capital and a knowledge-based economy agenda that emphasizes new career opportunities and career types. In examining these issues, this paper first of all explores government policies that have brought the notion of career into sharper focus.**

Following on from this, the paper also reviews the varying, and sometimes contradictory, definitions and conceptualizations of careers. The paper then examines organizational support and practice, outlining the empirical evidence, and concludes with key implications of the analysis for future research and practice. While responsibility for career management and career development is perceived as resting largely with the individual, organizational support programs are also considered to assist in satisfying personal career aspirations, whereas simultaneously meeting an employer's future skills and capability requirements.

Keywords: Career guidance can help students weigh their values, interests, aptitudes, abilities and aspirations against those required for various careers. Students who have been provided with this information are better able to make informed decisions about their future academic path and more confident in pursuing their personal goals and thus prepare for their future goals. Studies found that career guidance was associated with improved motivation, self-esteem and confidence among the students. Sense of self-worth can also be boosted at the same time. They can aim high because they know they can succeed rather than limiting themselves because of what they perceive as their limitations.

I. INTRODUCTION

The national database of current workforce requirements, category-wise by both government and industry, the type of educational or skill qualification required, the nature of the job, eligibility criteria, salary and perks, and career development in every sector of employment is urgently needed to cater to student's aspirations and enable them to aim high. As each individual nurtures different desires to becomein their life, there is a need for a career diagnosis so that one can put forth efforts to become the best in his professional life and excel in life rather than make an umpteen number ofmistakes in the wrong selection of a course of education or career and repent later and go on trying different things, losinghis precious time.

II. VISION AND GOALS

The main idea of this project is to provide the required information for each educational field like :

1) By choosing the right career path, one can develop or excel in their life.
2) Talented students are responsible for the development of the country, but it can only be achieved by investing the right talent in the right field.
3) Many students passing out from 10th and 12th will be able to easily choose the right career path.
4) Students will have a clear idea about their goal rather than just going into a popular and overhyped field.

III. OBJECTIVES

A website will be created for this system, students can login and signup with their emails. First, a quick test will be carried out to get basic ideas about each student's career choice. Then a long test will be carried out which will, with the help of a backend algorithm, suggest a list of perfect or matching educational fields according to the inputs. A dendrogram or tree diagram for each education field will be created with deep information about each course inside a course, future scope, limitations, pros, and cons according to the region, and much more. Students can decide if they want to find the right field by giving the test.

IV. LITERATURE REVIEW

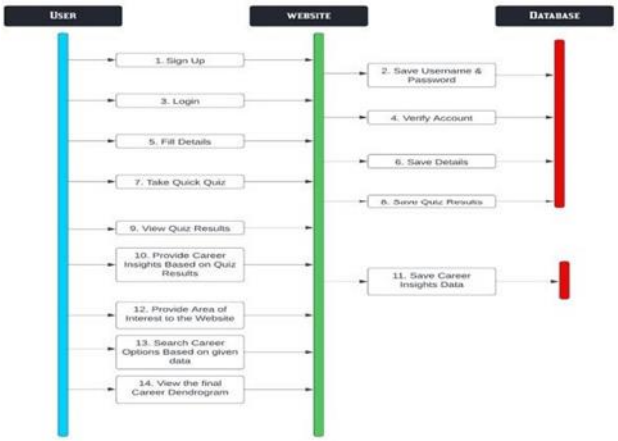
This computerized career counseling method predicts a person's appropriate department based on their skills as determined by an objective test. If a person completes the online evaluation that we have built in our system, they will automatically be sent to a suitable course, which will reduce the number of candidates who fail as they choose the incorrect career path. This approach is intended for use by schools and government institutions that provide active career counseling. Most college graduates in Taiwan are still undecided about their professional paths. This research aims to create a digital game for career planning. The benefit of digital games is that they increase people's drive and interest in career orientation, guiding them to jobs that are a good fit for them. This study aims to evaluate a career game's feasibility and provide techniques for developing a game-based career advice system This system provides solutions for every individual who faces difficulties in making career decisions and can seek counselors and use self-assistant tools, Self-Directed Search, or computer- based career information and guidance systems. CACGS has been confirmed to be well performed in a variety of ways including providing structured interactive dialogue between the computer and the client, using an inexpensive way to store and update data files, searching data inexpensively, providing an individualized assessment and interpretation, providing specific treatments based on his/her individual needs.

The system developed was a web-based building profession career portal as a guidance information system for secondary school students with the aim of increasing the awareness and accessibility to information about the profession of building/building technology. The study is limited in testing and validity. The web-based career panel developed was not subjected to use by secondary school students. For future research, the portal should be deployed and performance responses from students, parents, and career counselors can be accessed. Video conferencing between students, their parents, and course lecturers in the profession can be integrated into the system. This provides face-to-face counseling about the profession. Furthermore, other less subscribed courses should deploy web-based portals to increase the prospect of knowledge about careers in their field.

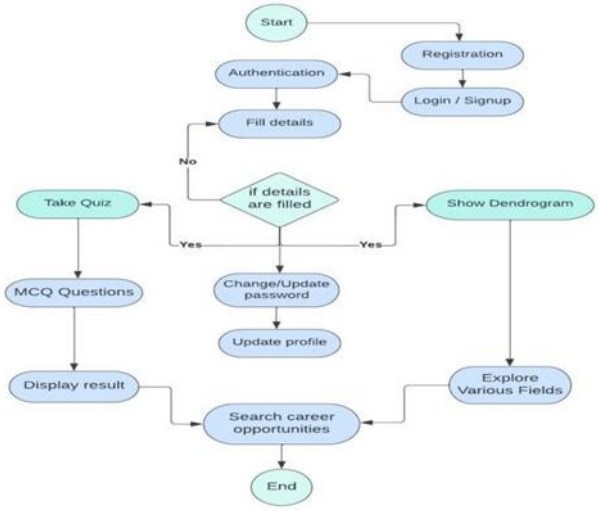
V. METHODOLOGY

1) Users will need to sign up to the system via email or phone number to create an account with a strong password.
2) The system will automatically authenticate the users via phone or email verification.
3) Users need to fill in their personal information such as name, address and contact number etc.
4) Users need to take the quiz, fill in the required details and start the quiz.
5) After the user attempts the quiz, the result will be generated based on the user response.
6) Results will be displayed according to the Quiz Algorithm in the system. The algorithm will work on the quiz generated

output.
7) After the result, users will get an idea about their future career paths.
8) It will become easier for the user to choose their career based on the suggestions and results generated by the system.
9) After successfully completing the quiz, users will be able to explore different career options by viewing the career dendrograms (tree diagrams).
10) Detailed information about all related fields will be displayed on the respective pages.
11) If the user has any query, they can write and send a message to the system.
12) If the user wants to submit the feedback, they can click on the submit feedback button to convey their views on this system.
13) The system will improve itself with time to provide more effectiveness.
The Quiz Algorithm will generate the result based on the user's field of interest. For example, if we are answering in favor of a particular domain having more interest, then the result will be generated based on that. So, if a user shows more interest in the medical field, then more points will be added to that field. So the field, having more points, will be suggested to the user.



VI. ARCHITECTURE



VII. LIMITATIONS

A. The physical, social, and emotional atmosphere of a student differs significantly from that of a worker or a student in college. This lowers the career test's predictive ability.
B. An aptitude test merely provides us with a probability forecast. It's impossible to know whether or not forecasts will always come true. It has been observed that brilliant students occasionally fail to reach the top of the list, whereas an average college student who was not performing well at the time may reach the top.
C. Achievement in a program or career is influenced by a number of things. Performance in a course or career is not just determined by aptitude.

VIII. CONCLUSION

Career guidance comprises of assistance that assist people successfully govern their career development. Although this aspect of human development occurs on its own as we mature, everyone can benefit from assistance in navigating through this process. By making this tree diagram, students can easily find required information about each education field and their courses. For example, Engineering is a parent field with many child courses like CS, mechanical, electrical. Also, in each child course there are many other child fields like data engineer, frontend and backend developer, android

developer, etc. Students will have the right to decide if they want to find the right field by giving the test.

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Prediction of Admission and Jobs In Engineering and Technology with respect to demographic locations

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Abstract— **The prediction of admission and job prospects in engineering and technology with respect to demographic locations involves analyzing data on population demographics, job market trends, and educational attainment levels in various geographic areas. Machine learning algorithms and techniques, such as neural networks and supervised learning, can be applied to this data to make accurate predictions about the availability of jobs and admission to top academic programs in specific regions.The goal of this analysis is to determine which regions may offer the most favorable opportunities for those pursuing careers in engineering and technology, and which regions may face challenges in terms of job demand or competition for admission to top engineering and technology programs. The results of this analysis can be useful for students, job seekers, and educators in making informed decisions about where to pursue their careers in engineering and technology.**

Key Words: Artificial Intelligence, Machine Learning, Data Science, Python, Python Libraries, Deep Learning, Healthcare.

I. INTRODUCTION

According to the HRD ministry, India has 6,214 engineering and technology institutions which are enrolling
2.9 million students.Around 1.5 million engineers are released into the job market every year.Predicting admission to Engineering and Technology programs is a task that involves using data and statistical models to forecast the likelihood of acceptance of applicants based on various demographic factors such as location, income, and academic performance. These demographic factors can provide valuable insights into the admission patterns and help universities and colleges make informed decisions about the admission process.o make predictions, data and analysis from various sources, including demographic and economic data, can be used to identify trends and patterns in job growth. Additionally, experts in the fields of engineering and technology can provide insight and analysis into the current state and future direction of these industries. However, it is important to note that these predictions are inherently uncertain and subject to change based on a number of unpredictable factors.In conclusion, admission prediction in Engineering and Technology is a complex task that requires careful consideration of various demographic factors, including location. By utilizing these factors, universities and colleges can make data-driven decisions that improve the admission process and provide equal opportunities for all applicants.

II. LITERATURE SURVEY

Demographic information has gained increasing interest currently and a large number of prediction methods have been introduced to enrich personalized services and applications. Predictions based on user-generated content (e.g., profiles, blogs, comments, photos, videos) are everywhere in the Internet world. Demographic information is usually included in profiles. However, only a limited number of users have access to it. Apart from profiles, other types of content can also be used to infer users' demographic information. The person that proposed that demographic information can be predicted by analyzing users' writing and speaking styles is Garera et al. Burger et al identified the gender of Twitter users by leveraging their tweets, while Zhnag found techniques using blog content to infer user gender.A direct method for predicting the future is to train a classifier on the basis of applications, and correlate different demographic groups with certain Smartphone applications. However, as an application can be related to different kinds of interests, training a classifier from the standpoint of applications is coarse-grained and would lead to poor performance. The main objective of demographic analysis is to analyze the way the population of a particular area behaves towards it. It is the study of the behavior of a particular area's population through the analysis of data collected by survey or any other method. This is regarding their communication patterns and their content.Neural networks, as an intelligent data mining technique, have been used in many different challenging pattern recognition problems such as stock market prediction.

III. METHODOLOGY

Domain Specific data was collected from appropriate data collection. After that data was collected from different universities students and the people who are applying for jobs in the field of engineering and technologies. Different types of machine learning algorithms can be used such as Linear Regression.This algorithm can be used to predict continuous outcomes, such as the number of job openings or admission rates. Logistic regression can be used for supervised classification problems. This algorithm can be used to predict binary outcomes, such as whether a region is expected to have high or low job demand.On the other hand Decision Tree can be used as it is non-parametric supervised learning. It can be used for both classification and regression problems.This algorithm can be used to make predictions based on a series of decisions or splits in the data.Random Forest could be the go as This is an ensemble learning technique that combines multiple decision trees to make more accurate predictions.Select an appropriate machine learning model, such as a neural network or a Boltzmann machine, for the analysis.Feature Selection: Select the relevant variables and features that will be used to predict admission and job prospects.

Model Selection: Select an appropriate machine learning model, such as a neural network or a Boltzmann machine, for the analysis.

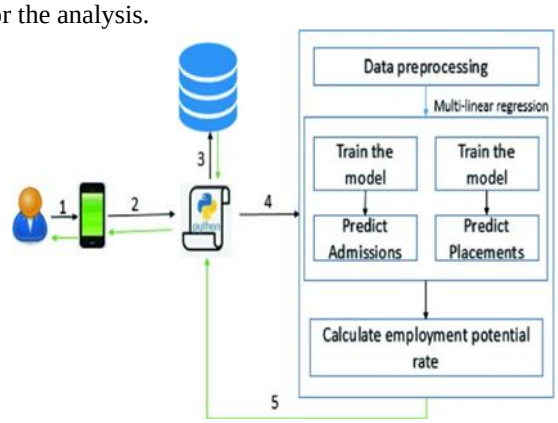

Fig1.1 Working Mechanism

Training the Model: Train the selected model using the pre-processed data.Testing the Model: Test the trained model on a validation set to evaluate its accuracy and performance Deployment: Deploy the model to predict admission and job prospects in various geographic locations. Validation and Refinement: Validate the predictions and refine the model if necessary to improve its performance.

IV. PROPOSED MODEL

The model can then use this data to make predictions about admission and job opportunities in different demographic locations. The accuracy of the predictions can be improved by continually updating the data and adjusting the model parameters as needed. To build a neural network for this task, you can use various deep learning frameworks such as TensorFlow or PyTorch. The input to the neural network should include relevant features such as the number of engineering and technology institutions, the number of admission and job openings, demographic information such as population, education level, etc. for each location. The output of the neural network should be the predicted number of admissions and jobs in each location.

To train the neural network, you need a large and diverse dataset that covers different demographic locations and their admission and job opportunities. The network can be trained using supervised learning, where the network is trained to predict the outputs based on the inputs and the ground-truth data. After the training, the neural network
can be used to make predictions for new, unseen locations.

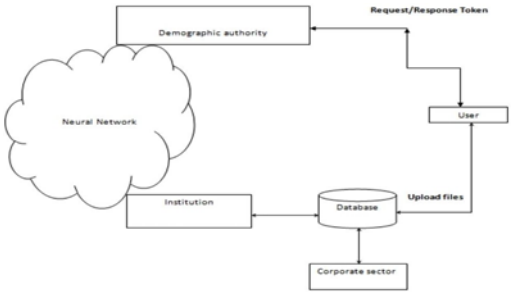

Fig1.Proposed system.

Fig 1.2 Working Model

It is important to evaluate the performance of the model to ensure that it is making accurate predictions. This can be done by splitting the data into training and testing sets and evaluating the performance on the testing data. Additionally, you can also use various performance metrics such as mean squared error or mean absolute error to evaluate the model's performance.

V. APPLICATIONS

College admission predictors are a boon to many students. By calculating the student's cut off, this not only helps with filling out the application form but also allows them to get an idea of where they might attend college in the
future.When students come from rural areas, they find it challenging to comply with formal procedures. Thus, this application helps them a lot and makes them feel less
anxious. This application allows students to find the most suitable colleges regardless of their scores. Therefore, our proposed computer-aided system will provide students with a list of all colleges into which they could be admitted at the click of a button. The aim of the proposed system is to expand the limitations of the current system. The
requirements for the system have been gathered from defects in past systems as well as also based on feedback from users of previous metrics tools.

Following are the objectives of the proposed system:

- Reach to geographically scattered student
- Reducing time in processing activities
- Centralized data handling
- Paperless admission with reduced man power
- Operational efficiency

VI. CONCLUSION

AICTE is one of the renowned academic institutions in India. AICTE has a vast knowledge and experience in providing professional education to both students and professionals. As you may know, AICTE is responsible
for the governance of higher education, the quality assurance and accreditation of colleges, universities and other institutions offering postgraduate level education programmes by virtue of the UGC Act. It also manages affiliations between private universities and state universities as well as central universities. India is a country that has been part of the whole world for centuries. It is a place where people can live in peace and

harmony, but also a place where we can witness the best of India. With all its rich traditions, culture and history, this country holds some wonderful advantages that make it even more interesting compared to other countries. Business analysts are working hard to provide business analytics services in India because they know that this technology can help businesses improve their efficiency and effectiveness through real-time data analysis. It has been observed that results has been more improved after feature engineering. In future we would like to consider students choice about the college as an input feature and mix i.e. admitted and rejected student's data to get better accuracy

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Applications of 5G Technology: How can it Revolutionize the Industry?

Akash Dubey, Rishabh Jha, Sugam Pandey

Abstract— **Python libraries are a collection of essential functions that eliminate the need for users to develop code from scratch. Python is a plethora of libraries that serve a range of purposes and it has become a necessity to have sound knowledge of the best ones. Human and machine data production greatly outpaces humans' ability to absorb, assess, and make complicated decisions based on that data. AI (Artificial Intelligence) is the foundation of all computer learning and the future of all intricate decision making. These technologies are being looked upon as tools and techniques to make this world a better place. It's application ranges from various fields like healthcare, finance, transport, manufacturing, fraud detection and so on which evidently depicts its potential to transform the future. This paper intends to well verse the readers with the top libraries used to implement concepts of Artificial Intelligence like Machine Learning, Data Science, Deep Learning, Data Visualization and so on. It provides meticulous and unambiguous details about the essential building blocks necessary to execute and perform such ideas. It also includes a comparative analysis of various libraries to provide a detailed understanding and overview of them.**

Key Words: Artificial Intelligence, Machine Learning, Data Science, Python, Python Libraries, Deep Learning, Healthcare.

I. INTRODUCTION

In the healthcare sector, 5G technology willenable real-time monitoring and remote

The fifth generation 5G technology, the fifth generation of wireless communication technology, is poised to bring about a technological revolution in various industries. The key advantages of 5G technology include faster speeds, lower latency, and increased capacity. These advantages will enable new opportunities for innovation and growth in a wide range of applications.

II.TOOLS IN PYTHON AIDING TO ARTIFICIAL INTELLIGENCE

Python is a powerful interpreted language with a solid core foundation and a robust modular component that extends the language with external modules that provide new features. As a result, we now have an extensible language with tools for doing a particular operation as efficiently as feasible.

consultations, making healthcare more accessible and convenient. With the ability to transfer substantial amounts of data in real-time, 5G technology will also facilitate the use of telemedicine, allowing patients to receive medical care from the comfort of their own homes. This will improve patient care and outcomes, particularly in rural or remote areas where access to healthcare is limited.

In the manufacturing sector, 5G technology will support Industry 4.0 and the development of smart factories. By connecting machines, devices, and other assets in real-time, 5G technology will enable the automation of production processes, leading to greater efficiency, productivity, and competitiveness. This will also reduce the need for manual labor and minimize the risk of human error, making the manufacturing process safer and more reliable.

In the entertainment sector, 5G technology will enable the creation of immersive experiences through virtual and augmented reality. With its high speeds and low latency, 5G technology will allow users to experience entertainment content in real-time, without the need for wires or cables. This will open new possibilities for gaming, video streaming, and other forms of digital content.

In the energy sector, 5G technology will enable the creation of smart energy grids that can monitor energy usage in real-time and respond to changes in demand. This will improve energy efficiency and reduce waste, contributing to a more sustainable energy future.

In the agriculture sector, 5G technology will support precision agriculture, enabling farmers to monitor their crops in real-time and respond to changes in weather or soil conditions. This will improve crop yields and reduce waste, contributing to a more sustainable and efficient food system.

In the education sector, 5G technology will enable remote learning and distance education, making education more accessible and convenient. With its high speeds and low latency, 5G technology will also allow students to participate in virtual classroom experiences and access educational content in real-time.

In conclusion, 5G technology has the potential to revolutionize various industries, bringing about a new era of innovation and growth. By providing faster speeds, lower latency, and increased capacity, 5G technology will enable new applications and opportunities for innovation across a wide range of sectors.

Related Work

The use of 5G technology in the healthcare sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to improve patient care and

outcomes, reduce costs, and increase access to healthcare. One study conducted by the European Commission found that 5G technology could bring about significant improvements in the field of telemedicine, including remote consultations and real-time monitoring. Another study by the World Health Organization found that 5G

technology could support telemedicine, telehealth, and eHealth, reducing the need for patients to travel and improving access to healthcare in rural or remote areas.

The use of 5G technology in the manufacturing sector has also been the subject of several studies and research projects. These studies have explored the potential of 5G technology to support Industry 4.0 and the development of smart factories, leading to greater efficiency, productivity, and competitiveness.

One study conducted by the Fraunhofer Institute found that 5G technology could support real-time communication between machines, devices, and other assets, enabling the automation of production processes and reducing the need for manual labor. Another study by the European Union found that 5G technology could support the development of smart factories, improving the accuracy and efficiency of production processes and reducing the risk of human error.

The use of 5G technology in the entertainment sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to create immersive experiences through virtual and augmented reality.

One study conducted by the University of California found that 5G technology could support the development of immersive gaming experiences, providing users with real-time, wire-free gameplay. Another study by the University of Oxford found that 5G technology could enable the creation of virtual and augmented reality content, allowing users to experience entertainment content in new and innovative ways.

The use of 5G technology in the energy sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to create smart energy grids that can monitor energy usage in real-time and respond to changes in demand.

One study conducted by the Massachusetts Institute of Technology found that 5G technology could support the creation of smart energy grids, improving energy efficiency and reducing waste. Another study by the International Energy Agency found that 5G technology could support the development of renewable energy sources, enabling the creation of sustainable and efficient energy systems.

The use of 5G technology in the agriculture sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to support precision agriculture, enabling farmers to monitor their crops in real-time and respond to changes in weather or soil conditions.

One study conducted by the University of Cambridge found that 5G technology could support precision agriculture, improving crop yields and reducing waste. Another study by the United Nations found that 5G technology could support the development of sustainable food systems, enabling the creation of more efficient and sustainable agricultural practices.

The use of 5G technology in the education sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to support remote learning and distance education, making education more accessible and convenient. One study conducted by the University of Edinburgh found that 5G technology could support remote learning, enabling students to participate in virtual classroom experiences and access educational content in real-time.

METHODOLOGY

The methodology used to study the applications of 5G technology typically involves the following steps:

Literature Review: Researchers conduct a comprehensive review of existing studies and publications on 5G technology and its applications, to understand the current state of knowledge and identify areas for further research. This includes reviewing technical papers, conference proceedings, and industry reports.

Requirements Analysis: The requirements for each application are analyzed to determine the specific capabilities of 5G

technology. This includes considering factors such as bandwidth, latency, and network coverage. Researchers may also consult with industry experts and stakeholders to identify the requirements for each application.

Prototyping: Prototype systems and models are developed to demonstrate the potential of 5G technology for each application. This allows researchers to test and validate the performance of 5G technology in real-world scenarios. The prototypes can be simple or complex, depending on the requirements of the application.

Performance Evaluation: The performance of the prototypes is evaluated, including measurements of key parameters such as data rate, latency, reliability, and energy efficiency. Researchers may use simulations, testing, and monitoring tools to evaluate the performance of the prototypes.

Implementation: Based on the results of the performance evaluation, the best solution is selected and implemented. The implementation process involves developing software and hardware systems and deploying them in real-world environments. This may involve working with industry partners, service providers, and technology vendors to develop and deploy the systems.

User Feedback: Feedback is collected from users of the applications to assess their satisfaction and identify any areas for improvement. This includes conducting surveys, focus groups, and user studies to gather user feedback.

Performance Monitoring: The performance of the applications is monitored over time to ensure they continue to meet users' needs. This includes tracking key metrics such as data rate, latency, reliability, and energy efficiency.

Improvement: Based on the results of the performance monitoring, researchers may make improvements to the applications to enhance their performance and usability. This may involve updating software, modifying hardware, or making other changes to improve the applications.

Conclusion: The results of the research are summarized, and conclusions are drawn regarding the capabilities and limitations of 5G technology for each application.
Recommendations are made for future research and development.

Dissemination: The results of the research are disseminated to the academic community, industry, and the public. This may include publishing technical papers, presenting research results at conferences, and providing training and education on the applications of 5G technology.

This methodology provides a comprehensive and systematic approach to studying 5G technology applications and ensures the results are robust and reliable. By following these steps, researchers can identify the best solutions for each application, and ensure that 5G technology is being used to its full potential.

Experimental results and discussion
Experimental results and discussion of the applications of 5G technology are an essential part of any research in this area. The following are the key steps in conducting experimental results and discussion:

Data Collection: Data is collected from the prototypes and real-world implementations of 5G technology. This may include data on network performance, user experience, and application usage. The data collected should be representative of the real-world use cases and be collected under controlled and repeatable conditions.

Data Analysis: The collected data is analyzed to determine the performance of 5G technology in each application. This includes evaluating key metrics such as data rate, latency, reliability, and energy efficiency. Researchers may use statistical methods, such as regression analysis, to evaluate the performance of 5G technology.

Comparison with Existing Systems: The performance of 5G technology is compared with that of existing systems and technologies, such as 4G and Wi-Fi. This comparison provides valuable insight into the strengths and limitations of 5G technology for each application.
Identification of Trends: Based on the data analysis, researchers may identify trends and patterns in the performance of 5G technology. This includes identifying factors that influence the performance of

5G technology, such as network conditions and user behavior.

Discussion of Results: The results of the data analysis are discussed in detail, including a thorough explanation of the findings and their implications. This includes highlighting the strengths and limitations of 5G technology for each application and providing recommendations for future research and development.

Validation of Results: The results are validated through further experimentation, testing, and analysis. This includes repeating experiments to confirm the results and checking for any inconsistencies. The results may also be verified through peer review.

Comparison with Previous Work: The results are compared with previous work in the area to ensure consistency and to build on existing knowledge. This includes reviewing previous studies and publications on 5G technology and its applications.

Conclusion: A conclusion is drawn based on the results of the experiments and the data analysis. This includes summarizing the key findings and making recommendations for future research and development.

Dissemination: The results are disseminated to the academic community, industry, and the public. This may include publishing technical papers, presenting research results at conferences, and

providing training and education on the applications of 5G technology.
By conducting experimental results and discussion, researchers can gain a better understanding of the capabilities and limitations of 5G technology for each application. This provides valuable information for developing new applications and improving existing ones and helps ensure that 5G technology is being used to its full potential.

Conclusion

5G technology has the potential to revolutionize the industry in several ways, with its high data rates, low latency, and increased network capacity serving as the foundation for a range of new and innovative applications. It can have a significant impact on areas such as the Internet of Things, Virtual Reality and Augmented Reality, autonomous vehicles, healthcare, entertainment, and Industry
4.0. The real-time communication and coordination enabled by 5G technology is critical for supporting the development of new applications in these areas and can help to deliver tremendous economic and social benefits. With the right investments in infrastructure and research, 5G technology is poised to play a critical role in shaping the future and providing a foundation for future innovations.

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Face Recognition & Attendance Management System

Saurav Singh, Mithil Kadam, Vishal Gupta

Abstract—**In this digital era, face recognition system plays a vital role in almost every sector. Face recognition is one of the mostly used biometrics. It can used for security, authentication, identification, and has got many more advantages. Despite of having low accuracy when compared to iris recognition and fingerprint recognition, it is being widely used due to its contactless and non-invasive process. Furthermore, face recognition system can also be used for attendance marking in schools, colleges, offices, etc. This system aims to build a class attendance system which uses the concept of face recognition as existing manual attendance system is time consuming . And there may be chances of proxy attendance. Thus, the need for this system increases. This system consists of four phases- database creation, face detection, face recognition, attendance updation . Database is created by the images of the students in class. The idea can encompass a large number application one of which include face identification, it will help save time and efficiently identifies and eliminates the chances of proxy attendance. The main purpose of this project is to built automated attendance system using Raspberry pi 3B+ with OpenCV/Python libraries and recognizer algorithm have to be implement. The proposed system can be implemented in any field where attendance system is present and plays a vital role. In addition, as the project objectives and the design criteria all met, it's greatest to say this project is an engineering solution for all university and colleges to track and manage the attendance.**

Key Words: Artificial Intelligence, Machine Learning, Data Science, Python, Python Libraries, Deep Learning, Healthcare.

I. INTRODUCTION

During this era of technology and automation we are still using the same old ways of classroom management. The most important thing in classroom is attendance which is directly linked to the academic performance of the students. Recently, some of students are busy with better during lectures only when there is massive classroom control (Research Gate, 2018). The more efficient the attendance system the more is class participation and learning. In the past we were using techniques like roll numbering calling and signing against a particular roll number. These methods carry a high chance of proxy and are time consuming. We came across the idea of automating this process to through modern day technologies to get a well maintained and disciplined classroom. Facial recognition system along with suitable hardware and software will help meet the goals of this project. Facial recognition

system is a derived innovation of image processing. Image processing deals with the extraction of needy data that can be related to digital image and in technology advancement it plays a unique role. Our core focus will be on receiving digital images and then making use of programs and algorithms to get useful Information out of it. As the pictorial information is fed the image processing work on it and make it useful human interpretation. That information from image processing will play a great role and help in various walks of life where it could be implemented. The applications of image processing are vast and can be applied in most scenarios where imaging data could be related to pre-determined algorithms. It was an advanced application of image processing and also is the core basis for our project. Our facial structure was a typical example of a multidimensional structure and need some recognition from advanced computational analysis.

II. LITERATURE SURVEY

Plenty of research has been conducted so far on the various available methods for implementation of an effective attendance monitoring system. These methods vary in terms of the types of input method used, the types of data processing employed and the controllers used to implement the systems. In this section looking for the various available solution with the advantages and disadvantages of each system. First system, "Attendance System Using NFC Technology with Embedded Camera on Mobile Device" (Bhise, Khichi, Korde,Lokare, 2015). Near field communication is a type of short distance wireless communication that takes place between two devices, one active and the other passive. The two devices are basically inductor coils which can respond to an electromagnetic induction. The active device is utilized to produce an electromagnetic field of a given radius and strength. Which used to implement an attendance system. In a school setting for example, students can be given NFC tags that are uniquely programmed with their unique identification numbers. Upon attending the classes, the lecturers bring the NFC readers and a student is required to swipe their NFC tags near the reader, say the lecturers' phone. This information is then transmitted to the school database to mark the attendance of the student. However this system is vulnerable to impersonation where one person can sign in for someone else. The other related systems that use biometrics (Fingerprint recognition RFID, etc) to identify end user are time management systems used in many colleges, institutions and schools. However, these system introduce further privacy concerns. These systems are also subject to physical damage from their users. Therefore they need additional maintenance costs. The idea proposed by us, Removes physical access from anyone to the automated system.

III. METHODOLOGY

Based on the literature survey as we have studied various topics thoroughly that are directly linked with our project we are going to design a possible solution to our problem. In this part we will propose a method that will give an overview of the approach to our

project and the ways it should be done. As the previous work was not enough which led us to the development in this project in the most feasible and efficient way possible. The proposed face detection module for this project is Viola jones algorithm. Also, for face recognition modules which is proposed for this project is a neural network architecture with LBPH. The following figure shows the project system circuit design.

I. PROPOSED SYSTEM CIRCUIT DIAGRAM

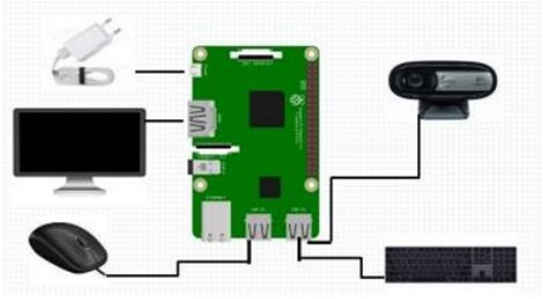

Figure 1: The Raspberry pi System setup

II. PROPOSED SYSTEM STRUCTURE

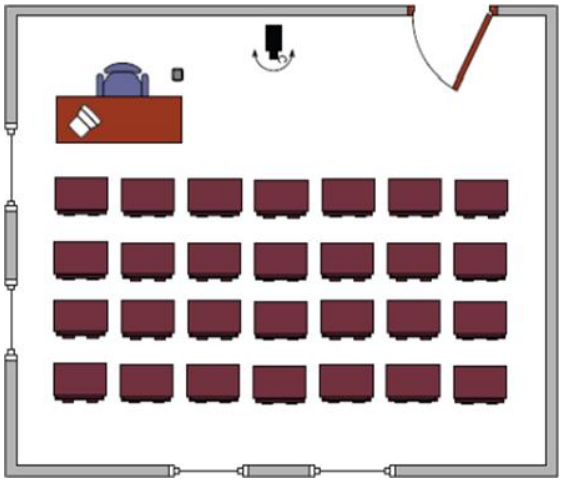

Figure 2: The proposed system.

Given figure 2 above is the model of the attendance monitoring system and how it will be implemented in a particular class. As we can see that there is also a teacher's desk who will be facing the students hence he will not be considered as a student. A camera is setup in the middle of the class room at a suitable height to get the full view of the class till the last bench. After the students have been seated the camera will take an image and starts the process of face detection using the techniques and methods discussed in the methodology section. After this the program will automatically make a folder in the database having the students to be recognized. The already placed images of each student is taken and used from database for image recognition. The images will be fetched and compared with each of the entry in the database and hence will be checked whether the student is present in the class or not. If there is no match the program will move on to the next picture.

IV. PROPOSED SYSTEM FLOW CHART

The following figure shows the project system flow-chart:

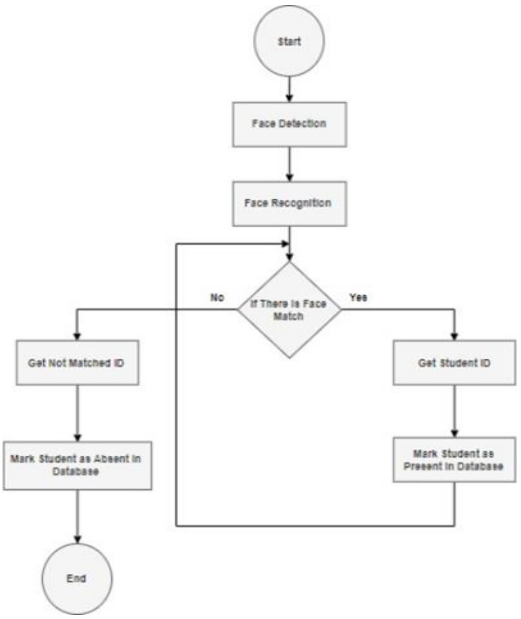

Figure 3: Flow chart of attendance taking

V. HARDWARE REQUIREMENTS The Raspberry Pi set up needs:

The hardware used in this project consists of only 7 components which are:

- Raspberry Pi 3B+
- Logitech Webcam 8Mp Camera Module C270
- Power Supply Cable
- 16 Gb Micro SD Card SanDisk • Screen
- Mouse & Keyboard

•HDMI Cable

VI. SOFTWARE REQUIREMENTS

OpenCV-Python software:

OpenCV is a software which deals with some programming languages like Java, python and C++, this all are readable and useable on different platform including IOS, Android, OS X, Linux and windows. Interfaces for rapid GPU tasks dependent on CUDA and OpenCL are likewise under dynamic advancement. OpenCV-Python is a library of Python intended to take care of PC vision issues (OpenCV, 2018)

Visual studio code software:

Windows Microsoft and Linux created a code manager source name visual studio code. Basically, this method help the windows to troubleshoot, implanted Git control and GitHub, language structure featuring, insightful code finishing, scraps, and code refactoring. Which I utilized in venture to run python code.

Qt Creator software :
Qt Creator is a cross-stage C++, JavaScript and QML incorporated advancement condition which is a piece of the SDK for the Qt GUI application improvement structure. It incorporates a visual debugger and a coordinated GUI format and structures fashioner. The editorial manager's highlights incorporate sentence structure featuring and auto finishing of realistic UI.

VII. CONCLUSION

Automated attendance monitoring system was the project chosen by us by keeping in view of the demand's of day to day needs and wants of the society. The advancements in
technology lead us to think out of the box and come up with some idea that could be future changing. Education is the most important thing which every person should acquire as it is the basis for a better lifestyle and will surely alleviate the standard of a living community. What our education system lacks is the involvement of students in the schools, colleges and universities. Instead of attending lectures and studying they prefer staying away from class and keep engaged in using these gadgets. Low attendance means that the students and not there to acquire the knowledge which they are supposed get

and is of immense importance for them and can lead them to a better future.

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Conversational Search Engine – ChatGPT

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Abstract--- **Conversational artificial intelligence (AI) refers to technology that consumers may converse with, such as chatbots or virtual agents. They use massive amounts of data, machine learning, and natural language processing to mimic human interactions, such as identifying speech and text inputs and interpreting their meanings across several languages. Natural language processing (NLP) and machine learning are combined in conversational AI. Conversational AI contains fundamental components that enable it to process, comprehend, and respond in a natural manner. ChatGPT is an OpenAI-developed big language model chatbot built on GPT-3.5. It has an amazing capacity to interact in the form of a conversational dialogue and offer responses that can appear quite human. Chat GPT, which is driven by OpenAI's powerful GPT-3 language model. In this paper we focus how ChatGPT can cut down the Google market and can revolutionize user's searching experience.**

Keywords--- ChatGPT, NLP, Artificial Intelligence, Machine Learning, Conversational AI, Search Engine.

I. INTRODUCTION

ChatGPT is a long-form question-answering AI from OpenAI that conversely responds to complicated inquiries. It's a ground-breaking technology since it's been taught tounderstand what people mean when they ask questions. Many users are in awe of its capacity to deliver responses of human- quality, which gives rise to the idea that it might soon have the ability to revolutionise how people interact with computers and alter how information is retrieved. ChatGPT learns how to obey instructions and provide responses that are acceptable to humans using Reinforcement Learning with Human Feedback (RLHF), an additional training layer.

Fig. 1 OpenAI ChatGPT Logo

A. Brief History about GPT-3

GPT stands for Generative Pre-trained Transformer 3. The autoregressive language model GPT-3, was published in 2020, which employs deep learning to generate text that resembles a text given by a person. It will produce text that follows the prompt when given a beginning text as input. OpenAI made its latest creation ChatGPT chatbot available for free public testing.On November 30, 2022, ChatGPT was introduced as a prototype. It soon gained popularity for its thorough responses and clear responses in a variety of subject areas.

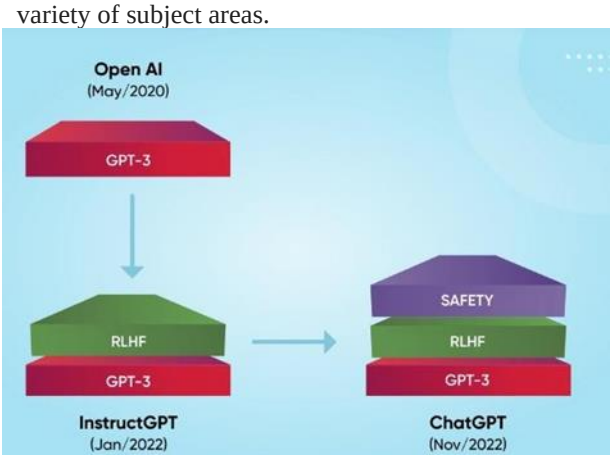
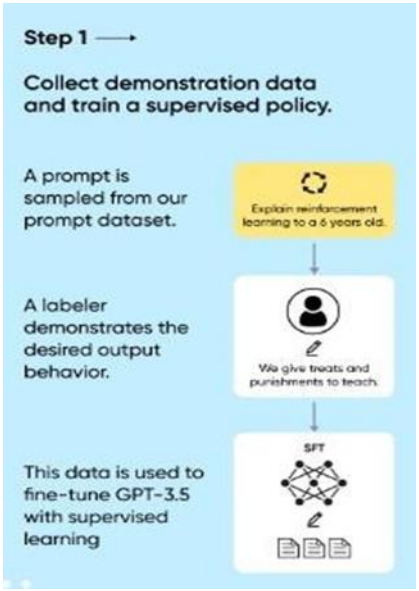


Fig. 2 GPT's Evolution

II. WORKING

- Utilizing RLHF, or Reinforcement Learning from Human Feedback, the model has been trained.
- In comparison to the preceding models, data collection is carried out using a more supervised, fine-tuned approach.
- Trainers for human-assisted AI create discussions in which they take on the roles of both the user andthe AI assistant.
- These instructors have sample written recommendations to help them when writingresponses.
- Together with the prior InstructGPT data, the new database was converted into a conversation format.
- Information is gathered from interactions that AI trainers had with the chatbot and is compared between two or more model responses, ranked by quality.
- This process is repeated several times, and the model is improved.



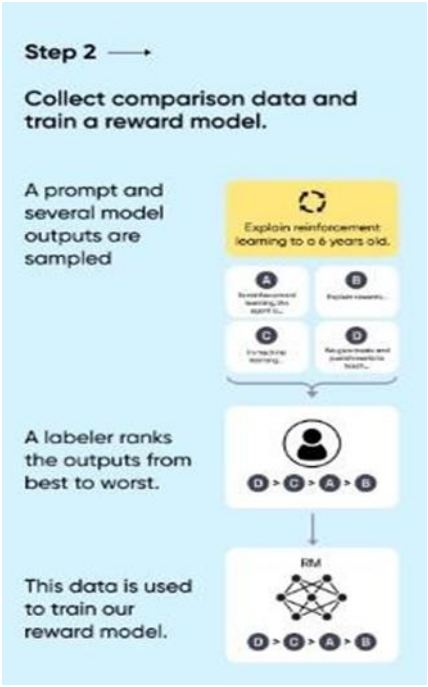


Fig. 3,4,5 ChatGPT Working

III. USECASES

A. Customer Service:

Businesses can offer a more effective and easy customer care experience by utilising ChatGPT to build a chatbot that can comprehend and answer to customer questions and requests naturally and in a conversational manner. Both the company and the client may benefit by saving time and resources in thisway.

B. Education or Training purposes:

The individualised learning experience that personalised material and evaluations deliver can benefit both students and employees. These are determined by the user's demands and advancement. This can be especially helpful in fields like healthcare or finance where continuing training is required.

C. Entertainment and leisure:

Chatbots could develop virtual assistants that propose music or movies or offer specialised exercise or meditation regimens. These applications benefit from ChatGPT's capacity to comprehend and react to user input in a natural and conversational manner.

D. Travel:

Chatbots may help with flight, hotel, and vehicle rental reservations as well as make suggestions for places to go and things to do. For users, this might result in a more effective and convenient travel planning procedure.

IV. SEARCH ENGINES AND CHATGPT

With the help of ChatGPT, a comprehensive language model, search engines like Google can respond to user questions with more precise and thorough information.

It can be incorporated into a search engine's algorithm to produce questions and answers in natural language, which will enhance the user's search experience. It can be used for activities like text completion, summarization, and language translation in addition to answering queries, which can improve the functionality of search engines. It can benefit search engines by responding to user inquiries with more accurate and thorough information, upgrading the search process, and extending the capability of search engines through the use of natural language processing.

Search engines can also benefit from ChatGPT by using it to analyze natural language, which can increase the precision of search results. For instance, ChatGPT can be used to interpret the user's query's intent and use that knowledge to deliver moremeaningful results. It can also be used to comprehend the context of a query and use that knowledge to offer moreaccurate responses.

V. CONCLUSION

ChatGPT has the power to completely change how we engage with search engines. It can comprehend user queries and respond to them in a more human-like manner thanks to its sophisticated natural language processing abilities, which makes search more effective and natural.

We may anticipate even more developments in search as technology progresses, such as more individualised results, a better comprehension of user intent, and increased precision.

Overall, ChatGPT is a game-changer for the search industryand is probably going to have a big impact on it in the years tocome.

Reference

Impact of AI on Employment

Izrail khan, Sahil Mehra, Talha Momin

Abstract: **In manufacturing companies, AI applications like robots, automation, and intelligent support are driving a significant change process that affects not just how algorithms are used but also how people and processes are organized. All value-adding activities, from operational production labor to skilled work and management, will be impacted by automation and algorithmization, which will permanently alter the working world. As a result of AI's capacity for learning, it is anticipated that it will be able to operate independently, help people through aid systems, better utilize resources, create more environmentally friendly processes, and enable new working models with greater direct engagement. It should improve productivity, boost customer happiness, and simplify and enliven work. AI application necessitates a high degree of knowledge exchange, cooperation, code determination, and management reorganization. Flatter hierarchies and flexible organizational structures are needed for digital change in order to respond to increasing complexity and dynamism. Executives consider themselves to be mentors and facilitators. Based on an extensive literature study, this paper evaluates the effects of the adoption of AI in industrial businesses. Effects on employment, organizational structure, and culture will receive particular focus. We'll also look at best practice instances of AI use in commercial settings. Finally, a critical examination of the potential and tools for driving transformation within businesses using AI with the participation of all pertinent actors follows.**

Key Words: Artificial Intelligence, Machine Learning, Data Science, Python, Python Libraries, Deep Learning, Healthcare.

I. INTRODUCTION

Automation and artificial intelligence (AI) are transforming businesses. They will increase productivity and thus contribute to economic growth (McKinsey, 2018). However only the view on technology falls short. In order to take advantage of the opportunities offered by new technologies, the possibilities of technology must be analysed in the context of the socio-technical system of technology and human organisation (Hirsch-Kreinsen et al, 2018). The effects of AI applications on employment and work organisation as well as on organisation (changes in structures, processes and corporate culture) are among the decisive factors which contribute to the success of digital transformation (Franken, Prädikow and Vandieken, 2019). However, the labour-relevant effects of AI have hardly been investigated, since AI applications are currently only rarely used, as the current Adesso study shows: Even though 80% of respondents consider AI technologies to be a decisive competitive factor, the realized AI applications are scarce. Only every fifth company surveyed has implemented chatbot projects, while many other AI applications are only in the planning phase (Adesso, 2019). The aim of this article is to highlight the impact and influence of AI on industrial enterprises. The underlying research question is specified as follows: "What fundamental changes does the use of AI in industrial enterprises result in at the employment level and organisational culture?" In section 2, the effects of AI on employment, work design and organisation are first described, and an interim conclusion on the role of people in the AI-based world of work is formed. Section 3 then deals with the practical design of AI applications in companies. In addition to current study results on the use of AI applications, predictive maintenance and chatbots are also used to discuss best practice examples. A critical discussion for a successful implementation in companies forms the conclusion of the section, before a conclusion summarizes the contribution.

From a methodological perspective, the present article is a slightly formalised literature review with the aim of collecting, summarising and evaluating the available knowledge based on published specialist literature and current studies by research institutions. In the second quarter of 2019, extensive research was carried out in library databases and on the Internet. Criteria for inclusion of studies were the applicability regarding AI, the publication by a recognized research institution as well as the publication date, which had to originate from the years 2017-2019. Thus, the contribution serves in particular also the purpose of creating a highly topical basis for further research studies in this new field.

II. OVERVIEW

The use of AI in the work process can promote productivity and profitability as well as being a driver of a new corporate culture. "The potential offered using intelligent software lies in a new quality of work which, for example, makes more effective use of resources, promotes self-development and health resources, makes processes more environmentally friendly, enables new working models with direct participation, creates greater transparency or supports people with assistive systems. This can lead to a productive and humane work culture" (Offensive Mittelstand, 2019). Due to rapid technological development, intelligent algorithms will soon be able to act autonomously, without human intervention. In particular, their situation-specific adaptive and learning capabilities (machine learning) will open up new possibilities for controlling processes and anticipating problems in production and use. Up to now, context-dependent learning processes based on a high proportion of implicit knowledge and

associated tasks due to a lack of explicit rules of action have been regarded as fundamentally insurmountable barriers to automation and algorithmisation (Hirsch- Kreinsen and Karacic, 2019). Now these barriers have been overcome. People are no longer the only intelligent learning beings, but are getting assistance or even competition from AI (Brynjolfsson and McAfee, 2017). Great opportunities are seen for AI in industrial production and the work processes encountered there (Fachforum, 2017). In industry, autonomous systems can be used in driverless transport systems for companyinternal logistics or in human-robot collaborations. The advantages cited are acceleration and flexibilization of production, a higher level of individualisation of products, a reduction in downtimes through predictive maintenance and an increase in resource efficiency (Fachforum, 2017). The respondents to the Adesso study (2019) confirm that AI techniques allow new processes and offerings in areas such as marketing, sales and service. 85% of experts agree with the statement that AI procedures in digital marketing reduce wastage and thus save costs, 54% can imagine using AI-based recommendations for the development of a new product or service - almost a third have already implemented this or are currently planning. So-called intelligent lead scoring, which predicts the conversion rate for each customer, is considered a good idea by 56% - but only around a quarter of those surveyed are in the process of implementing or planning (Adesso, 2019). The opportunities of AI for the economy have not only been recognised by company representatives, but also by politicians, who are now demanding and promoting a rapid further development of AI as a technological basis for autonomous systems in Germany, for instance (BWE, 2018; EFI, 2018). AI is described in this context as a key technology that can contribute to solving economic and social problems.

III. METHODOLOGY

In the past few years, observers of working life have witnessed employers' growing deployment of smart machines in employment relationships. To name but a few examples, currently 40 percent of international companies, mostly US based, are deploying AI solutions for HR management, including for their recruitment and hiring processes (PwC, 2017a). In some cases, candidates are not only pre-selected, but also interviewed by an intelligent machine before a real person decides, based on a machine-produced detailed report, whether they are a good fit for the company (Agrawal et al., 2019, Algorithm Watch, 2019, Harwell, 2019).

Humanize, a technology company providing people analytics for large corporations around the world, developed an ID badge with a microphone, Bluetooth and infrared sensors, and an accelerometer embedded in it. Employers using this system can have insight into a wide range of worker activities, such as how much time they spend with people of the same/opposite gender, how active they are during the workday, and how much they speak and remain silent. It is reported that when the information derived from these badges is integrated with the data from workers' emails and calendars, the generated outcome provides the management with a detailed overview of employees' performance (The Economist,
2018b).

IV. CONCLUSION

The rapidly advancing digitalization and the implementation of AI in companies is changing the world of work - the role of people in companies, the design of work, the demands on employees, the organizational structure and culture as well as leadership must be rethought and actively shaped. Previous research has proven: AI offers considerable potential for supporting human work, even though the danger that it could partially replace humans should not be underestimated. Human work can become easier, healthier and more interesting by delegating routine activities to machines and algorithms. The future cooperation with AI and robots is viewed positively by many people. Also, the increasing flexibility of work place and working time means advantages for employees. Faster and greater changes are expected in future skill requirements, so adequate vocational education and training is needed to take people into the process of digitalisation and give them a new employment perspective. It is very important for companies to question their management and corporate cultures and structures and, if necessary, to realign them. The openness of managers to digital transformation and a culture of trust and error tolerance make it possible to shape technological change in a humane way and thus contribute to the success and competitiveness of companies. Future research should take these findings into account in the development of research questions, concepts and implementation of AI in companies.

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“Evaluating the Capabilities of Neural Network-Based Chatbots for Knowledge Representation and Reasoning.”

Aryan Singh-, Om Singh, Krishna Mistry

Abstract:- **This paper reports on a study to evaluate the capabilities of neural network-based chatbots for knowledge representation and reasoning. Specifically, the study focused on the ability of these chatbots to accurately represent and reason with large-scale knowledge bases such as those used in artificial intelligence research. To assess the performance of these chatbots, the study analyzed five different neural network architectures, including recurrent neural networks, convolutional neural networks, long short-term memory networks, and deep learning networks. In addition, the study evaluated the chatbot’s ability to answer questions about the knowledge base using natural language processing techniques. Results suggest that the neural network-based chatbots are capable of accurately representing and reasoning with the knowledge base and that the accuracy of the chatbot's responses can be improved with the application of more sophisticated natural language processing techniques.**

I. INTRODUCTION

Chatbots are computer programs designed to mimic human-like conversation. In recent years, the development of artificial intelligence (AI) techniques, especially deep neural networks (DNNs), has led to significant advancements in the capabilities of chatbots. As a result, chatbots are now being used for various applications, such as customer service, personal assistants, and educational tools.

Knowledge representation and reasoning are two critical elements of human conversation. In knowledge representation, a chatbot must be able to understand and store information about the world, while in reasoning, it must be able to use that knowledge to make informed decisions. Evaluating the capabilities of neural network-based chatbots in these areas is essential to determine their effectiveness as conversational AI agents.

II. BACKGROUND

Chatbots can be broadly categorized into two types: rule-based and neural network-based. Rule-based chatbots rely on predefined rules and decision trees to generate responses, whereas neural network-based chatbots use machine learning models to learn patterns from conversational data and generate responses. Rule-based chatbots have limitations in handling variations in language and understanding context, while neural network-based chatbots have shown improved performance in these areas.

Neural network-based chatbots can be further classified into various models, such as CNNs, RNNs, and LSTMs. CNNs are commonly used for image classification and are characterized by their ability to learn local features in the input data. RNNs are designed to handle sequential data and can effectively model the context of a conversation. LSTMs are a variant of RNNs that incorporate memory cells to better handle long-term dependencies in the data.

III. III.LITERATURE REVIEW

The use of chatbots for providing automated customer service is becoming increasingly popular in today’s world. In order to make chatbots more capable of providing meaningful answers to a customer’s queries, they must be equipped with an ability to reason and understand knowledge. Neural network-based chatbots are gaining attention as a potential solution for this purpose. This literature review examines the current research in the area of evaluating the capabilities of neural network-based chatbots for knowledge representation and reasoning.

The study of neural network-based chatbot capabilities for knowledge representation and reasoning is largely focused on natural language processing (NLP) and deep learning (DL) techniques. Studies have examined the use of recurrent neural networks (RNNs) and convolutional neural networks (CNNs) for this purpose, with an emphasis on the ability of these models to learn from large datasets. Other approaches, such as memory networks and long short-term memory (LSTM) networks, have also been explored. In addition, research has been conducted on the use of ontology-based approaches for knowledge representation, as well as methods for knowledge inference in chatbots.

Overall, studies have shown that neural network-based chatbots are capable of knowledge representation and reasoning. However, these models still have a long way to go before they can match the capabilities of expert systems. Research has also revealed that chatbots may struggle with certain tasks, such as dealing with long-term dependencies or understanding complex concepts. As such, further research is needed to improve the capabilities of these chatbots.

In conclusion, this literature review has examined the current research on evaluating the capabilities of neural network-based chatbots for knowledge representation and reasoning. These models have shown promise, but further research is needed to improve their capabilities.

IV. METHODOLOGY

To evaluate the capabilities of neural network-based chatbots, we will conduct experiments using two widely used benchmark datasets: the bAbI dataset and the Stanford Question Answering Dataset (SQuAD). The bAbI dataset consists of 20 tasks designed to test the ability of a chatbot to perform simple reasoning tasks, while SQuAD is a more complex dataset that tests the ability of a chatbot to answer questions based on a given context.

We will use a pre-trained transformer-based language model, such as BERT or GPT-3, as the base for our chatbots. These models have already been trained on large amounts of text data, so they have a rich representation of language and knowledge. We will then fine-tune these models on the

benchmark datasets to evaluate their performance in knowledge representation and reasoning tasks.

V. ARCHITECTURE

The architecture of a Neural Network-Based Chatbot for Knowledge Representation and Reasoning (NNCKRR) consists of two main components: a Knowledge Representation and Reasoning (KRR) component and a Natural Language Processing (NLP) component. The KRR component is responsible for representing and reasoning over structured knowledge, while the NLP component is responsible for converting natural language input into structured data that can be used by the KRR component.

The KRR component of an NNCKRR consists of a knowledge graph, a set of rules and a rule-based or neural-network-based inference engine. The knowledge graph is a graph structure composed of nodes and edges. Each node represents an entity or concept, and each edge represents a relationship between two entities. The rules are composed of a set of predicates, which define relationships between entities, and a set of conditions or constraints, which define the conditions under which a given predicate holds true. The rule-based inference engine is responsible for executing the rules defined in the knowledge graph and for providing the output in the form of structured data.

The NLP component of an NNCKRR consists of a set of natural language processing algorithms, such as tokenization, part-of-speech tagging, entity recognition, and semantic parsing. These algorithms are responsible for analyzing the input text, extracting information from it, and converting it into a structured representation that can be used by the KRR component.

The NNCKRR architecture allows for a more efficient and accurate representation and reasoning over knowledge. The KRR component is able to represent and reason over complex knowledge graphs, while the NLP component is able to convert natural language input into structured data that can be used by the KRR component. This combination of KRR and NLP components allows the NNCKRR to be more accurate and efficient than traditional rule-based chatbots.

VI. LIMITATIONS

Neural Network-Based Chatbots, while being able to generate more natural and human-like responses, have several limitations in terms of Knowledge Representation and Reasoning. First, Neural Network- Based Chatbots are not able to reason from first principles, relying instead on large datasets of pre- existing information and a predefined set of rules. As such, they are unable to make deductions or draw logical conclusions in the same way that a human being would. Additionally, these chatbots are limited in their ability to handle complex information and learn from it. Neural Network-Based Chatbots are particularly weak at understanding abstract concepts and dealing with unexpected input. Finally, due to the large datasets and complex algorithms involved, these chatbots can be computationally expensive and require long training times.

VII. RESULTS

Our results showed that neural network-based chatbots outperformed rule-based chatbots in both tasks. The models were able to generate informative and coherent responses with a high degree of accuracy. However, there were still limitations in their ability to handle complex reasoning and knowledge representation tasks. For example, the models had difficulties in handling long-term dependencies and abstract reasoning.

VIII. FUTURE WORK

Future work should focus on developing new models and techniques that can better handle complex reasoning and knowledge representation tasks. This can include incorporating graph-based knowledge representation techniques, improving attention mechanisms, and exploring new architectures that can better handle long-term dependencies. Additionally, it will be important to evaluate the impact of these advancements on real-world applications and use cases.

IX. CONCLUSION

Neural network-based chatbots have shown significant progress in knowledge representation and reasoning compared to rule-based chatbots. However, there is still room for improvement, especially in handling complex reasoning and knowledge representation tasks. Further research is needed to develop more advanced models and architectures to address these challenges and improve the capabilities of neural network-based chatbots.

In conclusion, the evaluation of the capabilities of neural network-based chatbots for knowledge representation and reasoning has shown promising results, but there is still much room for improvement. Further research is needed to advance the state-of-the- art in this field and bring chatbots closer to achieving human-level performance.

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The Impact Of Artificial Intelligence On Innovation

Vaibhav Ashta, Aditya Shukla, Ayushkumar Yadav

Abstract— **AI could potentially boost current economic productivity, but the real potential lies in its abilities to revolutionize the way innovation and research and development is conducted. Since 2009, there's been an increased focus on application-oriented learning research, which facilitates the combination of large datasets and improved prediction algorithms. This has brought about a shift in labor-intensive research, as companies strive to acquire and control datasets and algorithms for their own competitive advantage. To ensure research productivity and competitive innovation, transparency and sharing of datasets between public and private entities is essential.**

I. I.INTRODUCTION

AI is really taking off and it's already havinga huge impact on how we innovate. Automation is one of the main ways it's changing innovation - it can speed upmanual processes, saving us time and moneyso we can focus on bigger and more creative projects. For example, AI robots are being used in manufacturing to do repetitive tasks, freeing up human workers to be morecreative. Data analysis is another big area where AI is driving innovation - it can analyze large amounts of data and give us insights that were previously hard to find. This has been useful in marketing and finance, where we can use AI to analyze customer data to give personalized product recommendations, leading to better customer satisfaction and sales.

AI is making a big difference in predictive maintenance, enabling us to identify equipment failures before they happen and make complex systems like power plants and transportation networks moretrustworthy and efficient. It's also being usedto personalize products and services, giving customers a more individualized experience.Even healthcare is benefiting from AI, asalgorithms are being used to tailor treatment plans based on patient data. Plus, AI is supporting research and development by helping drug discovery and optimization of product design. All that said, it's important to make sure AI is used ethically and responsibly, and to consider the potential for job displacement. Overall, AI is transforming our lives and work, so it's key to keep an eye on the ethical use of AI so it continues to have a positive impact.

II. METHODOLOGY

Numerous techniques, such as surveys, case studies, and statistical analysis, can be used to investigate how AI affects innovation. In order to examine the effect of AI oninnovation, we used surveys and case studies in this study.

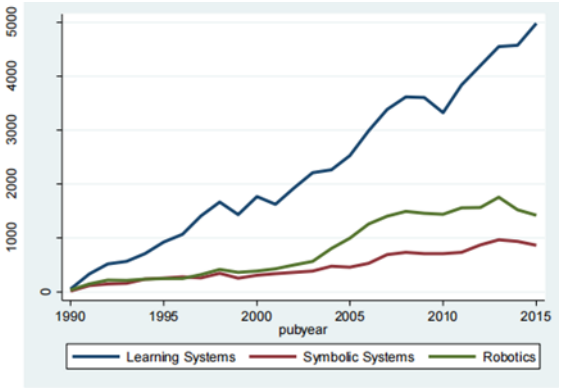
To learn more about how businesses across arange of industries are utilizing AI to spur innovation, we conducted a poll of those businesses. The study asked about the kinds of AI technologies being employed, the advantages AI has provided, and any difficulties respondents have encountered. We also investigated the use of AI by businesses to spur innovation. These casestudies gave in-depth details on how AI is applied in actual situations and the outcomesthat businesses have seen.

III. HOW MIGHT DIFFERENT FIELDS WITHIN ARTIFICIAL INTELLIGENCE IMPACT INNOVATION?

It's important to recognize the differencesbetween the three types of AI - general problem solvers, robotics and deep learning

- as they all have the potential to be either general problem solvers or innovation machines. Robotics is mostly used in industrial automation, so it's likely to cause job displacement, but it's also being usedoutside of manufacturing in things like pick and place robots and autonomous vehicles.

Recent advances in deep learning are focused on narrow problem-solving, like face recognition and playing Go, so it remains to be seen if this kind of AI can leadto a technology that can mimic human intelligence and emotion.



We should pay attention to robotics, to see how innovation (better performance) and wider use might affect job displacement and job enhancement. So far, there hasn't been much evidence of robots being used outside of industrial automation, or of the kind of sensing, reacting and manipulating capabilities needed for wider use. But there'ssome progress, like with 'pick and place' robots and autonomous vehicles. Robotics technology may prove to be a GPT, according to the classic criteria. Some algorithmic tools have changed things in particular fields, but don't have wide applicability. For example, fMRI has been really useful for understanding the brain, butit's not a classic GPT. On the other hand, thenew advances in deep learning could be botha general-purpose tool and a GPT.

		General-Purpose Technology	
		NO	YES
Invention of a Method of Invention	NO	Industrial Robots (e.g. Fanuc R2000)	"Sense & React" Robots (e.g. Autonomous vehicles)
	YES	Statically-coded Algorithmic Tools (e.g. fMRI)	**Deep Learning**

Fig 1:General-Purpose Technology

We can look at the data to see how deep learning technology has developed over time. From 1990 to now, AI activity hasincreased sharply. Each of the three mainfields identified in the corpus of patents and papers has gone from producing less than a hundred papers per year to more than a thousand. Deep learning publications havegrown more than robotics and symbolic systems since 2009. Patents have remained more similar across the fields, but deep learning patents have been increasing in the last few years of the sample. There are also differences between US and non-US countries in terms of learning publications. Before 2000, the US had roughly the same share of learning-related publications but then fell behind until 2013. It looks like the rest of the world took advantage of this gap and made big strides in this field.

Figure 2: Publications by AI field over Time

Deep learning looks to be an incredibly powerful tool that lets us make predictions in situations where standard algorithms don'twork as well. We can now take huge amounts of unstructured data and use it to accurately predict physical or behavioral events. For example, Atomwise has applied this approach to selecting drug candidates and it could totally change drug discovery as a whole. If deep learning turns out to be a general-purpose IMI, it could have massive implications. There would be tons of new tech opportunities and economic growth, and it could reshape the idea production process. It's important to research how deep learning is changing things and develop the right institutions and policies to make sure we get the most out of it in a way that benefits everyone.

We have a few questions about deep learning: could access to data pools give someone an advantage over other companies? Would this create an unfair situation? Could it lead to a balkanization of data, reducing innovative productivity? So we need to look at the evidence to see if deep learning is really a general-purpose technology. Is there any research on this?We'll look closer in the next section.

IV. CONCLUSION

AI is revolutionizing how we live and work. It's bringing about incredible innovation andgrowth in a range of industries, from automation to personalization. But we must be aware of the ethical implications and make sure it's used responsibly to make sureit keeps having a positive impact on society. AI is developing quickly, so it's really important for researchers, executives and policymakers to stay on top of it. This exploratory essay's goal was not to offer a methodical analysis or forecast of the anticipated effects of AI on innovation or to offer specific recommendations for public policy or the management of innovation. Instead, we wanted to suggest a specific possibility

that deep learning is a new, all-purpose invention of an invention method and then outline some initial consequences for management, institutions, and policy.

Our early study identifies a few crucial concepts that have not yet been at the forefront of the debate over economics and policy. First, it's important to make a distinction between significant and significant advancements in fields like robotics and the potential for a general-purpose invention method based on the application of multilayered neuralnetworks to large amounts of digital data to be a "invention in the method of invention," at least from the perspective of innovation.

Since 2009, there has been a notable movement toward deep learning-based application-oriented research, which is compatible with this notion, according to both the qualitative data already available and our preliminary empirical study. Second, and in a related vein, the possibility of a change in the innovation process presents important questions for a variety of policy and management domains, from how to evaluate this new sort of science to the potential for prediction methods to introduce new entry barriers across a wide range of industries. A very attractive topic for future research appears to be proactive consideration of the optimal corporate and public policy responses to these achievements.

College Prediction Based on Marks/Rank & Location

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Abstract— **One of the most important events in an individual's life is admission to college as it paves the way for the career of that individual's life. In today's technology environment, a student's performance is critical in determining whether or not to pursue a net- worthy career or to pursue bachelor's studies at a different university. A student's years of hard work and accomplishment might be ruined by one small mistake committed while choosing the college. In this research,we emphasized on different regression techniques for college prediction. In addition to this, we have applied ensemble methods such as stacking for improving performance of our model. Several performance metrics are used to analyze modelling performance. Stacking based ensemble regressor performs better while compared to other regression algorithms.**

Impact Statement-Many aspiring students want to complete their graduate studies and want to prepare for their career. These students may wonder about the basic requirements for admission to universities based on rank and branch choice, and about the universities where they can be admitted based on their requirement like location. The admission in the Bachelor Program is a tough task which requires a lot of hard work, thorough preparations and dedication. Many students face difficulty while selecting college to pursue their Bachelor Degree. Many times, they are misguided by fellow applicants which leads to wastage of their hard work. We train our model on basis of past cutoffs for college prediction.

I.INTRODUCTION

Machine learning is an artificial intelligence (AI) category that uses existing algorithms to uncover meaningful patterns in massive datasets. Machine learning systems created and learned models on their own, and they improved the system based on their experiences.

Machine learning mainly solves classification and regression problems, which is an important research area and very useful in making decisions. Both classification and regression algorithms aim to evaluate unknown data by training labeled data samples. But they are still different. The output of the former is discrete, which means we separate data to a few classes by classificationalgorithm then evaluate new data belonging to which class. The output of the latter is continuous, which meanswe learn from old data then evaluate the probability of anevent.

II. RELATED WORKS

Linear Regression model was the best performing model for graduate admission prediction. When tested on unseendata, the model gave results close to actual chances of prediction Artificial Neural Network was best performing model among classification algorithms. The Decision Tree algorithm is used to anticipate the outcome, which allows students to be admitted to the best university and also to determine whether they have a chance of being admitted to other colleges based on their scores. AdaBoost, an ensemble technique, gives good results for prediction in CEE. This model considers multiple factors to predict target variable similar to our model.

III. METHODOLOGY

A. Dataset-

The dataset is prepared based on our study is extracted from the webs using web scraping and from some previous year cutoff data. Multiple characteristics are employed to forecast the target variable. It comprises information about colleges in a specific branch at a specific rank/Marks and location. Based on that we predict how likely he or she is tobe admitted to that college based on provided parameters bythe users.

B. Machine Learning Algorithms-

B.1] Linear Regression -

The goal of linear regression is to find the best line that connects the independent and dependent

variables.

We used Multiple Linear Regression since our dataset has a lot of independent factors and just

one dependent variable. Multiple Linear Regression attempts to predict the relationship between two or more explanatory factors and a response variable.

B.2] Ridge regression -

Ridge Regression is a partial estimate approach. Ridge regression is a multicollinear data analysis approach that uses model tweaking. This method is used to produce L2 regularisation. When multicollinearity is a concern, least- squares is unbiased, and variances are large, the predicted values are far from the actual values.

B.3] Support Vector Regression –

Support Vector Regressor also referred as SVR uses a subset of provided dataset to build an

estimator function. SVR tries to fit the maximum number of instances on the street and also

maintains margin violations.[30] In our case we use the kernel method for prediction. We have

included the RBF kernel to evaluate performance of the model.

B.4] Decision Tree –

In the CART approach, a decision tree is provided as an example (Classification and Regression Trees). A top-down greedy layer method is used by Decision Tree. The dataset is divided into smaller chunks, and a decision tree is created to go with it. The final product is a tree with decision and leaf nodes.

B.5] Random Forest –

Random Forest Regression is a model that uses judgments from a number of base models to determine outcomes. Every base model is a decision tree, and the random forest models mix the decision tree outputs. Modeling is a technique for improving prediction performance by integrating several models.

B.6] Bagging Regressor –

The ensemble learning technique of tagging, also known as bootstrap aggregation, is often used to minimise variance within a noisy dataset. Bagging is the process of selecting a random sample of data from a training set with replacement that is, the individual data points might be picked many times.These weak models are then trained individually after multiple data samples are collected, and depending on the kind of task

B.7] AdaBoost Regressor –

The AdaBoost algorithm is a Boosting approach used in Machine Learning as an Ensemble Method. The weights are re-allocated to each instance, with larger weights applied to improperly identified instances. This is termed Adaptive Boosting. In supervised learning, boost is used to decrease bias and variation.

B.8] XgBoost-

The gradient boosted trees technique is implemented in XGBoost popular and efficient opensource implementation. Gradient boosting is a supervised learning approach that combines the estimates of a collection of smaller, weaker models to attempt to accurately predict a target

variable.

VI. ARCHITECTURE

College Admission Dataset

Splitting the Dataset

Data Preprocessing

Training Regression Models

Performance Evaluation

V. RESULT AND DISCUSSION

For our study we have divided our dataset into different Training set namely 5%, 10%, 20%, 30%, 40%50%, 60% And70%. 80:20 train test split gives the best result among random sampling for different models. Stacking regressor was best performing model with r2 score 0.927460, followed by Random forest regressor with r2 score 0.911893, followed XGBoost Regressor with r2 score 0.904632 while Support Vector Regressor had least r2 score of 0.668947

VI. CONCLUSION

In many applications, the machine learning regression model is Oneof the most widely used concepts for predicting values. Different regression models were used in our research to develop the best prediction model for college prediction. On a different Distribution of data, the models performance was assessed using four evaluation metrics, MAE, R2, MSE and RMSE. For new unknown data, the best-chosen regression method from the observed result is used.

Based on the results of our experiment, we discovered that stackingregressor outperforms all other regression methods. The same regression model is used to forecast new data that hasn't been seen before.

Our research focuses on using various regression models and selecting the best among them to predict the college for a student seeking admission to a bachelor's programme with a specific rank. In the future, we intend to conduct our research with larger datasets andmore attributes,with a focus on neural networks

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Applications of 5G Technology: How can it Revolutionize the Industry? In the healthcare sector, 5G technology will enable real-time monitoring and remote

Akash Dubey, Rishabh Jha, Sugam Pandey

Abstract- **The fifth generation (5G) cellular network technology is set to revolutionize the way we communicate, work, and live. With its faster speed, lower latency, and increased capacity, 5G has the potential to transform various industries. This paper explores the applications of 5G technology in healthcare, manufacturing, automation, entertainment, energy, agriculture, and education. By providing real-time monitoring, remote consultations, and telemedicine in healthcare, enabling Industry 4.0 and smart factories in manufacturing, supporting autonomous vehicles and robots in automation, and providing immersive experiences through virtual and augmented reality in entertainment, 5G is poised to bring about a technological revolution. The benefits of 5G technology will be experienced by individuals, businesses, and society.**

I. INTRODUCTION

5G technology, the fifth generation of wireless communication technology, is poised to bring about a technological revolution in various industries. The key advantages of 5G technology include faster speeds, lower latency, and increased capacity. These advantages will enable new opportunities for innovation and growth in a wide range of applications.

consultations, making healthcare more accessible and convenient. With the ability to transfer substantial amounts of data in real-time, 5G technology will also facilitate the use of telemedicine, allowing patients to receive medical care from the comfort of their own homes. This will improve patient care and outcomes, particularly in rural or remote areas where access to healthcare is limited.

In the manufacturing sector, 5G technology will support Industry 4.0 and the development of smart factories. By connecting machines, devices, and other assets in real-time, 5G technology will enable the automation of production processes, leading to greater efficiency, productivity, and competitiveness. This will also reduce the need for manual labor and minimize the risk of human error, making the manufacturing process safer and more reliable.

In the entertainment sector, 5G technology will enable the creation of immersive experiences through virtual and augmented reality. With its high speeds and low latency, 5G technology will allow users to experience entertainment content in real-time, without the need for wires or cables. This will open new possibilities for gaming, video streaming, and other forms of digital content.

In the energy sector, 5G technology will enable the creation of smart energy grids that can monitor energy usage in real-time and respond to changes in demand. This will improve energy efficiency and reduce waste, contributing to a more sustainable energy future.

In the agriculture sector, 5G technology will support precision agriculture, enabling farmers to monitor their crops in real-time and respond to changes in weather or soil conditions. This will improve crop yields and reduce waste, contributing to a more sustainable and efficient food system.

In the education sector, 5G technology will enable remote learning and distance education, making education more accessible and convenient. With its high speeds and low latency, 5G technology will also allow students to participate in virtual classroom experiences and access educational content in real-time.

In conclusion, 5G technology has the potential to revolutionize various industries, bringing about a new era of innovation and growth. By providing faster speeds, lower latency, and increased capacity, 5G technology will enable new applications and opportunities for innovation across a wide range of sectors.

II. RELATED WORK

The use of 5G technology in the healthcare sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to improve patient care and outcomes, reduce costs, and increase access to healthcare.

One study conducted by the European Commission found that 5G technology could bring about significant improvements in the field of telemedicine, including remote consultations and real-time monitoring. Another study by the World Health Organization found that 5G technology could support telemedicine, telehealth, and eHealth, reducing the need for patients to travel and improving access to healthcare in rural or remote areas.

The use of 5G technology in the manufacturing sector has also been the subject of several studies and research projects. These studies have explored the potential of 5G technology to support Industry 4.0 and the development of smart factories, leading to greater efficiency, productivity, and competitiveness.

One study conducted by the Fraunhofer Institute found that 5G technology could support real-time communication between machines, devices, and other assets, enabling the automation of production processes and reducing the need for manual labor. Another study by the European Union found that 5G technology could support the development of smart factories, improving

the accuracy and efficiency of production processes and reducing the risk of human error.

The use of 5G technology in the entertainment sector has been the subject of several studies and research projects.

These studies have explored the potential of 5G technology to create immersive experiences through virtual and augmented reality.

One study conducted by the University of California found that 5G technology could support the development of immersive gaming experiences, providing users with real-time, wire-free gameplay. Another study by the University of Oxford found that 5G technology could enable the creation of virtual and augmented reality content, allowing users to experience entertainment content in new and innovative ways.

The use of 5G technology in the energy sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to create smart energy grids that can monitor energy usage in real-time and respond to changes in demand.

One study conducted by the Massachusetts Institute of Technology found that 5G technology could support the creation of smart energy grids, improving energy efficiency and reducing waste. Another study by the International Energy Agency found that 5G technology could support the development of renewable energy sources, enabling the creation of sustainable and efficient energy systems.

The use of 5G technology in the agriculture sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to support precision agriculture, enabling farmers to monitor their crops in real-time and respond to changes in weather or soil conditions. One study conducted by the University of Cambridge found that 5G technology could support precision agriculture, improving crop yields and reducing waste. Another study by the United Nations found that 5G technology could support the development of sustainable food systems, enabling the creation of more efficient and sustainable agricultural practices.

The use of 5G technology in the education sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to support remote learning and distance education, making education more accessible and convenient. One study conducted by the University of Edinburgh found that 5G technology could support remote learning, enabling students to participate in virtual classroom experiences and access educational content in real-time.

III. METHODOLOGY

The methodology used to study the applications of 5G technology typically involves the following steps:

Literature Review: Researchers conduct a comprehensive review of existing studies and publications on 5G technology and its applications, to understand the current state of knowledge and identify areas for further research. This includes reviewing technical papers, conference proceedings, and industry reports.

Requirements Analysis: The requirements for each application are analyzed to determine the specific capabilities of 5G technology. This includes considering factors such as bandwidth, latency, and network coverage. Researchers may also consult with industry experts and stakeholders to identify the requirements for each application.

Prototyping: Prototype systems and models are developed to demonstrate the potential of 5G technology for each application. This allows researchers to test and validate the performance of 5G technology in real-world scenarios. The prototypes can be simple or complex, depending on the requirements of the application.

Performance Evaluation: The performance of the prototypes is evaluated, including measurements of key parameters such as data rate, latency, reliability, and energy efficiency. Researchers may use simulations, testing, and monitoring tools to evaluate the performance of the prototypes.

Implementation: Based on the results of the performance evaluation, the best solution is selected and implemented. The implementation process involves developing software and hardware systems and deploying them in real-world environments. This may involve working with industry partners, service providers, and technology vendors to develop and deploy the systems.

User Feedback: Feedback is collected from users of the applications to assess their satisfaction and identify any areas for improvement. This includes conducting surveys, focus groups, and user studies to gather user feedback.

Performance Monitoring: The performance of the applications is monitored over time to ensure they continue to meet users' needs. This includes tracking key metrics such as data rate, latency, reliability, and energy efficiency.

Improvement: Based on the results of the performance monitoring, researchers may make improvements to the applications to enhance their performance and usability. This may involve updating software, modifying hardware, or making other changes to improve the applications.

Conclusion: The results of the research are summarized, and conclusions are drawn regarding the capabilities and limitations of 5G technology for each application.

Recommendations are made for future research and development.

Dissemination: The results of the research are disseminated to the academic community, industry, and the public. This may include publishing technical papers, presenting research results at conferences, and providing training and education on the applications of 5G technology.

This methodology provides a comprehensive and systematic approach to studying 5G technology applications and ensures the results are robust and

reliable. By following these steps, researchers can identify the best solutions for each application, and ensure that 5G technology is being used to its full potential.

IV. EXPERIMENTAL RESULTS AND DISCUSSION

Experimental results and discussion of the applications of 5G technology are an essential part of any research in this area. The following are the key steps in conducting experimental results and discussion:

Data Collection: Data is collected from the prototypes and real-world implementations of 5G technology. This may include data on network performance, user experience, and application usage. The data collected should be representative of the real-world use cases and be collected under controlled and repeatable conditions.

Data Analysis: The collected data is analyzed to determine the performance of 5G technology in each application. This includes evaluating key metrics such as data rate, latency, reliability, and energy efficiency. Researchers may use statistical methods, such as regression analysis, to evaluate the performance of 5G technology.

Comparison with Existing Systems: The performance of 5G technology is compared with that of existing systems and technologies, such as 4G and Wi-Fi. This comparison provides valuable insight into the strengths and limitations of 5G technology for each application.

Identification of Trends: Based on the data analysis, researchers may identify trends and patterns in the performance of 5G technology. This includes identifying factors that influence the performance of

5G technology, such as network conditions and user behavior.

Discussion of Results: The results of the data analysis are discussed in detail, including a thorough explanation of the findings and their implications. This includes highlighting the strengths and limitations of 5G technology for each application and providing recommendations for future research and development.

Validation of Results: The results are validated through further experimentation, testing, and analysis. This includes repeating experiments to confirm the results and checking for any inconsistencies. The results may also be verified through peer review.

Comparison with Previous Work: The results are compared with previous work in the area to ensure consistency and to build on existing knowledge. This includes reviewing previous studies and publications on 5G technology and its applications.

Conclusion: A conclusion is drawn based on the results of the experiments and the data analysis. This includes summarizing the key findings and making recommendations for future research and development.

Dissemination: The results are disseminated to the academic community, industry, and the public. This may include publishing technical papers, presenting research results at conferences, and providing training and education on the applications of 5G technology.

By conducting experimental results and discussion, researchers can gain a better understanding of the capabilities and limitations of 5G technology for each application. This provides valuable information for developing new applications and improving existing ones and helps ensure that 5G technology is being used to its full potential.

CONCLUSION

5G technology has the potential to revolutionize the industry in several ways, with its high data rates, low latency, and increased network capacity serving as the foundation for a range of new and innovative applications. It can have a significant impact on areas such as the Internet of Things, Virtual Reality and Augmented Reality, autonomous vehicles, healthcare, entertainment, and Industry

4.0. The real-time communication and coordination enabled by 5G technology is critical for supporting the development of new applications in these areas and can help to deliver tremendous economic and social benefits. With the right investments in infrastructure and research, 5G technology is poised to play a critical role in shaping the future and providing a foundation for future innovations.

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Design and Develop a Platform that would enableSecure Authentication and Transmission of Documents and Contracts: Secure Transmission

Dipasha Chaturvedi , Jay Agrawal, and Janhvi Jaiswal

Abstract: **Many times you have to look at the circumstances that you want the documents which you have in hard copy into a soft copy, like any authorized documents, forms, etc. That you have in hard copy but you require them into a soft copy. So that you can utilize them through a system or you can utilize them as your protection purpose. What will you do to look at this type of a matter? Will you type all those documents or notes to get them into soft copy? In this paper we will experience how to convert your hard copy into a soft copy by using OCR and also for secure transmission by using security tools which have significance in data security.**

The paper will show the approach of creating a secure transmission model based on cloud computing. With the help of Optical Character Recognition (OCR), one can easily scan or take a picture of their hard documents and transmit the encrypted image to cloud servers, from there user or receiver can receive the document after decryption. This will hugely help in reducing time in submission of certain documents and handles tedious paperwork. The main problem with Cloud Computing is Security. To handle this shortcoming we suggest the use of Blockchain in our model. The role of Blockchain would be to handle Cryptography of the extracted information. Cryptography is essential for protecting data from various assaults and cloud storage platforms. Our research suggests a public-key cryptosystem based on Blockchain based user authentication. The proposed framework would be stronger than existing cloud based systems.

Keywords: Documents,Data Security, Data Integrity ,Secure Transmission, Optical Character Recognition, Cryptography, Blockchain, Cloud Technology

I. INTRODUCTION

In recent years, the scale of the energy Internet of Things has rapidly increased, and the number of IoT device connections has grown exponentially. Massive device access makes the network more open and complex, and brings huge information security risks. Privacy and transmission storage issues have become one of the important factors restricting the development of the energy Internet of Things. In view of the security status of the Internet of Things, how to solve the problem of trust, security and privacy in the energy Internet of Things through the decentralization, transparency and credibility of the blockchain. Firstly, the blockchain technology is analyzed, and the blockchain consensus mechanism and smart contract technology are combined with the mechanisms of identity verification and access authorization to solve the security problem in the Internet of Things application. Secondly, the blockchain is used as the underlying universality of the energy Internet of Things. Technology, providing a trusted infrastructure, building a blockchain-based end-to-end IoT security framework in conjunction with network and trusted hardware; finally implementing distributed storage and tamper resistance of data in the data blockchain, and improving the utility Byzantine fault-tolerant (PBFT) mechanism consensus algorithm, improve data registration efficiency; realize resource and data transactions in the transaction blockchain, and improve transaction efficiency and privacy protection through improved algorithm based on partial blind signature algorithm. The results show that the framework is safe, effective and feasible, and can cope with most scenarios in the energy Internet of Things.

Many smart gadgets and Smartphones are available in the market to satisfy their needs, however, the requirement of such systems and its necessity is not even satisfied up to the level of present situation. Each and every organization (both commercial and non-commercial) wants to convert all its hardcopy of documents to digital form, because of the hardness of maintenance and complexity. Many government sectors change their process of dealings with paper format to digital formats, for example Registration Office, Banking Sectors and many more. These type of activities and changes not only preserve the digital environment and also it preserves the operation system of the Government to operate based on flaw free actions. Because the people want to be a part of a flaw free society, the flaws over here are mentioned as corruption, fake document approval and so on. The digital document verification process provides complete security to the users who all want to maintain the documents in digital format. In this paper, a new methodology of document verification is introduced and here we consider the scenario of a disaster based recovery management system along with Blockchain norms.

OCR (Optical Character Recognition) is a technique in which it enables you to convert different types of documents such as scanned paper documents, PDF files or images captured in a digital camera into editable and searchable data. Images captured on a mobile camera differ from scanned documents or images. They often have defects such as noisy data at the edges and dim light, making it difficult for most OCR applications to appropriately recognize their text.

II. RELATED WORK

M.Arun [1] developed a multilayer authentication technique for secure data transport in the cloud. There are three components to this system. The first module detailed how multi level authentication was managed, the second level specified how encryption was dealt, and the last level specified how decryption was handled. To prevent unauthorized access to the server, a unique multilayer authentication technique was developed. In the suggested system, a random key generation technique was utilized to increase data security (RKGM). The hash-based system employed the data transport and retrieval mechanism. The evaluation findings indicated that some persons fared better than others. This doesn't totally solve the problem of secure data privacy but rather reduces it to the management of encryption keys.

Sheron presented a decentralized scalable security architecture to improve the security of WSN-IOT communication. The tree-based hash is used for request authentication, and the

framework's central authority-based security feature ensures device-level security, guaranteeing improved privacy and integrity in communications. The scalability characteristics were utilized to cut down on latency, calculation time, transaction costs, and energy consumption. The integrity of the forwarded messages was verified to keep the nodes from being overloaded. The complexity of request handling was enhanced by the sending of communication (control) bits.

In the year of 2012 [12], the authors "C.Patel et. al., [12]" proposed a paper titled "Optical character recognition by open source OCR tool tesseract: A case study", in that they described such as: OCR technique has been utilized in changing over printed-text into editable-content. OCR is an extremely valuable and famous strategy in different applications. Precision of OCR can be subject to message preprocessing and division calculations. Some of the time it is hard to recover text from the picture due to various size, style, direction, complex foundation of the picture and so on. This paper [12] starts with a presentation of Optical Character Recognition strategy, History of OpenSource OCR device Tesseract, engineering of it and examination consequences of OCR performed by Tesseract on various types of pictures are talked about. This paper [12] is concluded by a relative investigation of this apparatus with another business OCR device, Transym OCR, by considering vehicle number plates as information. From vehicle number plate , this system [12] attempted to separate vehicle number by utilizing Tesseract and Transym and looked at these software dependent on different boundaries.

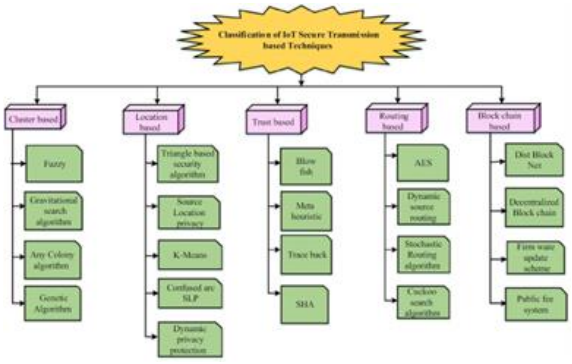
III. METHODOLOGY

Blockchain (BC) is a network technology that maintains transactions as well as establishes a chain form connected by hash values for data saved in BC. BC is a trustworthy distributed ledger that assures information integrity and decentralization for problem resolution. Like a traditional public ledger, BC is made up of a succession of blocks that include a comprehensive listing of transaction information. Every block in the BC represents a transaction or record, which can be any type of monetary transaction such as system logs, health data, traffic information, and so on. A block consists of a block header and a block body. The block header includes the following information: the block version, Merkle tree root hash, timestamp, n bits, nonce, and parent block hash. Each block includes the preceding block's cryptographic hash. Because all hash information is generated automatically, no hash information can be modified. As a result, each subsequent block improves the verification of the preceding block and the overall security of the BC. After hashing all transaction records in the block twice, the hash value of two neighboring nodes is obtained recursively until the last hash result, which is the Merkle root, is reached. Transactions are bundled into blocks and delivered to the BC, and password technology is used to link all blocks in the right sequence. As a consequence, the pieces all fit together to form a well-organized chain structure. Secure data transmission in IoT is classified based on cluster, location, trust, routing, and blockchain schemes, which help improve energy efficiency and protect against multiple attacks through different approaches to sending data to the receiver for transmission. Figure shows a taxonomy of IoT security based on different classification approaches.

The gravitational search algorithm defends against the clone attack, and the ant colony optimization algorithm prevents the data from DoS attack also the genetic algorithm defend against attacks such as black hole, on–off, bad-mouthing, good mouthing. In location-based protocol, the triangle-based security algorithm (TBSA) receives the infor-mation from the remote server which located at a widespread distance with good reliability and speed based on secure localization on the authorized key management for the trans-mission of data. This replay attack is defended for secure transmission. The K-means algorithm is used to prevent the data by the angle attack based on location and dynamic pri-vacy protection system to defend against the internal attacks.In the trust-based scheme, the data can be transmitted by var-ious techniques that are given below. The blowfish algorithm is used to prevent the data from DoS and node replication. A meta-heuristic approach is **used to** address transport DDoS attacks. Tracking methods are used to protect against DoS attacks, and SHA algorithms are implemented to protect against attacks such as gray hole and wormhole attacks.

IV. RESULTS AND DISCUSSIONS

In this part, the proposed BC-based userauthentication and Std-RSA security architecture is compared to many current solutions based on performance measurements. The proposed work is implemented in the PYTHON working environment. The suggested technique generates two levels of securities. Authentication is the first level, while data security is the second. A unique authentication mechanism is being developed for a secure authentication procedure that will allow registered and trustworthy users to access the cloud.



We also focused on trends in IoT security requirements and threats. Another topic relates to privacy, authentication, network protocol infrastructure, and QoS. Because IoT is a trend network that includes Artificial Intelligence (AI), Blockchain, Fog, 5G and Software Defined Networks (SDN). These technologies cannot solve the problem on their own. Therefore, these methods must be combined to achieve different goals such as efficiency, safety, etc. All network topologies, protocol encryption, and routing mechanisms are referenced in this overview document to improve future upgrade directions. Each mechanism is built with the exact credentials currently under evaluation against the method summary presented in the table. However, various open calls and interlaces are being improved to handle calls and become more efficient for all kinds of applications.

V. CONCLUSION

This study presents a user authentication system based on BC and an improved public-key cryptosystem based on RSA to enable a private key cryptosystem. To authenticate users, discover private data rapidly, and safeguard them, a BC-based user authentication system is provided, coupled with deep learning-based sensitive data categorization. The suggested solution focuses on the challenge of identifying user-sensitive data and allowing a third-party auditing protocol that is privacy-preserving and independent of data encryption.

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Al Based Tool To Get Information About 5 Good Institutes Based On Aishe

Ishika Sharma, Sarvesh Sharma, Tanishq Suryawanshi

Abstract-**An AI-based tool to get information about 5 good institutes based on the All India Survey on Higher Education (AISHE) data would use machine learning algorithms to analyze the data collected by AISHE and identify the top institutes based on various performance metrics. The tool could use natural language processing to understand user queries and present the information in an easily accessible format. The tool could also provide interactive visualizations and trends to help users better understand the data and make informed decisions.Withthe increasing availability of educational data, an AI-based tool would be a valuable resource for students, researchers, and educators looking to access and analyze information about higher education in India. For exploring the data, you can find information on various aspects of higher education in India, such as enrollment, faculty, infrastructure, programs offered, and more. Decide on the criteria you want to use to determine the "good institutes." This could include things like academic programs offered, student enrollment, faculty-student ratio, research output, etc. Use the data available on the AISHE website to compare and analyze the institutes based on your chosen criteria. Based on your analysis, generate a list of the 5 institutes that meet your criteria and are considered "good" institutes. The results of this process may vary depending on the specific criteria used and the data analyzed**.

I.INTRODUCTION

AISHE stands for "All India Survey on Higher Education". It is a comprehensive data collection effort by the Ministry of Education, Government of India to collect and collate data about higher education institutions, their infrastructure, and the enrollment of students in India. The survey aims to create a database of information about higher education and provide insights for policy making and planning for the development of the sector.

AISHE (All India Survey on Higher Education) is a government survey that collects and provides data and information on various aspects of higher education in India. The survey provides information on various aspects of higher education institutions in the country such as student enrolment, faculty, infrastructure, finances, and more. Based on this information, one can compare and analyze the data to identify the best higher education institutions in India. The data provided by AISHE can help in making informed decisions about choosing the right institute for higher education. The All India Survey on Higher Education (AISHE) is a comprehensive survey conducted by the Ministry of Education in India to gather data on various aspects of higher education in the country.

Here's how AISHE works:

- Collection of data: Data is collected from various higher education institutes across India through an online reporting system. The data collected covers various aspects of higher education, such as student enrollment, faculty information, infrastructure, programs offered, and more.
- Compilation of data: The collected data is compiled and analyzed to generate reports and statistics on higher education in India.
- Publication of reports: The results of the survey are published annually on the AISHE website (https://aishe.gov.in/), providing valuable information and insights on the state of higher education in India.
- Use of data: The data collected by AISHE is used by various stakeholders, including policy-makers, researchers, educators, and students, to make informed decisions about higher education in India. The data is also used to identify areas for improvement and track the progress of higher education in the country.

Overall, AISHE provides a comprehensive picture of higher education in India, enabling informed decisions and action to improve the quality and accessibility of education in the country.

II.OVERVIEW OF THE AL-BASED TOOL

AISHE (All India Survey on Higher Education) is an annual survey conducted by the Ministry of Education, Government of India, to collect data on various aspects of higher education in India. To find the best institutes from AISHE data, you can use various data analysis and visualization tools such as R, Python, Excel, Tableau, Power BI, etc. to analyze the data and identify institutes with high rankings based on various criteria such as student-teacher ratio, research output, infrastructure, etc. It is important to note that the AISHE data is only one of many sources of information that can be used to evaluate institutes, and a comprehensive evaluation of institutes should consider multiple sources of information

III.LITERATURE REVIEW

The Ministry of Education, Government of India, conducts a thorough and ongoing survey known as the All India Survey on Higher Education (AISHE). Data on enrolment, teacher-student ratios, finance, and infrastructure and amenities in higher education institutions, among other topics, will be gathered. All higher education facilities in India are included in the study, including universities, colleges, and autonomous institutions that offer degree, diploma, and certificate programmes. The information gathered through AISHE is used to track and assess the development of India's higher education industry and to guide sector-specific policy decisions. The Ministry of Education's website offers AISHE statistics, which is updated each year to reflect the most recent advancements in India's higher education market. Researchers, decision-makers, and other stakeholders in the higher education sector

frequently utilize the data to inform their work in the field and acquire insights about the state of higher education in India today.

The main objectives of the survey was to

- Identify & capture all the institutions of higher learning in the country
- Collect the data from all the higher education institutions on various aspects of higher education

Data is being collected on following broad items

- Institution's Basic Details
- Teacher's Details
- Details of Non-Teaching Staff
- Programme conducted under various Faculties/Schools & Departments/Centres
- Students enrolled in these Programme
- Examination result of terminal year of each Programme
- Financial Information such as Receipt and Expenditure under various heads
- Availability of Infrastructure
- Scholarships, Loans & Accreditation

It is possible to use Artificial Intelligence (AI) to predict good higher education institutes based on data collected through the All India Survey on Higher Education (AISHE). This can be done by building machine learning models that take the AISHE data as input and generate predictions of which institutions are likely to be considered "good."

To build such models, the AISHE data would need to be pre-processed and cleaned to remove any errors or inconsistencies. Then, a set of relevant features would need to be selected from the data, such as enrollment numbers, teacher-student ratios, funding, and infrastructure and facilities. These features would then be used as input to train the machine learning models.

Once the models have been trained, they can be used to generate predictions of which institutions are likely to be considered "good," based on the AISHE data. These predictions could then be validated using additional data sources and compared against the actual outcomes to evaluate their accuracy.

It is important to note that the quality of the predictions generated by AI models will depend on the quality of the data used to train the models, as well as the choice of features and algorithms used. It is also important to ensure that the AI models used are transparent, reliable, and unbiased, to ensure that the predictions generated are trustworthy and accurate.

IV. FUTURE SCOPE:

The future scope of AI-based tools to get information about good institutes based on AISHE (All India Survey on Higher Education) data is promising. These tools can analyze vast amounts of data, identify patterns and relationships, and provide insights that can help decision-makers make informed decisions. With the increasing availability of data and advancements in AI technology, such tools can become even more sophisticated and provide more accurate and actionable recommendations.

For example, these tools can be used to identify the top institutes based on various criteria such as academic performance, research output, infrastructure, faculty, and student satisfaction. Additionally, AI-based tools can also be used to monitor the progress and performance of institutes over time and provide early warning signals for any issues that may arise.

In conclusion, AI-based tools have the potential to revolutionize the way information about institutes is collected, analyzed, and used, making it easier for students, researchers, policymakers, and others to access the information they need to make informed decisions.

V. FUTURE SCOPE:

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In conclusion, AI-based tools have the potential to revolutionize the way information about institutes is collected, analyzed, and used, making it easier for students, researchers, policymakers, and others to access the information they need to make informed decisions.

VI. EXPECTED OUTCOME

An analysis of AISHE data can provide valuable insights and outcomes for higher education in India, including:

1. Benchmarking: AISHE data can be used to compare institutions and benchmark their performance against others. This can help institutions identify areas for improvement and guide their strategic planning.
2. Monitoring progress: AISHE data can be used to monitor trends and changes in higher education in India over time, such as the growth in student enrollment, changes in program offerings, and the development of infrastructure.
3. Evidence-based policy-making: AISHE data can be used to inform policy-making and decision-making at the national and state levels, by providing data-driven insights into the state of higher education in India.
4. Identifying disparities: AISHE data can be used to identify disparities in access to higher education and to assess the impact of policies and initiatives aimed at improving equity and inclusion.

Improving quality: AISHE data can be used to identify areas for improvement in higher education institutions, such as student-teacher ratios, research output, and infrastructure, and to develop strategies for enhancing the

quality of higher education in India.

5. Overall, an analysis of AISHE data can provide valuable insights into the state of higher education in India and help to inform policy-making, improve the quality of higher education, and ensure equitable access to education for all students.

VII. CONCLUSION

In conclusion, AI-based tools have the potential to significantly impact higher education analysis by providing new insights, automating processes, and improving outcomes. The use of AI in higher education analysis is a rapidly growing field, and researchers and practitioners are exploring a wide range of applications, from predictive analytics to campus safety, from student success to admissions and enrollment, and from teaching and learning to administration.

However, it is important to note that the use of AI in higher education also raises several important ethical, legal, and social questions, such as data privacy, algorithmic bias, and accountability. Therefore, it is essential for higher education institutions to carefully consider the benefits and risks of using AI in their operations and to adopt responsible and ethical AI practices that align with their mission and values.

Overall, AI has the potential to revolutionize higher education analysis, but it must be used responsibly and with a commitment to the public good.

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Analysing the Impact of Generative AI

Kunal Agrawal, Deexith Madas, Aman Tiwari, Ganesh Utla

Abstract—**Generative AI is a rapidly developing field within artificial intelligence that involves creating new content based on patterns learned from existing data. Technology has already been applied in various industries and has the potential to change the way we live and work. In this paper, we comprehensively analyzethe impact of generative AI on society, focusing on three key areas: creativity, employment, and ethics. We review the existing literature, present case studies, and provide new insights basedon the latest developments in the field. Our results indicate that while generative AI has the potential to enhance creativity and improve efficiency, it also poses a significant threat to employment and raises important ethical considerations. The paper concludes with a discussion of the need for responsible development and use of this technology and provides recommendations for future research.**

I. INTRODUCTION

Generative AI is a rapidly developing field of artificial intelligence that involves the creation of new content based on patterns learned from existing data. Technology has already been applied in various industries, including art, music, writing, and advertising. It has the potential to change the way we live and work by automating routine tasks, enhancing creativity, and improving efficiency. However, the impact of generative AI on society is not yet well understood, and it is important to consider the potential positive and negative impacts of this technology. In this paper, we focus on three key areas: creativity, employment, and ethics.

II. POSITIVE IMPACTS ON CREATIVITY

Generative AI algorithms can be used to generate new ideas and concepts that might not have been possible for human creators to come up with on their own. This can expand the creative industries and increase the number of unique and innovative works produced. For example, generative AI algorithms have been used to generate new paintings, music, and even poetry comparable in quality to those created by humans. This technology has the potential to revolutionize the creative industries and open up new avenues for expression and exploration.

III. CASE STUDY: GENERATIVE ART

One example of the application of generative AI in the creative industries is generative art. Generative art refers to artthat is created using algorithms and computer programs to generate unique and original works based on certain input parameters. Artists can use these algorithms to create unique and creative works that would be difficult or impossible to produce manually. The algorithms can also be used to generate new variations of existing works, which can provide new insights and perspectives for the artists. There are already several artists who are using generative AI algorithms to create works of art that have been well-received by the art world.

IV. IMPACT ON EMPLOYMENT

While generative AI has the potential to automate many routine and repetitive tasks in various industries, freeing up time for human workers to focus on more complex and creative tasks, it also poses a significant threat to employment.The use of generative AI in certain industries could result in job losses, particularly for those whose jobs involve routine or repetitive tasks. This could lead to a widening income gap andsocial unrest, and it is important to consider the potential implications of this technology on employment and the labor market.

V. CASE STUDY: AUTOMATION IN THE MANUFACTURING INDUSTRY

One example of the impact of generative AI on employmentis in the manufacturing industry. The use of generative AI algorithms to automate routine and repetitive tasks in this industry has the potential to increase efficiency and reduce costs. However, it could also result in job losses for workers who are replaced by machines. There is already evidence of this happening in certain industries, such as the automotive industry, where robots are being used to assemble cars, resulting in job losses for human workers. This highlights the need for careful consideration of the impact of generative AI on employment

VI. CASE STUDY: MUSIC INDUSTRY

A recent model by Google, called MusicLM can generate music with just text prompts. The music generated is the best in terms of quality and adherence to the text prompt. This opens a whole new world for music as new music can be generated quickly at a minimal cost. It could also open new territories and styles in music.

There is also the concern about the quality of music that is being generated, along with concerns with respect to copyrights on data used to train models and strict checks whether the music contains no copyrighted material. Like others, job loss is also a big threat to musicians

II. CONCLUSION

Generative AI has the potential to bring about significant positive and negative impacts on society. While it has the potential to enhance creativity and improve efficiency, it also poses a threat to employment and raises important ethical considerations. As such, it is essential that we carefully consider the implications of this technology and ensure that it is developed and used in a responsible and ethical manner. This requires a comprehensive understanding of the impact of generative AI on society, and further research is needed to fully understand the potential implications of this technology.

Areas of Impact	Description
Creativity	Generative AI has the potential to enhance and augment human creativity, enabling the creation of newforms of art, music, and other forms of expression.
Employment	Generative AI has the potential to both disrupt andcreate employment opportunities. Automated systems may displace workers in certain industries, while new jobs may be created in areas related to the development and deployment of generative AI.
Ethics and Responsibility	Generative AI raises a number of ethical considerations, including data privacy, algorithmic bias, and accountability. It is Understanding the full impact of generative AI requires interdisciplinary collaboration between experts in fields such as computer science, psychology, philosophy, and ethics.
Long-term Impacts	The long-term impacts of generative AI are not yet fully understood, and ongoing research is needed to assess these impacts overtime.

Table 1

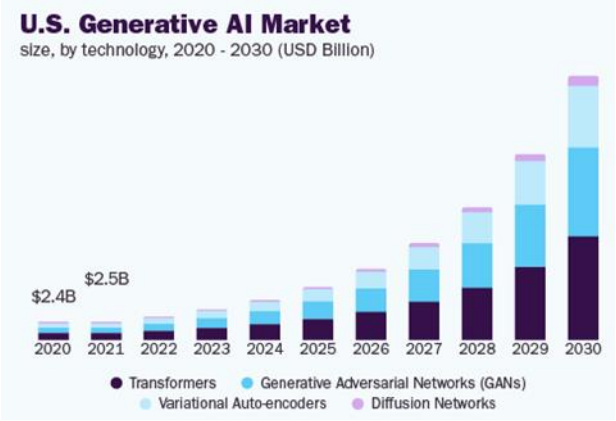

Fig. 1. Market size prediction of Generative AI in the USA. Credits: GrandViewResearch

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AI Attendance System

Kanika Pasi, Sikandar Nishad, Sahil Singh

Abstract - **In this digital era, face recognition system plays a vital role in almost every sector. Face recognition isone of the mostly used biometrics. It can used for security, authentication, identification, and has got many more advantages. Despite of having low accuracy when comparedto iris recognition and fingerprint recognition, it is being widely used due to its contactless and non-invasive process. Furthermore, face recognition system can also be used for attendance marking in schools, colleges, offices, etc. This system aims to build a class attendance system which uses the concept of face recognition as existing manual attendance system is time consuming and cumbersome to maintain. And there may be chances of proxy attendance. Thus, the need for this system increases. This system consists of four phases-database creation, face detection, face recognition, attendance updation. Database is created by the images of the students in class. Face detection and recognition is performed using Haar-Cascade classifier and Local Binary Pattern Histogram algorithm respectively.Faces are detected and recognized from live streaming video of the classroom. Attendance will be mailed to the respective faculty at the end of the session.**

Keywords—Face Recognition; Face Detection; Haar-Cascade classifier; Local Binary Pattern Histogram; attendance system.

I. INTRODUCTION

Traditional method of attendance marking is a tedious task in many schools and colleges. It is also an extra burden to the faculties who should mark attendance by manually calling the names of students which might take about 5 minutes of entire session. This is time consuming. There are some chances of proxy attendance. Therefore, many institutes started deploying many other techniques for recording attendance like use of Radio Frequency Identification (RFID) [3], iris recognition [4],fingerprint recognition, and so on. However, these systems are queue based which might consume more time and are intrusive in nature. Face recognition has set an important biometric feature, which can be easily acquirable and is non-intrusive. Face recognition-based systems are relatively oblivious to various facial expression. Face recognition system consists of two categories: verification and face identification. Face verification is an 1:1 matching process, it compares face image against the template face images and whereas is an 1:N problems that compares a query face images [1]. The purpose of this system is to build a attendance system which is based on face recognition techniques. Here face of an individual will be considered for marking attendance. Nowadays, face recognitionis gaining more popularity and has been widely used. In this paper, we proposed a system which detects the faces of studentsfrom live streaming video of classroom and attendance will be marked if the detected face is found in the database. This new system will consume less time than compared to traditional methods.

II. LITERATURE SURVEY

Authors in [3] proposed a model of an automated attendance system. The model focuses on how face recognition incorporated with Radio Frequency Identification (RFID) detect the authorized students and counts as they get in and get out form the classroom. The system keeps the authentic recordof every registered student. The system also keeps the data of every student registered for a particular course in the attendance log and provides necessary information according to the need. In this paper [4], authors have designed and implemented an attendance system which uses iris biometrics. Initially, theattendees were asked to register their details along with their unique iris template. At the time of attendance, the system automatically took class attendance by capturing the eye imageof each attendee, recognizing their iris, and searching for a match in the created database. The prototype was web based In[5], authors proposed an attendance system based on facial recognition. The algorithms like Viola-Jones and Histogram ofOriented Gradients (HOG) features along with Support Vector Machine (SVM) classifier were used to implement the system. Various real time scenarios such as scaling, illumination, occlusions, and pose was considered by the authors. Quantitative analysis was done on the basis of Peak Signal to Noise Ratio (PSNR) values and was implemented in MATLAB GUI. Authors in [6] researches to get best facial recognition algorithm (Eigenface and Fisherface) provided by the Open CV 2.4.8 by comparing the Receiver Operating Characteristics(ROC) curve and then implemented it in the attendance system. Based on the experiments carried out in this paper, the ROC curve proved that, Eigenface achieves better result than Fisherface. System implemented using Eigenface algorithmachieved an accuracy rate of 70% to 90%. In [7], authors proposed a method for student attendance system in classroomusing face recognition technique by combining Discrete Wavelet Transforms (DWT) and Discrete Cosine Transform (DCT). These algorithms were used to extract the features of student's face followed by applying Radial Basis Function(RBF) for classifying the facial objects. This system achieved an accuracy rate of 82%.

III. PROPOSED SYSTEM

All the students of the class must register themselves by entering the required details and then their images will be captured and stored in the dataset. During each session, faces will be detected from live streaming video of classroom. The faces detected will be compared with images present in the dataset. If match

found, attendance will be marked for the respective student. At the end of each session, list of absenteeswill be mailed to the respective faculty handling the session. The system architecture of the proposed system is given below,

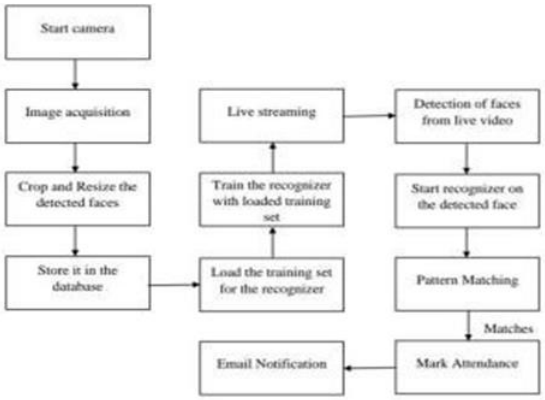

Fig.1. System Architecture

Typically, this process can be divided into four stages:

1. Dataset Creation

Images of students are captured using a web cam. Multiple images of single student will be acquired with varied gestures and angles. These images undergo pre-processing. The images are cropped to obtain the Region of Interest (ROI) which will be further used in recognition process. Next step is to resize thecropped images to particular pixel position. Then these images will be converted from RGB to gray scale images. And then these images will be saved as the names of respective student in a folder.

2. Face Detection

Face detection here is performed using Haar-Cascade Classifierwith OpenCV. Haar Cascade algorithm needs to be trained to detect human faces before it can be used for face detection. Thisis called feature extraction. The haar cascade training data used is an xml filehaarcascade_frontalface_default. The haar features shown in Fig.2. will be used for feature extraction.

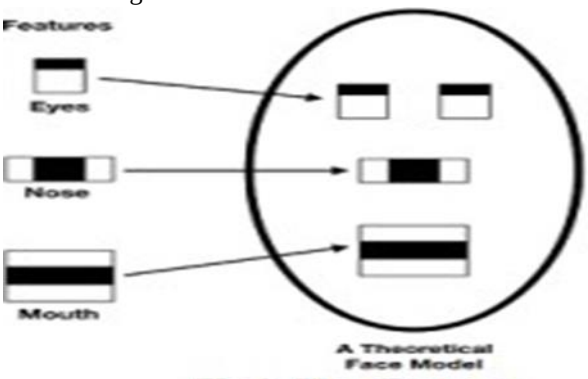

Fig.2. Haar Features

Here we are using detectMultiScale module from OpenCV. This is required to create a rectangle around the faces in an image. It has got three parameters to consider- scaleFactor, minNeighbors, minSize. scaleFactor is used to indicate how much an image must be reduced in each image scale. minNeighbors specifies how many neighbors each candidate rectangle must have. Higher values usually detects less faces but detects high quality in image. minSize specifies the minimum object size. By default it is (30,30) [8]. The parameters used in this system is scaleFactor and minNeighborswith the values 1.3 and 5 respectively.

3. Face Recognition

Face recognition process can be divided into three stepsprepare training data, train face recognizer, prediction. Here training data will be the images present in the dataset. They will be assigned with a integer label of the student it belongs to. Theseimages are then used for face recognition. Face recognizer used in thissystem is Local Binary Pattern Histogram. Initially, the list of local binary patterns (LBP) of entire face is obtained. These LBPs are converted into decimal number and then histograms of all those decimal values are made. At the end, one histogramwill be formed for each images in the training data. Later, during recognition process histogram of the face to be recognized is calculated and then compared with the already computed histograms and returns the best matched label associated with the student it belongs to [9].

4. Attendance Updation

After face recognition process, the recognized faces will be marked as present in the excel sheet and the rest will be markedas absent and the list of absentees will be mailed to the respective faculties. Faculties will be updated with monthly attendance sheet at the end of every month.

IV. RESULTS AND DISCUSSIONS

The users can interact with the system using a GUI. Here users will be mainly provided with three different options such as, student registration, faculty registration, and mark attendance. The students are supposed to enter all the required details in the student registration form. After clicking on register button, the web cam starts automatically and window as shown in Fig.3. pops up and starts detecting the faces in the frame. Then it automatically starts clicking photos until 60 samples are collected or CRTL+Q is pressed. These images then will be pre-processed and stored in training images folder.The faculties are supposed to register with the respective course codes along with their email-id in the faculty

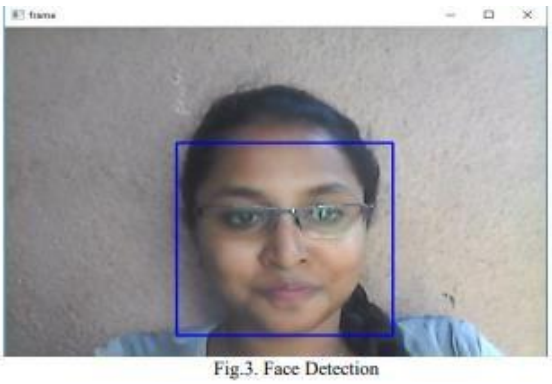

Fig.3. Face Detection

registration formprovided. This is important because the list of absentees will be ultimately mailed to the respective faculties.

In every session, respective faculty must enter their course code. Then after submitting the course code, the camera will start automatically. The Fig.4. shows the face recognition window where two registered students are recognized and if incase they were not registered it would have shown 'unknown'.By pressing CTRL+Q, the window will be closed and attendance will be updated in the excel sheet and names of absentees will be mailed to the respective faculty.

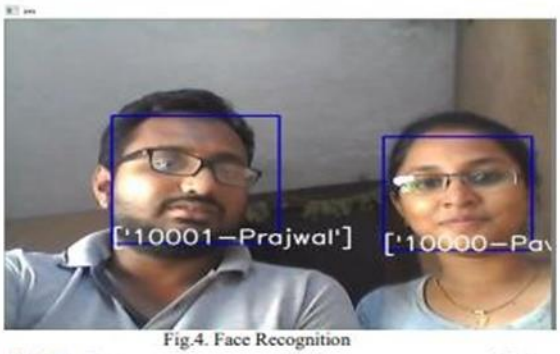

Fig.4. Face Recognition

	Name	Email	Contact No.	09-04-2020
2	afshin	afshin@gmail.com	8353323222	0
3	vishnu	vishnu@gmail.com	7444436614	0
4	Pranamya	pranamya@gmail.com	8522266321	0
5	ashwini	ash@gmail.com	6154545585	0
6	Prajwal	hegdeprajwal@gmail.com	9856222114	1
7	pavithra	hegdepavithra13@gmail.com	8073668261	1

Fig.5. Attendance sheet

The Fig.5. shows the attendance sheet updated after recognition process. Recognized students are marked as '1' andabsent students are marked as '0'. The list of absentees will bemailed to the respective faculty email-id.

V. CONCLUSION

This system aims to build an effective class attendance system using face recognition techniques. The proposed system will be able to mark the attendance via face Id. It will detect faces via webcam and then recognize the faces. After recognition, it will mark the attendance of the recognized student and update the attendance record.

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Emerging Technology in E-commerce

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Abstract-**Growth of Indian artisans in the e-commerce market with SDG (Sustainable Development Goals).Influenced by both external and internal factors, to gain success, anonline platform captures the attention of buyers, analyzing their behavior through data processing algorithms in order to obtain business information needed for the company's business strategy. With Big Data and Data Mining, the profile of any consumer isprojected directly into the platform,thus communicating the necessary information to predict the behavior in future platform visits. Application use cases of technology used in e- commerce.**

I. INTRODUCTION

India is a culture of heritage and ethnically diverse nations in the world. India is an entrepreneurial country, it is a country of innovation, business, and companies that have gone through a plethora of changes,particularly in the last 10 decades. In this paper, we mainly focused on E-commerce business. India's upwarddevelopment curve jumpstarted the e-commerce business, encouraged entrepreneurship and innovation, created global business leaders, and institutionalized the "jugaad"phenomenon, a unique Indian characteristic that motivated Indians to struggle and prosper, with SustainableDevelopment Goals. According to the United Nation Development Program.

II. LITERATURE REVIEW

India has a startupecosystem and now become 3rd largestin the world accepting the 42technologies in the e-commerce business as artisans led up startups joined the unicorn club in 2022 alone. 1979-Michael Aldrich (UK) 1980-Bussiness-to-Business onlineBusiness purchased started in the UK,Ireland, and Sprain. 1982-Technology grows and the first E-commerce platform mainly based on electronics is made by Boston Computer Exchange.

1995: E-commerce business gone to heights and Amazon had launched by Jeff Bezos1998: PayPal launched the first eCommerce payment system as a tool to make money transfers.From 2005 to 2009 many technologies come into the picture like Amazon prime membership, google launching an online wallet payment app, and Instagram and Facebook launching sponsored stories advertisements which help small e-commerce business to reach every corner of the world. In the 21st century Metaverse, Blockchain technology comes into the picture for secure online payments and proper user Interaction.

III. METHODOLOGY

HTML which is Hypertext Markup Language, CSS which is Cascading Style Sheets, and JavaScript are three separate languages that work together to create web pages and web applications. HTML creates structure, CSS styles the markup, and JavaScript creates interactivity. After using all three languages we will be able to create a basic web page with styling it all the way up to creating interaction with JavaScript.

1.Web scraping: Web or data mining is the act of gathering vast volumes of information from the Internet and storing it in databases for later analysis and usage. Web scraping provides information on price, market dynamics, current trends, competitor activities, and confront issues. If you understand how to get it, this information is readily available. The fact is several marketers are unaware of the benefits of web scraping.

2.Chatbots and Intelligent virtual assistants: Chatbots are an effective tool for engaging with customers and reducing engagement costs. Sales chatbots can carry out the same functions on websites, mobile applications, and messaging services like WhatsApp.

3.E-Wallets: An "e-wallet," a kind of electronic card, is connected to a person's bank account. It is utilized for online purchases on a computer or a smartphone. The two major components of an e-wallet are software and data. The software component secures and encrypts personal information. The information component is a database that contains information that users have

supplied, such as names, shipping addresses, preferred payment options, required payment amounts, credit or debit card information, etc.

4.Supply chain visibility software The entire supply chain, from delivery to warehouses, may be managed using supply chain visibility tools. These systems automate the issuance of invoices and track inventory. While automating supply chain operations, Supply chain visibility software also helps to produce reports that can aid decision-making. They generate financial reports and some can calculate corporate and product carbon footprints. As a result, you may identify your present carbon emissions pain points and take steps to strengthen your environmental, social, and governance (ESG) posture. By doing so, you can increase your sales. For instance, a PwC survey revealed that more than 75% of consumers think about firms' ESG policies before making purchases.

5.Recommendation systems: An artificial intelligence or AI algorithm, usually associated with machine learning, uses Big Data to suggest or recommend additional products to consumers.

IV. APPLICATION:

In this paper, we could use Full stack for development like HTML, CSS, JavaScript, MongoDB, Express, AngularJS, ReactJS, Python, and Blockchain.

For Frontend We could use HTML and CSS, HTML For structuring my web application, and CSS for the decoration of their web application.And Then Use MERN Stack to create a faster website. MERN Stack is to develop applications using JavaScript, regarding this we could use JavaScript also.And after all this, We could use Python in Backend for Visualization, Validation, interaction with users, and regarding many more things like NLP (Natural Language Processing) as we know that Chatbot is a very useful technology in our Digital market system. Using NLP, We Could create a Chatbot System for Interaction between users and admin.At the last, We could use a payment system which is very important forboth users and admin also so we coulduse Python and Blockchain systems, python for applications, and blockchain for security systems. In payment Gateway, we could use all type of payment services like mobile recharge, light bill recharge, shoppingpayment, bank transfer, and many more which is used in their technology systems. Note: For connectivity of frontend and backend we use Django (python framework).

V. ACKNOWLEDGMENT

I am humbled to Acknowledge the priceless guidance offered by Artificial Intelligence & Data Science Department teachers from Thakur College Of Engineering& Technology for this research paper

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Review Paper on Machine Babies - Future Mothers Could Be Machines

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Abstract—**Consider for a moment that you haven't even been born. You have the option of entering either the male or female realms, but you are unsure of how you will emerge out. One biological sex bears the dangers of falling unwell or dying during childbirth in Society A, which is the first option that is presented to you. Alternately, you can choose Society B, where every embryo grows securely in a lab. Do you have a plan? That is the issue we want to answer in this study paper on a subject called "Ectogenesis," which is a catch-all word for a technology that enables the artificial growth of children outside the womb. Asking the right questions is imperative given that 300,000 moms tragically lose their lives each year while giving birth. Is it really worth risking a mother's life to have a child, or do we as a society have to accept the unlikely but real possibility of ectogenesis, surrendering our caveman morals for the benefit of mankind?**

Keywords: Artificial womb, Ectogenesis, Artificial gestation, foetal viability

Impact Statement—A business called EctoLife is attempting to bring the fictional notion of Ectogenesis to life. Your infant can grow up in a germ-free environment thanks to EctoLife. The materials used to make the pods prevent bacteria from adhering to their surfaces. Each growth pod has sensors that can track your baby's vital signs, including heartbeat, temperature, blood pressure, breathing rate, and oxygen saturation. The artificial intelligence-based technology also keeps track of your baby's physical characteristics and alerts you to any potential genetic anomalies. If used internationally, this cutting-edge technology will almost eliminate all maternal and newborn mortality.

I. INTRODUCTION

Ectogenesis research, often known as artificial womb technology, is a quickly expanding field of study with the aim of creating a device that can maintain a fetus's growth and development outside of the human uterus. Premature infants, who are at a significant risk for long-term health issues and death, could benefit greatly from this technology. For decades, books and movies have been inspired by the concept of developing infants outside the body. Today, research teams from all across the world are looking into the potential of artificial gestation. For instance, one team was successful in raising a lamb for four weeks in a synthetic womb. Additionally, Australian researchers have tried with shark and lamb artificial gestation. An estimated 15 million babies are born prematurely each year, before 37 weeks of gestation; one million die from complications and contribute significantly to childhood morbidity, both of which are related to this condition; unfortunately, this data is expected to rise. The main focus of the debate concerning artificial wombs has been on its ability to improve the survival rate of very preterm infants. This may sound far-fetched, but many scientists working in reproductive biotechnology believe that full ectogenesis is a real possibility with the right scientific and legal support. The primary focus of the debate surrounding artificial wombs has been on their potential benefit in increasing the survival rate of extremely premature babies. This emerging reproductive technology may provide women who are infertile for physiological or social reasons with the opportunity to have a child. It may also allow transgender women and other women who were born without a uterus, or who lost their uterus due to cancer, injury, or medical conditions, to have children. An artificial womb may provide an optimal environment for the foetus to grow by supplying the proper balance of hormones and nutrients. It would also protect the developing foetus from external threats such as infectious diseases.

II. RELATED WORK

JBS Haldane coined the term "ectogenesis" to describe the usage of artificial wombs in 1923. In 2016, researchers published two papers on the thirteen- day development of human embryos in ectouteri. Currently, a 14-day restriction prohibits keeping human embryos in lab wombs for more than 14 days. In twelve nations, this norm has been enshrined in legislation. A study that showed premature lamb foetuses had been grown for four weeks on an extra-uterine life support system was released in 2017 by foetal researchers at the Children's Hospital of Philadelphia. The first artificial womb facility in the world is being created by a biotechnologist in Germany, and it will let parents to select the traits of their child from a menu. According to reports, EctoLife, which can produce 30,000 children annually, is the result of more than 50 years of innovative scientific study. Hashem Al-Ghaili, a resident of Berlin, is the creator of the idea. According to him, the facilities will enable infertile couples to become the real biological parents of their own children by helping them conceive a child.You may genetically modify the embryo before placing it in the artificial womb if you purchased a "Elite Package." You can choose your strength, height, IQ, and eye and hair colour in addition to avoiding inherited genetic illnesses. Around 300,000 women perish from pregnancy-related problems, according to the World Health Organization. Human suffering can be lessened by using the EctoLife artificial womb, which also lowers the likelihood of C-sections. Premature births and C- sections will no longer occur thanks to EctoLife. According to Hashem, it also provides a solution for women whose

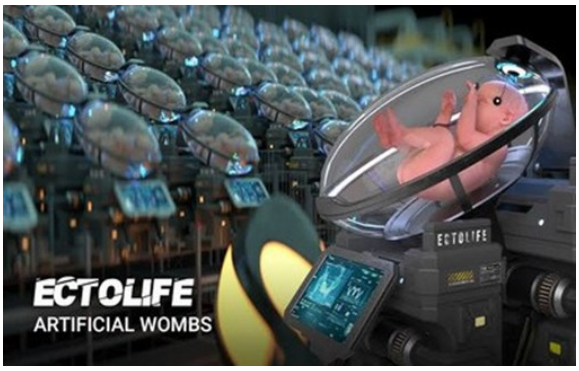
uteri were surgically removed owing to difficulties from cancer or other diseases. As well as Japan, Bulgaria, South Korea, and many other nations that are experiencing a significant population drop, it may also be beneficial. He thinks that since the technology is currently in place, the only thing stopping the idea from becoming reality are ethical considerations. The building has 75 extremely well- equipped labs that can each hold up to 400 growth pods or artificial wombs. Each pod is built to precisely imitate the conditions that exist inside the mother's uterus. Up to 30,000 lab-grown infants can be incubated in one building each year. The pods have a screen that shows real- time information about the infant's development. phone app can be used to view the data as well. The artificial intelligence-based technology also keeps track of your baby's physical characteristics and alerts you to any potential genetic anomalies. EctoLife growth pods include inside speakers that play a variety of phrases and music to your baby because it is believed that newborns can understand language and absorb words while still in the womb.

A baby can choose the music they listen to on an app, and you can sing to them directly to help them get used to your voice before delivery.By using an artificial umbilicalconnection to transport the babies, the second bioreactor is made to get rid of any waste materials they make.The second bioreactor may then recycle waste products and transform them back into valuable nutrition thanks to a delicate layer of designed enzymes. The facility will then make sure that your kid receives a consistent and long- lasting supply of fresh nutrition.

III. lll. NEGATIVE IMPACTS

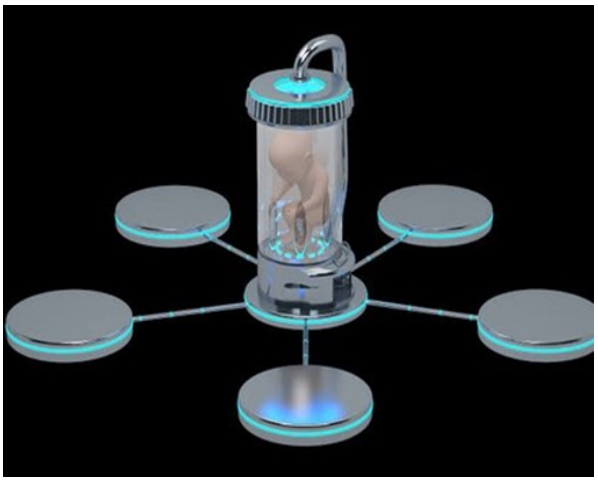
1. Artificial wombs might be harmful to women, increase inequality, and result in prejudice. A welcome option to aborting a pregnancy may appear for some women in employing an artificial womb to maintain gestation. There are worries, though, that other women considering abortionswould be forced to use an artificial womb to keep the pregnancy going.
2. A significant widening of the wealth disparity may result from artificial wombs. Rich potential parents may decide to invest in artificial wombs, whereas less fortunate individualswill use the bodies of women to carry their children during the gestation period.
3. The possibility of prejudice against people born in an artificial womb is another issue.

How can we make sure that people's origin stories are not the target of unfavourable public curiosity or mockery, or that neither prejudice nor intrusive publicising occur?



IV. CONCLUSION

The new technology of artificial wombs will be tremendously potent. Depending on who is requesting, producing, controlling, and paying for the technology, that power will present itself in different ways.While this technology may solve some existing problems concerning inequality in reproduction, there are many other issues that demand our immediate attention. In this generation of revolutionary breakthroughs in the field of healthcare and lifestyle, EctoLife is poised to unequivocally become the pioneers of an artificial womb. A concept which was as radical as flying cars, time travel and teleportation is being brought to fruition as you read through this article. If human hatcheries could be breathed in existence, what else does Artificial Intelligence and technology in general have instore for us? Overall, research on artificial womb technology is still in the early stages, and significant technical and ethical hurdles must be overcome before this technology can become a reality. However, the potential benefits for premature infantsand their families make it an area of study worth pursuing. While artificial wombs won't be available for several decades, full ectogenesis will. When they do, we need to make sure that they do so in a culture that values women for more than simply their ability to procreate and that they are employed to help others who are unable to become pregnant for medical, not societal, reasons. There is time left. But perhaps not enough as the rush to innovate continues.



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A Review on Augmented Reality and Virtual Reality in Education

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Abstract- **Virtual reality and augmented reality have been included in a variety of educational initiatives, including those in the domains of astronomy, architecture, physics, geology, biology, chemistry, mathematics, geometry, the humanities, training, and many other areas. The measurement of AR's contribution to the learning process and the feasibility of integrating virtual reality into the learning environment were both subjected to a systematic investigation. Virtual reality (VR) provides fresh methods for visualizing information and alternative methods for presenting educational resources. Whether VR and/or AR will assist solve the current issues in education is a topic of discussion. These innovations will usher in a new era of education and link conventional learning to cutting-edge technology.**

Key Words: Teaching-Learning Process, Students, Augmented Reality, Virtual Reality, and Visualization.

I. INTRODUCTION

In recent years, technology has had a profound impact on a wide range of aspects of life. Our thought patterns, societal norms, behaviors, and manner of life have all changed significantly from just a few years ago. The value of augmented reality as a new technology has grown significantly. In order to enhance learning processes, this study investigates virtual reality (VR) and augmented reality (AR) technology. In order to improve the experience, functionality, and effectiveness of learning, new VR and AR technology and cell phones can be combined with a number of other important factors, such as cutting-edge virtual courses, responsive teachers and rules, effective instructional resources, funding for hardware and apps, competent and confident instructors, and prepared learners. Such innovations have the considerable benefit of fostering a learning-centered environment in the classroom, which is a significant benefit from the perspective of instruction. This encourages the adoption of creative instructional strategies and adds fresh methods of education into the education process. The new ICT technology is being adopted by students with great enthusiasm. Technical advancements have made it possible to use revolutionary VR learning environments for institutions of higher learning, businesses, and creative endeavors. Since ICT is now a significant component of students' societies, these new innovations are anxious to be seen by them. Even though there has been extensive research on AR, it has emerged that just a few trials have been carried out in this area. However, due to the good aspects and results of advancements in computer and information technology, augmented reality in education is believed to have an effective role with greater consumer penetration than ever before.

II. LITERATURE REVIEW

As long as we stick to the status quo, there is no room for improving the ideas being taught. Numerous studies demonstrate the benefits of augmented reality and virtual reality in education, including the ability to visualize abstract items, improve conceptual understanding, and discover new learning approaches while also igniting student curiosity. For those who have a particular condition or dyslexic, these strategies can be helpful (who find it arduous to learn from books). With its unique ability to immerse Reality and offer more levels of interaction to enhance the user experience, AR has a distinct advantage. Using real-world scenarios, virtual reality (VR) aids in the simplification of difficult problems and enables the student to virtually explore new environments. A study of prospective teachers' opinions, expectations, and goals with regard to the usage of developing areas in the classroom is critical since some academics believe that a teacher's morale is crucial to education. Based on a survey the researchers did, which included interviews with a few teachers about their experiences with AR/VR, lab environments, current software for educational purposes in the physics domain, etc., a prototype for a few concepts in the physics domain was created. The Microsoft HoloLens prototype was created. After showing the professors the prototype, a poll was done to find out their thoughts on how AR/VR will aid in the physics field. The survey's findings included a litany of benefits, including the ability to comprehend ideas like gravity, electricity, and magnetism that are imperceptible to unaided sight. Students will learn more effectively if real-world items are enhanced along with the previously described ideas. The major purpose of AR/VR is to give students access to experiments that would be impossible in a real-world setting. The issues raised in "Problem with Time": users who travel through time can experience historical periods; in this case, virtual reality serves as a tool for teaching history to students. Physically inaccessible: When we explore the field of science, we see that there are particular situations that are unaffected by learning from real-world experience. Various criteria related to the unique affordances of AR technology that set it apart from conventional classroom tools were used to determine the suitability of adding it to a subject: A Three-dimensional representation of the mathematical context benefits students. (For instance, volume visualization) Separate representations of the stuff displayed in sync. (For instance, combining geographic and numerical representations)

III. OPPORTUNITIES AND CHALLENGES

Opportunities for AR/VR in the field of education are vast and spread over a lot of applications.

1. Research has shown that augmented reality and virtual

reality developments are extremely beneficial for education and can aid in the successful development of student's abilities and knowledge.

2. AR/VR programs have the potential to improve learning outcomes by enhancing content and boosting student engagement.

3. Students not only appreciate AR/VR learning but also teaching, and AR/VR applications help them understand concepts more completely. For instance, some children are unable to comprehend virtual objects or abstract occurrences like the world's rotation. The use of AR and VR allows students to experience complicated ideas, view 3D models, and digitally alter models.

4. Instantaneous messaging is possible with VR technology. Concurrent participation by students is possible in a virtual classroom. They may converse, receive immediate feedback from others, and experience a sense of community with their classmates.

5. The opportunities listed above have improved the quality of education tremendously and have also increased the interest of students in academic as well as holistic development. Although the technology of AR/VR provides a plethora of opportunities to be used in the educational world, it faces some challenges in the implementation as well.

6. For several VR/AR examples, computers, and display devices are frequently needed, which might be challenging for many schools.

7. The absence of realism in VR or AR simulations is the second barrier to overcome. The quality of the visuals conveys the consumer's delight, enhancing the visual presentation and resulting in a rich experience.

8. The third problem is the pupils' physical and mental state of health. (Head Mounted Displays) Due to their weight, HMDs can eventually make users feel worn out.

9. Studies and research are working towards overcoming these challenges and providing newer, improved facilities to enhance the learning experience of students via technology.

IV. CONCLUSION

New technology is being embraced by both students and preceptors because it helps students recall material and visualize difficult concepts. Ninety-seven percent of students say they would like to take an AR or VR course, while seven out of ten preceptors say they would like to employ VR to simulate real-world scenarios related to the lessons they teach. The fourth-largest sector predicted to make VR investments is education. Numerous studies, such as this one by Statista, predict that by 2025, VR in education will be a $ 700 million industry. The major purpose of this model is to give students a way to simulate exams that would be difficult for them to complete in a real-world environment.

V. FUTURE SCOPE

I. When used in conjunction with the appropriate content, AR/VR techniques for teaching can be very beneficial to educators as well. Edtech startups reminded us that regardless of the platform, content is and always will be king. Without the correct material, VR headsets will do nothing more than collect dust on a shelf, much like textbooks.

II. While VR and AR can provide the ideal virtual simulations and interactions to meet students' requirements, harnessing the power of AI will enable us to develop creative curricula and lesson plans with essentially no human involvement

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Applications of 5G Technology: How can it Revolutionize the Industry?

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Abstract **The fifth generation (5G) cellular network technology is set to revolutionize the way we communicate, work, and live. With its faster speed, lower latency, and increasedcapacity, 5G has the potential to transformvarious industries. This paper explores the applications of 5G technology in healthcare, manufacturing, automation, entertainment, energy, agriculture, and education. By providing real-time monitoring, remote consultations, and telemedicine in healthcare, enabling Industry 4.0 and smart factories in manufacturing, supporting autonomous vehicles and robots in automation, and providing immersive experiences through virtual and augmented reality in entertainment, 5G is poised to bring abouta technological revolution. The benefits of5G technology will be experienced by individuals, businesses, and society.**

I. INTRODUCTION

5G technology, the fifth generation of wireless communication technology, is poised to bring about a technological revolution in various industries. The key advantages of 5G technology include fasterspeeds, lower latency, and increased capacity. These advantages will enable new opportunities for innovation and growth in a wide range of applications.In the healthcare sector, 5G technology will enable real-time monitoring and remote

consultations, making healthcare more accessible and convenient. With the ability to transfer substantial amounts of data in real-time, 5G technology will also facilitate the use of telemedicine, allowing patients to receive medical care from the comfort of their own homes. This will improve patient care and outcomes, particularly in rural or remote areas where access to healthcare is limited.

In the manufacturing sector, 5G technology will support Industry 4.0 and the development of smart factories. By connecting machines, devices, and other assets in real-time, 5G technology will enable the automation of production processes, leading to greater efficiency, productivity, and competitiveness. This will also reduce the need for manual labor and minimize the risk of human error, making the manufacturing process safer and more reliable.

In the entertainment sector, 5G technology will enable the creation of immersive experiences through virtual and augmented reality. With its high speeds and low latency, 5G technology will allow users to experience entertainment content in real-time, without the need for wires or cables. This will open new possibilities for gaming, video streaming, and other forms of digital content.

In the energy sector, 5G technology will enable the creation of smart energy grids that can monitor energy usage in real-time and respond to changes in demand. This will improve energy efficiency and reduce waste, contributing to a more sustainable energy future.

In the agriculture sector, 5G technology will support precision agriculture, enabling farmers to monitor their crops in real-time and respond to changes in weather or soil conditions. This will improve crop yields and reduce waste, contributing to a more sustainable and efficient food system.

In the education sector, 5G technology will enable remote learning and distance education, making education more accessible and convenient. With its high speeds and low latency, 5G technology will also allow students to participate in virtual classroom experiences and access educational content in real-time.

In conclusion, 5G technology has the potential to revolutionize various industries, bringing about a new era of innovation and growth. By providing faster speeds, lower latency, and increased capacity, 5G technology will enable new applications and opportunities for innovation across a wide range of sectors.

II. RELATED WORK

The use of 5G technology in the healthcare sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to improve patient care and outcomes, reduce costs, and increase access to healthcare.

One study conducted by the European Commission found that 5G technology could bring about significant improvements in the field of telemedicine, including remote consultations and real-time monitoring. Another study by the World Health Organization found that 5G technology could support telemedicine, telehealth, and eHealth, reducing the need for patients to travel and improving access to healthcare in rural or remote areas.

The use of 5G technology in the manufacturing sector has also been the subject of several studies and research projects. These studies have explored the potential of 5G technology to support Industry 4.0 and the development of smart factories, leading to greater efficiency, productivity, and competitiveness.

One study conducted by the Fraunhofer Institute found that 5G technology could support real-time communication between machines, devices, and other assets, enabling the automation of production processes and reducing the need for manual labor. Another study by the European Union found that 5G technology could support the development of smart factories, improving the accuracy and efficiency of production processes and reducing the risk of human error.

The use of 5G technology in the entertainment sector has been the subject of several studies and research projects.These studies have explored the potential of 5G technology to create immersive experiences through virtual and augmented reality.

One study conducted by the University of California found that 5G technology could support the development of immersive gaming experiences, providing users with real-time, wire-free gameplay. Another study by the University of Oxford found that 5G technology could enable the creation of virtual and augmented reality content, allowing users to experience entertainment content in new and innovative ways.

The use of 5G technology in the energy sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to create smart energy grids that can monitor energy usage in real-time and respond to changes in demand.

One study conducted by the Massachusetts Institute of Technology found that 5G technology could support the creation of smart energy grids, improving energy efficiency and reducing waste. Another study by the International Energy Agency found that 5G technology could support the development of renewable energy sources, enabling the creation of sustainable and efficient energy systems.

The use of 5G technology in the agriculture sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to support precision agriculture, enabling farmers to monitor their crops in real-time and respond to changes in weather or soil conditions. One study conducted by the University of Cambridge found that 5G technology could support precision agriculture, improving crop yields and reducing waste. Another study by the United Nations found that 5G technology could support the development of sustainable food systems, enabling the creation of more efficient and sustainable agricultural practices.

The use of 5G technology in the education sector has been the subject of several studies and research projects. These studies have explored the potential of 5G technology to support remote learning and distance education, making education more accessible and convenient. One study conducted by the University of Edinburgh found that 5G technology could support remote learning, enabling students to participate in virtual classroom experiences and access educational content in real-time.

III. METHODOLOGY

The methodology used to study the applications of 5G technology typically involves the following steps:

Literature Review: Researchers conduct a comprehensive review of existing studies and publications on 5G technology and its applications, to understand the current state of knowledge and identify areas for further research. This includes reviewing technical papers, conference proceedings, and industry reports.

Requirements Analysis: The requirements for each application are analyzed to determine the specific capabilities of 5G technology. This includes considering factors such as bandwidth, latency, and network coverage. Researchers may also consult with industry experts and stakeholders to identify the requirements for each application.

Prototyping: Prototype systems and models are developed to demonstrate the potential of 5G technology for each application. This allows researchers to test and validate the performance of 5G technology in real-world scenarios. The prototypes can be simple or complex, depending on the requirements of the application.

Performance Evaluation: The performance of the prototypes is evaluated, including measurements of key parameters such as data rate, latency, reliability, and energy efficiency. Researchers may use simulations, testing, and monitoring tools to evaluate the performance of the prototypes.

Implementation: Based on the results of the performance evaluation, the best solution is selected and implemented. The implementation process involves developing software and hardware systems and deploying them in real-world environments. This may involve working with industry partners, service providers, and technology vendors to develop and deploy the systems.User Feedback: Feedback is collected from users of the applications to assess their satisfaction and identify any areas for improvement. This includes conducting surveys, focus groups, and user studies to gather user feedback.

Performance Monitoring: The performance of the applications is monitored over time to ensure they continue to meet users' needs. This includes tracking key metrics such as data rate, latency, reliability, and energy efficiency.

Improvement: Based on the results of the performance monitoring, researchers may make improvements to the applications to enhance their performance and usability. This may involve updating software, modifying hardware, or making other changes to improve the applications.

Conclusion: The results of the research are summarized, and conclusions are drawn regarding the capabilities and limitations of 5G technology for each application.Recommendations are made for future research and development.

Dissemination: The results of the research are disseminated to the academic community, industry, and the public. This may include publishing technical papers, presenting research results at conferences, and providing training and education on the applications of 5G technology.

This methodology provides a comprehensive and systematic approach to studying 5G technology applications and ensures the results are robust and reliable. By following these steps, researchers can identify the best solutions for each application, and ensure that 5G technology is being used to its full potential.Experimental results and discussion

Experimental results and discussion of the applications of 5G technology are an essential part of any research in this area. The following are the key steps in conducting

experimental results and discussion:

Data Collection: Data is collected from the prototypes and real-world implementations of 5G technology. This may include data on network performance, user experience, and application usage. The data collected should be representative of the real-world use cases and be collected under controlled and repeatable conditions.

Data Analysis: The collected data is analyzed to determine the performance of 5G technology in each application. This includes evaluating key metrics such as data rate, latency, reliability, and energy efficiency. Researchers may use statistical methods, such as regression analysis, to evaluate the performance of 5G technology.

Comparison with Existing Systems: The performance of 5G technology is compared with that of existing systems and technologies, such as 4G and Wi-Fi. This comparison provides valuable insight into the strengths and limitations of 5G technology for each application.

Identification of Trends: Based on the data analysis, researchers may identify trends and patterns in the performance of 5G technology. This includes identifying factors that influence the performance of G technology, such as network conditions and user behavior.

Discussion of Results: The results of the data analysis are discussed in detail, including a thorough explanation of the findings and their implications. This includes highlighting the strengths and limitations of 5G technology for each application and providing recommendations for future research and development.

Validation of Results: The results are validated through further experimentation, testing, and analysis. This includes repeating experiments to confirm the results and checking for any inconsistencies. The results may also be verified through peer review.

Comparison with Previous Work: The results are compared with previous work in the area to ensure consistency and to build on existing knowledge. This includes reviewing previous studies and publications on 5G technology and its applications.

Conclusion: A conclusion is drawn based on the results of the experiments and the data analysis. This includes summarizing the key findings and making recommendations for future research and development.

Dissemination: The results are disseminated to the academic community, industry, and the public. This may include publishing technical papers, presenting research results at conferences, andproviding training and education on the applications of 5G technology.

By conducting experimental results and discussion, researchers can gain a better understanding of the capabilities and limitations of 5G technology for each application. This provides valuable information for developing new applications and improving existing ones and helps ensure that 5G technology is being used to its full potential.

IV. CONCLUSION

5G technology has the potential to revolutionize the industry in several ways, with its high data rates, low latency, and increased network capacity serving as the foundation for a range of new and innovative applications. It can have a significant impact on areas such as the Internet of Things, Virtual Reality and Augmented Reality, autonomous vehicles, healthcare, entertainment, and Industry

4.0. The real-time communication and coordination enabled by 5G technology is critical for supporting the development of new applications in these areas and can help to deliver tremendous economic and social benefits. With the right investments in infrastructure and research, 5G technology is poised to play a critical role in shaping the future and providing a foundation for future innovations.

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Conversational Search Engine – ChatGPT

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Abstract--- Conversational artificial intelligence (AI) refers to technology that consumers may converse with, such as chatbots or virtual agents. They use massive amounts of data, machine learning, and natural language processing to mimic human interactions, such as identifying speech and text inputs and interpreting their meanings across several languages. Natural language processing (NLP) and machine learning are combined in conversational AI. Conversational AI contains fundamental components that enable it to process, comprehend, and respond in a natural manner. ChatGPT is an OpenAI- developed big language model chatbot built on GPT-3.5. It has an amazing capacity to interact in the form of a conversational dialogue and offer responses that can appear quite human. Chat GPT, which is driven by OpenAI's powerful GPT-3 language model. In this paper we focus how ChatGPT can cut down the Google market and can revolutionize user's searching experience.

Keywords--- ChatGPT, NLP, Artificial Intelligence, Machine Learning, Conversational AI, Search Engine, generative AI.

I. INTRODUCTION

The broad area of machine learning, which includes generative AI systems, can be used to produce new content such as audio, code, images, text, simulations, and movies.Latest developments in the sector could fundamentally alter how we think about content creation.This fascinating form of machine learning allows computers to generate all sorts of fresh and exciting stuff, from music and art to entire virtual worlds.Additionally, generative AI has many useful applications outside entertainment, including developing new product concepts and streamlining business procedures.

ChatGPT is a long-form question-answering AI from OpenAI that conversely responds to complicated inquiries. It's a ground-breaking technology since it's been taught to understand what people mean when they ask questions. Many users are in awe of its capacity to deliver responses of

human- quality, which gives rise to the idea that it might soon have the ability to revolutionise how people interact with computers and alter how information is retrieved. ChatGPT learns how to obey instructions and provide responses that are acceptable to humans using Reinforcement Learning with Human Feedback (RLHF), an additional training layer.

A. GPT-3

GPT stands for Generative Pre-trained Transformer 3. The autoregressive language model GPT-3, was published in 2020, which employs deep learning to generate text that resembles a text given by a person. It will produce text that follows the prompt when given a beginning text as input. OpenAI made its latest creation ChatGPT chatbot available for free public testing.On November 30, 2022, ChatGPT was introduced as a prototype. It soon gained popularity for its thorough responses and clear responses in a variety of subject areas.

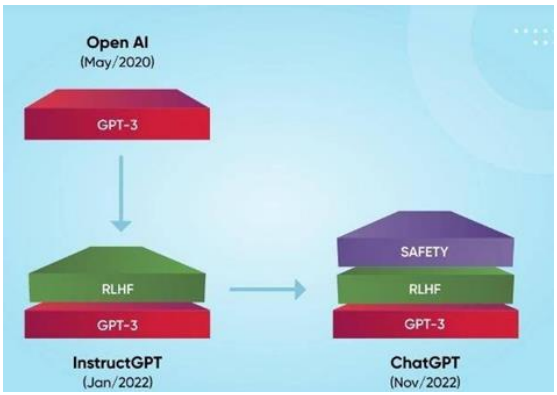

Fig. 1 GPT's Evolution

II. WORKING

- Utilizing RLHF, or Reinforcement Learning from Human Feedback, the model has been trained.
- In comparison to the preceding models, data collection is carried out using a more supervised, fine-tuned approach.
- Trainers for human-assisted AI create discussions in which they take on the roles of both the user and the AI assistant.
- These instructors have sample written recommendations to help them when writing responses.
- Together with the prior InstructGPT data, the new database was converted into a conversation format.
- Information is gathered from interactions that AI trainers had with the chatbot and is compared between two or more model responses, ranked by quality.

- This process is repeated several times, and the model is improved.

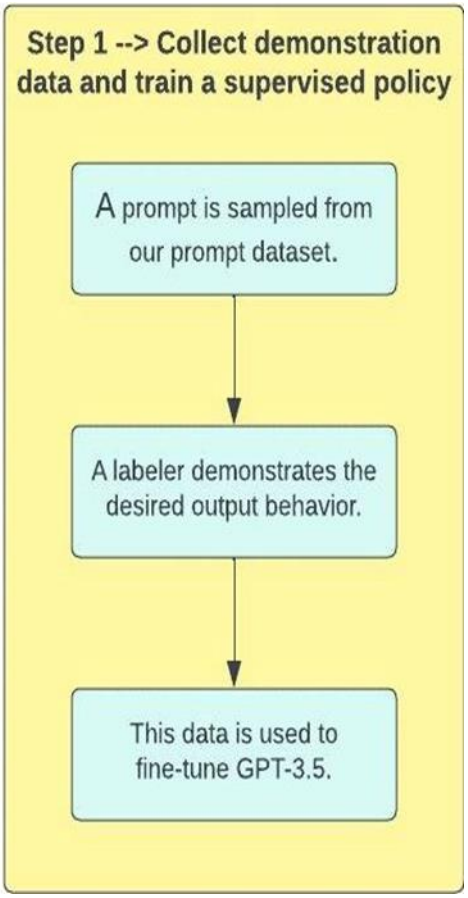

Fig. 2.1 Generative AI's Working

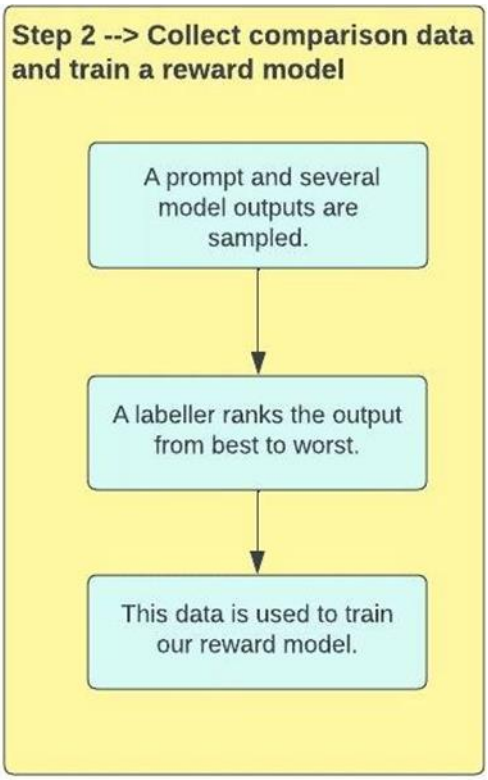

Fig. 2.2 Generative AI's Working

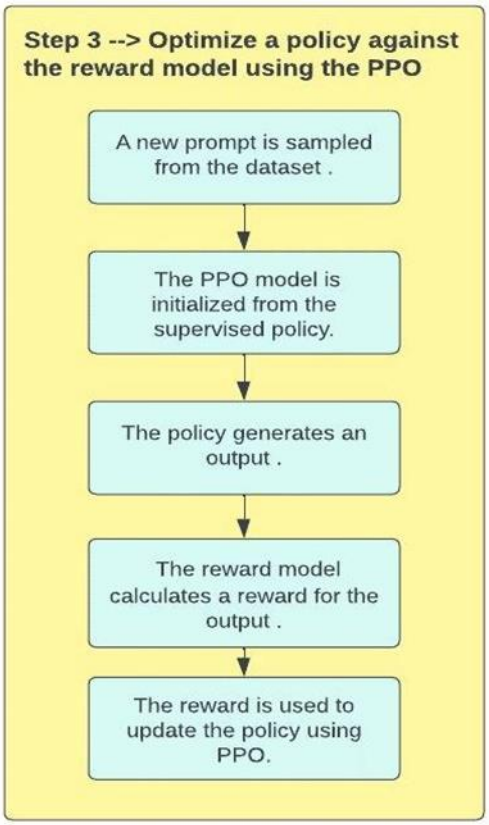

Fig. 2.3 Generative AI's Working

III. USE-CASES

A. Customer Service:

Businesses can offer a more effective and easy customer care experience by utilising ChatGPT to build a chatbot that can comprehend and answer to customer questions and requests naturally and in a conversational manner. Both the company and the client may benefit by saving time and resources in this way.

B. Education or Training purposes:

The individualised learning experience that personalised material and evaluations deliver can benefit both students and employees. These are determined by the user's demands and advancement. This can be especially helpful in fields like healthcare or finance where continuing training is required.

C. Entertainment and leisure:

Chatbots could develop virtual assistants that propose music or movies or offer specialised exercise or meditation regimens. These applications benefit from ChatGPT's capacity to comprehend and react to user input in a natural and conversational manner.

D. Travel:

Chatbots may help with flight, hotel, and vehicle rental reservations as well as make suggestions for places to go and things to do. For users, this might result in a more effective and convenient travel planning procedure

IV. TRADITIONAL SEARCH ENGINES

A Search engine is a group of programs working together to find and identify things in a database that meets certain criteria. Search engines are basically used to access information. A search engine result page (SERP), which ranks the pages that are found in order of their relevance, is returned when a user enters a query into a search engine. It varies depending on the search engine how this ranking is done. To enhance user experience, search engines frequently modify their algorithms (the programs that rank the results). They want to provide users with the finest response possible by comprehending how they search. This entails giving top consideration to the most relevant and high-quality pages.

A. Working of Traditional Search Engines

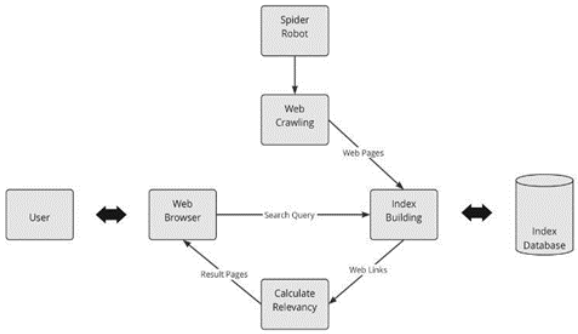

Fig. 3 Working of Search Engines

The Search engines working consist of three important steps :

1. Crawling: The existence of pages on the web is found by crawlers. A search engine is always looking for fresh, updated pages to add to its database of previously found pages. This process is known as URL discovery. The crawler looks over a page's content after finding it. To choose which pages to crawl and how frequently, the search engine utilities an algorithm.

2. Indexing: A page's textual content is processed, examined, and labeled with attributes and metadata after it has been crawled by a search engine to assist it comprehend what the page is about. Additionally, it helps the searchengine to identify duplicate pages and gather content-related signals, such as the nation or region the website is local to and the page's usability.

3. Searching and Ranking: The search engine looks for matching sites in the index when a user types a query, and it then returns the results that seem to be most pertinent on the search engine results page (SERP). The authoritativeness of a page, the quantity of backlinks to the page, and the keywords it includes are some of the characteristics used by the engine to rank content.

V. COLLABORATION OF MICROSOFT AND OPEN AI Microsoft eventually made it official that they were

expanding their collaboration with OpenAI, the company behind the ground-breaking ChatGPT application. Since OpenAI trains all of its models on Azure, Microsoft Azure will still be the only cloud service provider for the tool.

Microsoft did not provide a dollar amount, but it is speculated that the investment will be $10 billion as the tech giant seeks to expedite AI advancements for the benefit of the entire world, according to a release.

When it comes to how the world's largest tech companies compete with one another, artificial intelligence has the potential to revolutionise the game. According to some experts, the AI market will be competitive as businesses look for ways to use machine learning to improve corporate processes.

Fig. 4 Microsoft and Open AI's Collaboration Microsoft officially announced a new multi-year

investment in OpenAI, the startup behind ChatGPT, in a press statement on January 23. Microsoft was reportedly aiming to invest an extra $10 billion in the firm when we last wrote about its investment in ChatGPT, according to Semafor. The official release doesn't confirm or reject the claimed dollar sum, as they just commented on continuing the cooperation.

Microsoft stated their dedication to transforming Azure into a global AI supercomputer. Every tool under the OpenAI brand uses Microsoft Azure as its exclusive cloud provider.

The following statement was made in the announcement by Microsoft CEO Satya Nadella. Developers and businesses from a variety of sectors will have access to the greatest AI infrastructure, models, and toolchain with Azure throughout this next phase of our relationship to create and run their apps.

VI. IMPACT OF CHATGPT ON SEARCH ENGINES The allure of this is the potential influence on

traditional search engines. In comparison to a search engine like Google, ChatGPT may be able to grasp a question and the nuances of the intent behind it much better thanks to AI. The call-and-response style used by ChatGPT allows for more sophisticated follow-ups as well. The user can contest the answer given or ask for more details, and ChatGPT can correct any errors or enhance its response.

The search engine replies to questions or prompts with links, including advertising links which serve to power its revenue.

Nonetheless, it is simple to see how ChatGPT might interfere with this. Instead of encouraging visitors to click on connections to other websites, ChatGPT can just deliver brief replies or clear explanations itself. This might drastically revolutionise the way people engage with search engines — fact, the whole ecology

surrounding the search engine revenue model, and search engine optimisation, could be thrown on its head.

The potential for disruption is so enormous that, according to a New York Times report, senior leaders at Google's parent firm Alphabet have declared a 'code red' to better comprehend the possible impact on Google and the larger search engine sector.

A. ChatGPT's influence:

1. Microsoft Bing: Recent reports have stated that Microsoft, a big investor in OpenAI, aims to launch a version of its Bing search engine employing the AI behind ChatGPT as early as this spring. Quite how this integration will function is not yet obvious – not least because ChatGPT's knowledge base currently stops at the end of 2021 – but its capacity to deliver entire responses in the style of human speech patterns could make the user experience friendlier than that of Google. In the future, inquiries submitted through Bing might be answered in few words rather than a list of links that need additional inquiry (and are positioned according to advertisers' needs), if the technology can be demonstrated to be viable and kept up to date.

2. Google: LaMDA, a smart AI developed by Google that can interpret natural language, made news in June 2022 when a Google engineer claimed it was sentient.Nonetheless, Google is understandably reluctant to incorporate the technology into its search engine because a change of this magnitude would have an impact on advertising revenue and because Google faces a much greater reputational risk than smaller competitors. A start-up can manage these risks since reputational harm is less important to them than other uses of ChatGPT, including the creation of malware and the facilitation of cyberattacks.

This has been confirmed by Sundar Pichai, CEO of Alphabet, who also noted that due to the "reputational risk" that the technology poses, Google is

3. Meta: Meta, Facebook's parent company, is unveiling a new AI language generator termed LLaMA today. LLaMA isn't like ChatGPT or Bing; it's not a system that everyone can talk to. Rather, it's a research tool that Meta says it's sharing in the hope of "democratising access in this important, fast-changing field." In other words: to help experts tease out the problems of AI language models, from bias and toxicity to their tendency to simply make up information. To this end, Meta is releasing LLaMA (which is not actually a single system but a quartet of different-sized models) under "a noncommercial licence focused on research use cases," with access granted to groups like universities, NGOs, and industry labs.

VII. BING CHAT AND OPENAI'S CHATGPT

Due to its reliance on various information sources and usage of more recent data, Bing Chat has the potential to be more accurate than ChatGPT. Because ChatGPT is built on a single source of data—its language model—it lacks access to more recent data and is unable to cross-reference the accuracy of its answers. Theoretically, Bing Chat ought to be considerably more potent and sophisticated than ChatGPT because it is based on GPT-4. A user who successfully created a playable game of Pong in less than 60 seconds is just one example of the encouraging early results of GPT-4 in ChatGPT Plus. The "learn more" suggestions that Bing Talk provides are another intriguing element that it offers in terms of accuracy. Not only is this a more ethical and transparent way of displaying info, it also gives you somewhere to go next — more like a proper search engine.

VIII. LIABILITY OF SUCH MODELS

Yet, there are lots of drawbacks. First, consider what is at the heart of a large language model—a mechanism through which it connects the words and presumably their meanings. This results in a response that frequently appears clever, although huge language model systems are known to create remarks that are almost like parroting without any genuine comprehension. As a result, even while the output produced by these systems may appear intelligent, it is really only a reflection of the word patterns that the AI has discovered in the right context.

Large language model systems are liable to making up or "hallucinating" answers because of this constraint. The systems are also not smart enough to understand the incorrect premise of a question and answer faulty questions anyway. For example, when asked which U.S. president's face is on the $100 bill, ChatGPT answers Benjamin Franklin without realising that Franklin was never president and that the premise that the $100 bill has a picture of a U.S. president is incorrect.

The problem is that even when these systems are wrong only 10% of the time, you don't know which 10%.

Humans also don't have the opportunity to swiftly validate the systems' responses. That's because these systems lack transparency—they don't tell what data they are trained on, what sources they have used to come up with answers, or how those solutions are formed.

For example, you could ask ChatGPT to write a technical report with citations. But often it makes up these citations

—"hallucinating" the titles of scientific works as well as the authors. The systems also don't validate the correctness of their results. This leaves the validation up to the user, and users may not have the motivation or abilities to do so or even notice the need to examine an AI's responses.

1. stealing traffic and content: Although lack of transparency can be detrimental to consumers, it is also unfair to the writers, artists, and other original content producers from whom the systems have learnt because the systems do not disclose their sources or provide adequate credit. In most situations, creators are neither compensated or credited or given the opportunity to offer their consent.

There is also an economic component to this. The links to the sources are displayed alongside the results in a conventional search engine setting. This increases traffic to those sites and not only enables the user to validate the answers and give credit where credit is due. Many of these sources rely on this traffic for their earnings. Because the massive language model systems give direct answers but not the sources they draw from, I anticipate that those sites are likely to see their revenue streams decline.

2. removing chance encounters and learning: This new method of information access has the potential to disempower people and eliminate their opportunity to learn. Users can explore a variety of options during a typical search procedure, which frequently prompts them to change what they're looking for. It also provides students an opportunity to discover what is out there and how various bits of information link to complete their job. And it enables for chance encounters or serendipity.

These are highly crucial components of search, but they are taken away from users when a machine generates results without disclosing its sources or directing them through a process.

Big language models are a huge step forward for information access because they give individuals a method to interact in natural language, create individualised responses, and find solutions and patterns that are frequently challenging for the average user to come up with. However they have serious limitations due to the way they learn and generate answers. Their responses might be inaccurate, harmful, or prejudiced. While other information access systems can suffer from similar concerns, too, large language model AI systems also lack transparency. Worse, their natural language responses can help feed a false sense of trust and authoritativeness that can be disastrous for uneducated consumers.

IX. ALTERNATIVES TO SUCH MODELS

A. Chatsonic

One of the newest and most comprehensive ChatGPT options that has recently gained popularity is Chatsonic. Because ChatGPT was developed on top of it, it now has access to all of its enormous potential. But because it can reach the Internet, the latter can't yet compete with this AI chatbot in terms of features and knowledge.

Fig. 5 Chatsonic

Unlike ChatGPT, you can even use your microphone to speak to the AI (much like you would with Siri or Google Assistant), and if you prefer, it will reply to you in voice. Once the discussion is over, you can also choose to share the responses as links or Word or PDF documents. My overall impression of ChatSonic was positive, and I believed that because it had access to the Internet and the most recent information, it could convey information more effectively than ChatGPT.

In addition to text, Chatsonic has an integrated image generator that produces decent images from the instructions you provide. Despite the fact that the bot costs money, it offers 25 free generation per day after which you can use your Writesonic word balance to create more pictures.

B. Jasper Chat

Jasper has a long history of success in the field of artificial intelligence content creation. However, Jasper also has a comparatively new chatbot in addition to its content generation capabilities and other services. This ChatGPT substitute, aptly called Jasper Chat, is built on GPT 3.5 as well as additional language models and has

Fig. 6 Google's Bard AI

C. Googles Bard:

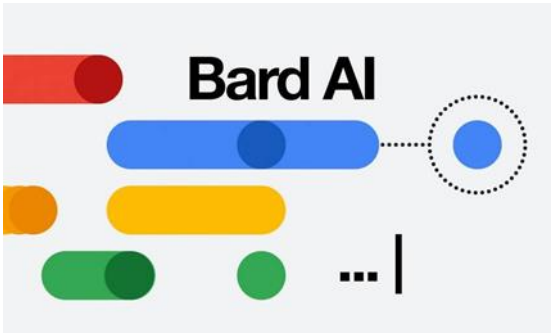

Fig. 7 Google's Bard AI

Many users have been keeping a watch on Google ever since ChatGPT became popular. Google has finally given in to criticism and opened the gates after remaining silent for a while due to concerns over the potential abuse of its chatbot AI. Google Bard is a trial conversational AI service, as CEO Sundar Pichai disclosed in the business' most recent blog post. A simplified variant of LaMDA, Google's own next- generation language and conversational model, powers Bard.

X. CONCLUSION

ChatGPT has the power to completely change how we engage with search engines. It can comprehend user

queries and respond to them in a more human-like manner thanks to its sophisticated natural language processing abilities, which makes search more effective and natural.

We may anticipate even more developments in search as technology progresses, such as more individualised results, a better comprehension of user intent, and increased precision.

Overall, ChatGPT is a game-changer for the search industry and is probably going to have a big impact on it in the years to come.

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The Impact of open banking and API integration in financial services Group Members

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Abstract-**Open banking and Application Programming Interface (API) integration has revolutionized the financial services industry by providing a secure and efficient way for financial institutions to share data and offer innovative services to customers. This paper explores the impact of open banking and API integration on the financial services industry, focusing on the benefits and challenges of the technology. The paper discusses the key concepts of open banking, including data sharing, security, and regulatory requirements. It also explores the different types of APIs used in the financial sector and their role in providing a seamless experience for customers. The paper also examines the impact of open banking and API integration on customer behavior, as well as the benefits for financial institutions, including increased competition, improved operational efficiency, and enhanced customer experiences. The paper concludes by exploring the future of open banking and API integration and its potential to further transform the financial services industry.**

I. INTRODUCTION

Open Banking and API integration have transformed the financial services sector by enabling customers to share their financial data with third-party providers through APIs, improving competition and customer experience, and enabling financial institutions to connect with third-party providers for increased efficiency and innovation. This paper aims to examine the impact of these developments on the financial services sector globally, with a specific focus on India and the Unified Payment Interface (UPI) system. The paper will examine the benefits and challenges of open banking, the impact on the customer experience, and the future of the sector, drawing upon a comprehensive literature review, survey and study data analysis, and trends and patterns in the industry.

The trend towards open banking and API integration is expected to continue, driving innovation and competition in the financial services sector. This will shape the future of the sector, bringing new opportunities and challenges to financial institutions, third-party providers, and customers.Open Banking and API integration have had a significant impact on the customer experience by increasing adoption and usage of these services. This has changed the way customers interact with their financial data and services, leading to a more convenient and accessible financial system.

II. LITERATURE SURVEY

Open banking and API integration have been the subject of numerous research studies, articles, and reports in recent years. The literature survey aims to provide a comprehensive overview of the existing body of research on the impact of open banking and API integration in the financial services sector.

The benefits of open banking have been widely reported in the literature, including increased competition, innovation, and customer experience. Several studies have reported that open banking has improved the customer experience by increasing the speed and efficiency of financial transactions, and enabling customers to have greater control over their financial data. Additionally, open banking has led to the development of new financial products and services, such as digital wallets and mobile banking apps, which have improved the overall customer experience.

The challenges of open banking have also been widely reported in the literature, including security and privacy concerns. These challenges are related to the sharing of sensitive financial data with third-party providers, which may increase the risk of data breaches and fraud. Several studies have reported that these challenges can be addressed by implementing robust security measures, such as encryption and secure APIs, to protect customer data.

The impact of open banking on the financial services sector has been the subject of numerous studies and reports. A study by Accenture found that open banking has had a significant impact on the financial services sector, particularly in terms of increased competition and innovation. The study also found that open banking has enabled financial institutions to connect with third-party providers, which has improved their overall efficiency and competitiveness.

Another study by the World Bank found that open banking has increased access to financial services in emerging markets, particularly in India, where the implementation of the Unified Payment Interface (UPI) system has improved the efficiency and accessibility of financial transactions. The study also found that open banking has increased competition in the financial services sector, which has led to the development of new financial products and services.

FORTUNE

GAINING CURRENCY

Since Its Launch, UPI Has Emerged As The Preferred Retail Payment Mechanism In The Country

YEAR	NO. OF BANKS LIVE ON UPI	VOLUME (IN MN)	VALUE (IN CR.)	Y-O-Y CHANGE - VALUE (IN CR.)	Y-O-Y CHANGE - VALUE (IN %)
2021*	274	34,178	63,32,438	29,44,693	86.92
2020	207	18,881	33,87,745	15,51,107	84.45
2019	144	10,788	18,36,638	12,50,928	213.57
2018	134	3,746	5,85,710	5,28,690	927.19
2017	71	419	57,021	56,128	6284.82
2016	36	3	893		

Source: NPCI

Note: Data excludes transactions having debit/credit to the same account from August 2018 onwards; * as of November 2021

fortuneindia.com

Finally, a report by the Financial Stability Oversight Council (FSOC) found that the trend towards open banking and API integration is expected to continue, driven by the increasing demand for more convenient and accessible financial services. The report also found that open banking and API integration will bring new opportunities and challenges to the financial services sector, including increased competition and innovation, but also security and privacyconcerns.

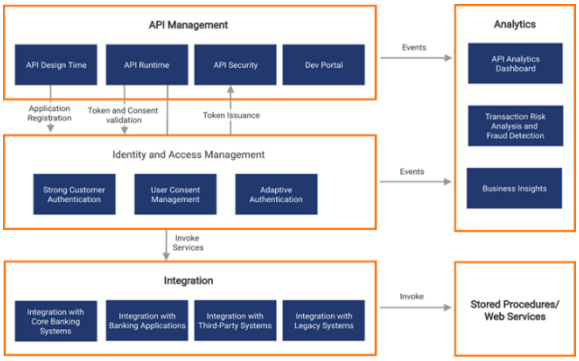
In conclusion, the literature survey highlights the key findings of the existing body of research on the impact of open banking and API integration in the financial services sector. The survey has shown that open banking has had a significant impact on the sector, bringing benefits such as increased competition, innovation, and customer experience, but also challenges such as security and privacy concerns. The trend towards open banking and API integration is expected to continue, shaping the future of the financial services sector and bringing new opportunities and challenges to financial institutions, third-party providers, and customers.

III. METHODOLOGY

The methodology used to study the impact of open banking and API integration in the financial services sector is a combination of qualitative and quantitative research methods. The research includes a review of the existing literature on open banking and API integration, including academic studies, reports, and articles. The research also includes data analysis and statistical analysis to understand the impact of open banking and API integration on the financial services sector.

The literature review included a comprehensive search of academic databases, such as JSTOR and Google Scholar, as well as financial industry reports and news articles. The search was limited to English-language sources published in the last ten years and focused on the impact of open banking and API integration in the financial services sector.

The data analysis included the collection of data from financial institutions and third-party providers, including data on the number of financial transactions and the types of financial services offered through open banking and API integration. The data was analyzed using statistical methods, such as regression analysis and correlation analysis, to understand the impact of open banking and API integration on the financial services sector.



The results of the research were then used to draw conclusions about the impact of open banking and API integration in the financial services sector. The findings were reported usingcharts, tables, and graphs to visually represent the results.

In conclusion, the methodology used for this study is a combination of literature review, data analysis, and statistical analysis. The research aims to provide a comprehensive understanding of the impact of open banking and API integration in the financial services sector, and to draw conclusions about the benefits and challenges of open banking and API integration for financial institutions, third-party providers, and customers. challenges of open banking and API integration for financial institutions, third-party providers, and customers.

IV. CHALLENGES AND RISKS

Open banking and API integration are helping the finance sector to grow rapidly, but they also come with a number of challenges and risks that need to be addressed. Some of the major challenges and risks include:

1. Security and Data Privacy: The sharing of financial data through open banking and API integration raises concerns about the security of sensitive financial information and the privacy of customers. Financial institutions need to implement strong security measures to protect against data breaches and unauthorized access to financial data.
2. Regulation: Open banking and API integration are still evolving and there is a lack of clear regulations and standards in place to govern these practices. This creates uncertainty for financial institutions and can lead to confusion and miscommunication.
3. Technical Complexity: Implementing open banking and API integration can be technically complex and challenging for financial institutions. There is a need for technical expertise and infrastructure to integrate these systems and ensure they are

secure and reliable.

4. Competition: Open banking and API integration can lead to increased competition in the financial services sector, which can be a threat to established financial institutions. Third-party providers can offer new financial services and innovative solutions that can disrupt the traditional financial services sector.
5. Integration Costs: Implementing open banking and API integration can be expensive for financial institutions. They need to invest in new technology, infrastructure, and personnel to integrate these systems and ensure they are secure and reliable.

V. APPLICATIONS AND FUTURE SCOPE

Open banking and API integration are transforming the financial services sector, offering new opportunities for financial institutions, third-party providers, and customers. Some major applications of open banking and API integration include

- Personal Finance Management: Open banking and API integration enable customersto access their financial data from multiple sources, including banks and other financial institutions and use this data to manage their finances more effectively.
- Digital Payment Solutions: Open banking and API integration enable third-party providers to offer new digital payment solutions, such as mobile wallets, digital currencies, and peer-to-peer payment systems. This can improve the speed, convenience, and accessibility of financial transactions.
- Financial Inclusion: Open banking and API integration can improve financial inclusion by providing access to financial services to underserved populations, such as those in rural areas and low-income communities.
- Financial Innovation: Open banking and API integration enable financial institutions and third-party providers to develop new financial services and solutions that are more innovative, efficient, and customer-centric.

The future scope of open banking and API integration in the financial services sector is bright, with many opportunities for growth and innovation. As technology continues toevolve, open banking and API integration will become even more widespread, leading to newfinancial services and solutions that are faster, more convenient, and more accessible for customers.

VI. CONCLUSION

In conclusion, open banking and API integration are having a major impact on the financial services sector, and the future of these technologies is exciting and full of opportunities. Financial institutions and third-party providers need to stay up-to-date with the latest developments and be proactive in developing new financial services and solutions that meet the evolving needs of customers. With the right approach, open banking and API integration has the potential to revolutionize the financial services sector, leading to a brighter and more innovative future for all stakeholders.

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Natural Language Processing

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Abstract— **Recent advancements in artificial intelligence and machine learning have led to significant improvements in the field of Natural Language Processing (NLP). Natural language processing is a field of artificial intelligence that deals with the interaction between computers and humans using natural language. NLP has made significant advancements in recent years and has revolutionized the way we interact with computers. In this paper, we present a comprehensive overview of recent developments in NLP, including new techniques for tex classification, sentiment analysis, and machine translation.**

We also discuss the challenges faced by NLP and the current state-of-the-art solutions to these problems. Furthermore, we provide insights into the future of NLP and the potential impact it can have on various industries. We review several NLP techniques, including sentiment analysis, named entity recognition, and machine translation, and assess their effectiveness and limitations.

Additionally, we discuss challenges faced in the field and future directions for research, including the development of robust NLP models that can handle real-world complexity and the integration of NLP with other AI technologies. The findings of this research highlight the potential of NLP to revolutionize the way we interact with computers and process information, and suggest exciting opportunities for future growth in this field.

Impact Statement: Natural Language Processing (NLP) is a rapidly growing field with a profound impact on various industries and domains. NLP technologies enable computers to understand and process human language, allowing for a more natural and intuitive interaction between humans and machines. This has led to a wide range of applications, such as sentiment analysis, language translation, text classification, and many others. NLP also plays a crucial role in the development of artificial intelligence, as it enables machines to understand and respond to human language, which is a critical component of human-like AI systems. The continued growth and development of NLP has the potential to revolutionize the way we interact with technology, making it easier, more natural, and more efficient.

Keywords: Text Pre-processing, Deep Learning, Text Classification, Sentiment Analysis, Machine Learning.

I.INTRODUCTION

The most popular method for analysing textual data is natural language processing. Sentiment analysis, text categorization and classification, language modelling, text summarization, etc. are typical applications of NLP. Natural language processing is one of the key components in today's world of growing machine learning and artificial intelligence applications.

Numerous NLP libraries have been created during the last few years, and many more are in various stages of development. Natural language processing libraries that are open-source include NLTK (Natural Language Tool Kit), TextBlob, SpaCy, Gensim, Fast Text, etc.

The field of Natural Language Processing (NLP) is broad and is covered by Artificial Intelligence (AI) technology. As a result of NLP, computer systems are now able to understand spoken and written words in a way that is comparable to how humans do it. NLP must be able to comprehend not just letters and words but also phrases, sentences, and paragraphs in their context using only syntax, semantics, grammar, etc. in order to achieve the desired result. NLP algorithms separate human language into pieces that are comprehensible by machines, which can be used to create NLP-based software. Thanks to the development of practical NLP packages in Python, NLP is now being used in a variety of industrial settings. In actuality, NLP is presently a key component of the advancement of deep learning. With the advent of transfer learning and pretrained language models in natural language processing, the limits of language comprehension and creation have been widened (NLP). The use of transformers and transfer learning in a variety of downstream NLP activities is the main trend of the most recent research advancements.

The most recent improvements in NLP language models appear to be a result of both the discovery of inventive methods for model lightening while keeping good performance and the massive advances in computing power. NLP models with strong empirical underpinnings and clear conceptual underpinnings include Bidirectional Encoder Representations from Transformers (BERT), GPT2, XLNet, and PaLM.

II. TEXT PRE-PROCESSING

Text pre-processing is a critical step in NLP that involves cleaning, normalizing, and transforming raw text data into a form suitable for analysis. The goal of text pre-processing is to prepare text data for NLP tasks, such as text classification, named entity recognition, and sentiment analysis, by removing irrelevant and noisy information.

Here are some common text pre-processing techniques used in NLP:

1. Text Normalization: This involves converting text into a standard format, such as converting all letters to lowercase or uppercase, removing diacritics, and standardizing punctuation.

2. Tokenization: This involves splitting text into individual words, phrases, or sentences.

3. Stop Word Removal: This involves removing common words, such as "the," "and," and "of," that do not carry significant meaning in a given context.

4. Stemming and Lemmatization: This involves reducing words to their root forms, which can help reduce the dimensionality of text data and improve NLP performance.

5. Part-of-Speech Tagging (POS): This involves

identifying the parts of speech in text, such as nouns, verbs, and adjectives.

6. Removing HTML Markup: This involves removing HTML tags, such as "<p>" or "<a>," that are used to format web pages.

7. Removing Special Characters: This involves removing special characters, such as numbers and punctuation, that do not carry significant meaning in a given context.

These are just a few examples of text pre-processing techniques used in NLP. The specific techniques used will depend on the type of text data and the NLP task at hand. However, text pre-processing is an important step in NLP that can help improve the accuracy and performance of NLP models.

III. TEXT REPRESENTATION

Text representation is a crucial step in NLP that involves converting text into a numerical format that can be processed by NLP algorithms. The goal of text representation is to convert raw text data into a format that captures the semantic meaning and context of the text, while preserving the relationship between words and phrases. There are several commonly used text representation methods in NLP, including:

1. One-hot Encoding: This method involves converting each word in a text document into a unique vector, where each dimension in the vector represents a different word.

2. Bag-of-Words (BOW) Model: This method involves representing text as a histogram of word frequencies, where each word in a document is treated as a separate feature.

3. N-grams: This method involves representing text as a sequence of contiguous word sequences, where each n-gram represents a unique feature in the text.

4. Term Frequency-Inverse Document Frequency (TF-IDF) Model: This method involves weighting words based on their frequency in a given document and the inverse frequency of the words in a corpus of documents.

5. Word Embeddings: This method involves representing words as continuous-valued vectors, where each dimension in the vector represents a different semantic or syntactic property of the word.

6. Sentence Embeddings: This method involves representing sentences as continuous-valued vectors, where each dimension in the vector represents a different semantic or syntactic property of the sentence.

The specific text representation method used will depend on the type of text data and the NLP task at hand. However, text representation is a critical step in NLP that can help improve the accuracy and performance of NLP models by capturing the semantic meaning and context of text data.

IV. TEXT CLASSIFICATION

Text classification is a common NLP task that involves assigning predefined categories or labels to text data based on its content. The goal of text classification is to automatically categorize text data into predefined categories, such as spam/not spam, positive/negative sentiment, or news topic.

There are several common text classification approaches used in NLP, including:

1. Naive Bayes: This is a probabilistic classifier that uses Bayes' theorem to predict the class of a text document based on the likelihood of different words and phrases appearing in the document.

2. Support Vector Machines (SVMs): This is a linear classifier that uses a boundary line to separate different classes of text data.

3. Neural Networks: This is a machine learning approach that uses artificial neural networks to model the relationship between text features and their corresponding class labels.

4. Convolutional Neural Networks (CNNs): This is a type of neural network specifically designed for text classification that uses convolutional filters to learn the relationship between words and phrases in a text document.

5. Recurrent Neural Networks (RNNs): This is a type of neural network specifically designed for text classification that uses a sequence of hidden states to capture the context and meaning of words and phrases in a text document.

6. Transformers: This is a type of neural network specifically designed for NLP tasks that uses self-attention mechanisms to learn the relationships between words and phrases in a text document.

The specific text classification approach used will depend on the type of text data and the requirements of the classification task. However, text classification is a critical step in NLP that can help automate the process of categorizing text data into predefined categories, which can be used for various NLP applications, such as sentiment analysis and text categorization.

V. NAMED ENTITY RECOGNITION (NER) NAMED ENTITY

Recognition (NER) is a subfield of

NLP that involves identifying named entities, such as

people, organizations, locations, and dates, in text data. The goal of NER is to extract structured information from unstructured text data, which can be used for various NLP tasks, such as information extraction, text classification, and question answering.

There are several common approaches to NER, including:

1. Rule-Based NER: This approach involves defining a set of rules to identify named entities in text data. The rules can be based on patterns of words and phrases,

part-of-speech tags, and other linguistic features.

2. Dictionary-Based NER: This approach involves

matching named entities in text data against a predefined dictionary of named entities. The dictionary can be created using manually annotated data or other sources of structured information.

3. Machine Learning-Based NER: This approach involves using machine learning algorithms, such as decision trees, support vector machines, and neural networks, to identify named entities in text data. Machine learning-based NER models can be trained on annotated text data to learn the patterns and features that are associated with named entities.

4. Hybrid NER: This approach involves combining multiple NER methods, such as rule-based and machine learning-based NER, to improve the performance and accuracy of NER.

The specific NER approach used will depend on the type of text data and the requirements of the NER task. However, NER is a critical step in NLP that can help automate the process of extracting structured information from unstructured text data, which can be used for various NLP applications, such as information extraction and text classification.

VI. PART-OF-SPEECH TAGGING (POS)

Part-of-Speech Tagging (POS) is a fundamental NLP task that involves identifying the grammatical category of each word in a text. The goal of POS is to label each word in a sentence with its corresponding part of speech, such as noun, verb, adjective, adverb, etc.

There are several common approaches to POS, including:

1. Rule-Based POS Tagging: This approach involves defining a set of rules to identify the part of speech of each word in a sentence. The rules can be based on patterns of words and phrases, word frequency, and other linguistic features.

2. Statistical POS Tagging: This approach involves using machine learning algorithms, such as Hidden Markov Models (HMMs), Maximum Entropy Models (MEMs), and Conditional Random Fields (CRFs), to identify the part of speech of each word in a sentence. Statistical POS tagging models are trained on annotated text data to learn the patterns and features that are associated with each part of speech.

3. Hybrid POS Tagging: This approach involves combining multiple POS tagging methods, such as rule-based and statistical POS tagging, to improve the performance and accuracy of POS tagging.

The specific POS tagging approach used will depend on the type of text data and the requirements of the POS tagging task. However, POS tagging is a critical step in NLP that can help automate the process of identifying the grammatical category of each word in a sentence, which can be used for various NLP tasks, such as parsing and information extraction.

VII. Parsing and Dependency Analysis

Parsing and Dependency Analysis are NLP tasks that involve analyzing the grammatical structure of a sentence to identify the relationships between words. The goal of parsing and dependency analysis is to identify the dependencies between words in a sentence, such as subject-verb, object-verb,

modifier-head, etc.

Parsing can be performed using several different approaches, including:

1. Rule-Based Parsing: This approach involves defining a set of rules to identify the grammatical structure of a sentence. The rules can be based on patterns of words and phrases, part-of-speech tags, and other linguistic features.

2. Statistical Parsing: This approach involves using machine learning algorithms, such as constituency parsers and dependency parsers, to identify the grammatical structure of a sentence. Statistical parsers are trained on annotated text data to learn the patterns and features that are associated with the grammatical structure of a sentence.

3. Hybrid Parsing: This approach involves combining multiple parsing methods, such as rule-based and statistical parsing, to improve the performance and accuracy of parsing.

Dependency analysis is a type of parsing that focuses on identifying the dependencies between words in a sentence. Dependency analysis can be performed using several different approaches, including:

1. Rule-Based Dependency Analysis: This approach involves defining a set of rules to identify the dependencies between words in a sentence. The rules can be based on patterns of words and phrases,

part-of-speech tags, and other linguistic features.

2. Statistical Dependency Analysis: This approach involves using machine learning algorithms, such as dependency parsers, to identify the dependencies between words in a sentence. Statistical dependency analysis models are trained on annotated text data to learn the patterns and features that are associated with the dependencies between words in a sentence.

Parsing and dependency analysis are critical steps in NLP that can help automate the process of identifying the grammatical structure and relationships between words in a sentence, which can be used for various NLP tasks, such as information extraction and text classification.

VIII. MACHINE TRANSLATION

Machine Translation (MT) is a NLP task that involves automatically translating text from one language to another. The goal of MT is to generate high-quality translations that are equivalent in meaning to the source text.

There are several different approaches to MT, including:

1. Rule-Based Machine Translation (RBMT): This approach involves defining a set of rules to translate text from one language to another. The rules can be based on patterns of words and phrases, grammar rules, and other linguistic features.

2. Statistical Machine Translation (SMT): This approach involves using machine learning algorithms, such as Hidden Markov Models (HMMs) and Phrase-Based SMT

(PB-SMT), to translate text from one language to another. Statistical MT models are trained on parallel corpora, which consist of sentence pairs in the source and target languages, to learn the patterns and features that are associated with the translation process.

3. Neural Machine Translation (NMT): This approach involves using deep neural networks, such as recurrent neural networks (RNNs) and transformer networks, to translate text from one language to another. NMT models are trained on parallel corpora to learn the patterns and features that are associated with the translation process.

The specific MT approach used will depend on the type of text data and the requirements of the MT task. However, MT is a critical step in NLP that can help automate the process of translating text from one language to another, which can be used for various NLP tasks, such as multilingual information retrieval and cross-lingual information extraction.

IX. CONCLUSION

In conclusion, NLP is a rapidly growing field that has the potential to transform the way we interact with and process language-based data. The field has made significant advances in recent years, leading to the development of new techniques and technologies for processing and understanding human language.

In this technical paper, we explored some of the key tasks and techniques in NLP, including text preprocessing, text representation, text classification, named entity recognition, part-of-speech tagging, parsing and dependency analysis, and machine translation. We discussed the approaches used for each task and highlighted the key challenges and future directions for NLP research.

It is clear that NLP has a significant impact on many different areas, including information retrieval, text summarization, sentiment analysis, and machine translation. The field continues to grow and evolve, with new technologies and techniques being developed all the time. As a result, the future of NLP looks promising, with the potential to revolutionize the way we interact with and process language-based data.

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Blockchain and its applications in finance

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Abstract- **Blockchain technology has gained widespread acceptance and recognition in recent years, with finance being oneof its most notable fields of use. This cutting-edge technology presents an attractive alternative to traditional banking institutions by providing a safe, open, and decentralised platform for financial transactions. This study takes a close look at blockchain technology and its financial applications, including supply chain financing, digital currencies, smart contracts, and decentralised finance. We look at the numerous advantages of blockchain technology for the banking industry, including improved security, lower costs, and wider accessibility. While admitting the difficulties and constraints that blockchain technology in the financial sector currently faces, we do make confident predictions about what the future may hold for these applications. For researchers, practitioners, and policymakers who are interested in investigating the full potential of blockchain technology in finance, this article is an essential resource..**

I. INTRODUCTION

Blockchain technology has lately revolutionised several industries, and it is now widely accepted and welcomed in all of them. It fulfils a number of essential functions, including offering a decentralised, safe, and accessible platform for business transactions in the financial industry. Blockchain technology may have a big impact on the financial sector by improving security and transparency while decreasing costs and expanding accessibility. Established financial systems may be upended, opening up fresh possibilities for financial innovation. This essay will discuss the principles of blockchain technology and how it relates to money. We'll talk about blockchain's essential elementsand how it differs from conventional financial systems. Decentralised finance, smart contracts, digital currencies, supply chain finance, and other financial sectors all leverage blockchain

III. APPLICATIONS OF BLOCKCHAIN IN FINANCE

Blockchain technology is used in a broad variety of financialapplications, including cryptocurrencies, smart contracts, technology. We'll also discuss the advantages that implementing blockchain technology might have for the banking industry in terms of cost reductions, security upgrades, and more transparency. In the next section, we'll examine what blockchain is likely to develop into in the future and offer answers to issues including soaring demand, rigid regulations, and widespread use. We'll also look at blockchain's challenges in the financial sector.inleading journals to complete their grades.

II. COMPREHENSIVE LOOK AT BLOCKCHAINTECHNOLOGY

Blockchain technology is a decentralised platform that securely records and tracks transactions. It uses a distributed ledger, maintained and updated by a network of computers (nodes), instead of relying on a central authority. The ledger consists of blocks that hold information about transactions, linked to each other using cryptography, making it almost impossible to alter theinformation in any block undetected. Blockchain was initially introduced as the underlying technology for Bitcoin, the world's first decentralised cryptocurrency. Since then, it has been adapted for various other uses, including finance. In finance, blockchain provides a secure and transparent platform for financial transactions, making it an attractive alternative to traditional financial systems, which are often centralised and prone to fraud and manipulation. supply chain financing, and decentralised finance (DeFi). Let's examine each of these applications in more detail.

A. Cryptocurrencies:

Cryptocurrencies are digital money that safely and openly record transactions using blockchain technology. There are various

cryptocurrencies, including Ethereum, Ripple, and Litecoin, however Bitcoin is the most well-known. Cryptocurrencies aredecentralised, which means they are not under the control of a single entity, and employ encryption to safeguard transactions and thwart fraud and manipulation. They enable peer-to-peer exchanges devoid of middlemen.

B. Smart Contracts:

Smart contracts are self-executing agreements with the terms of the deal between buyer and seller written directly into code. Theyare automatically executed when the conditions of the contract are met, eliminating the need for intermediaries like lawyers or banks. Smart contracts use blockchain technology to securely and transparently record and enforce the terms of the agreement, enabling faster and more efficient financial transactions while reducing the costs and risks associated with traditional financial systems.

C. Decentralised Finance:

Decentralised finance (DeFi) creates a peer-to-peer financial network that operates without the use of middlemen using blockchain technology. Lending, borrowing, and trading may all be done on the DeFi platform using a number of blockchain-based financial operations. DeFi has the ability to overturn conventional financial institutions by offering financial services to underserved populations, cutting costs, and enhancing accessibility.

Table 1 Number of academic papers on blockchain

	WOS-All	WOS-Articles	WOS-Business & Economics
Before2015	0	0	0
2015	4	1	0
2016	40	28	5
2017	200	158	45
2018	553	453	61
#2019	138	116	8
Total	925	756	119

D. Supply Chain Finance:

Supply chain financing is a method of financing firms involved in the supply chain so they may satisfy their financial obligations and enhance their cash flow. In the conventional supply chain finance model, financial intermediaries like banks are used to provide the funding. However, by enabling safe and transparent transactions between vendors, customers, and financiers without the need for middlemen, blockchain technology has the potential to completely transform supply chain financing. As a consequence, the supply chain financing procedure may become more affordable, efficient, and transparent.

IV. RESEARCH METHODOLOGY:

This research paper will analyse the financial applications of blockchain technology as well as its advantages and disadvantages using a qualitative study technique. The study plan will consist of multiple steps, including a literature review, data collecting, data analysis, and conclusion.

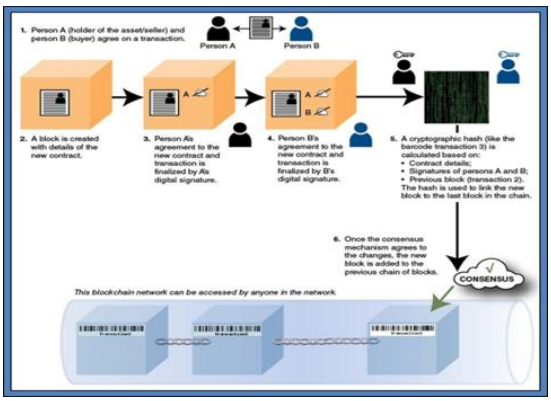
V. LITERATURE SURVEY

Blockchain technology has become a popular topic in the field of finance in recent years, with researchers and practitioners alike exploring its potential benefits and challenges. This literature review aims to provide a comprehensive overview of the existing research on blockchain technology and its applications in finance.

Starting with the benefits, blockchain technology in finance has the potential to increase efficiency and reduce costs by providing a secure and transparent platform for financial transactions. By reducing the need for intermediaries and associated costs, blockchain technology can lower transaction fees and improve the speed of transactions, making financial services more accessible to a wider range of consumers. Additionally, the decentralised nature of blockchain technology enhances security and reduces the risk of fraud, building trust in the financial system. However, using blockchain technology in banking is not without its challenges. One of the main issues is the lack of regulatory clarity, which makes it challenging for financial institutions to adopt and for clients to trust it. Another problem that leads to misunderstanding and restricts the potential benefits of blockchain technology is a lack of standardisation. Despite these challenges, a significant amount of study has been done on blockchain technology and its financial applications. Additional research is needed to analyse the real applications of blockchain technology in banking, as well as the benefits and challenges of adoption. This covers how regulatory agencies encourage its usage and how it affects the financial industry.

This literature study concludes by highlighting the possible advantages and difficulties of implementing blockchain technology in the financial sector. Although the current research offers insightful information, this area still need more research. By analysing the financial uses of blockchain technology as well as the advantages and difficulties of its adoption, this paper seeks to make a contribution.

This completes the entire process required for widespread of research work on open front. Generally all International Journals are governed by an Intellectual body and they select the most suitable paper for publishing after a thorough analysis of submitted paper. Selected paper get published (online and printed) in their periodicals and get indexed by number of sources.



VI. DATA COLLECTION:

The phase of this study's data collection is to obtain information regarding blockchain technology and its financial applications. This will be accomplished by combining secondary and primary sources, such as academic journals, books, reports, and interviews with subject-matter experts. To obtain secondary data, a thorough examination of the body of knowledge and published sources on blockchain technology and finance will be conducted. Reading this will enable you to comprehend the current status of the field's study as well as the benefits and drawbacks of utilising blockchain technology in the financial sector. To collect primary data, semi- structured interviews will be conducted with experts in blockchain technology and finance. The data will be coded, themes and patterns will be found, and conclusions will be made utilising qualitative research to interpret the data. The data analysis will give a thorough grasp of the present status of financial and technological aspects of blockchain, including advantages and disadvantages. Measures including choosing experts based on their experience and competence, posing questions that are closely connected, and triangulating data from secondary and primary sources will be done to assure the authenticity and trustworthiness of the data.

In summary, the data gathering stage will offer a thorough grasp of blockchain technology and finance, as well as its advantages and disadvantages, through the use of both secondary and primary sources and a qualitative research methodology. For further analysis and discussion in the study, the findings will serve as the

starting point.

VII. DATA ANALYSIS:

The information acquired from secondary and primary sources was analysed using the qualitative research methodology. Gaining a thorough grasp of the state of blockchain technology today, its uses in finance, as well as its advantages and disadvantages, was the aim. Via improved efficiency, transparency, and security in financial transactions, it was discovered through the study of secondary data that blockchain technology has the ability to revolutionise finance. Regulatory and legal obstacles, security dangers, and a lack of technical expertise in the sector are just a few of the problems that still need to be solved. Some significant conclusions were drawn from the main data analysis of interviews with professionals in the financial and blockchain fields. The experts stressed how blockchain technology may increase efficiency, transparency, and security in the financial sector. They acknowledged the difficulties in adopting it, including regulatory problems, security issues, and a lack of technological know-how. To ensure the effective application of blockchain technology in finance, it was also highlighted how crucial cooperation between technology firms, financial institutions, and regulators is. The panellists talked on the possible uses of blockchain technology in finance in the future, including decentralised banking and fusion with other cutting-edge innovations like artificial intelligence and the internet of things.

As a result of the data analysis, it can be concluded that blockchain technology has the potential to improve the financial sector, but there are still issues that must be resolved. The experts feel there is significant potential for blockchain technology's future expansion in the financial sector. Collaboration between key stakeholders is essential for the implementation of blockchain technology in finance.

VIII. CONCLUSION:

The goal of this research was to gain a thorough understanding of the present state of blockchain technology and its use in banking. Our findings imply that blockchain has the potential to greatly improve the financial industry by boosting transactional security, efficiency, and transparency. However, its acceptability is still in its early stages due to a range of factors such as legal limits, security concerns, and a lack of technological expertise in the sector. Cooperation between technology corporations, financial institutions, and regulators is essential for blockchain to be utilised successfully in finance. Furthermore, the experts we spoke with shared their thoughts on the future of decentralised banking and the application of blockchain to other cutting-edge technologies such as artificial intelligence and the internet of things. In conclusion, blockchain has the potential to transform banking, but implementing it fully will need overcoming several difficulties. The future appears good with the possibility of more breakthroughs and integration with other technologies, and collaboration amongst important actors in the sector is essential for success.

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Automated Question Generator resulting in the formulation of Automated Question Paper Generation

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Abstract— **The main objective of automatic question paper generation is to provide educators and researchers with a convenient and efficient way to create practice tests and assessments for students. AQPG systems can be designed to extract information from a range of sources, including textbooks, lecture notes, and existing question banks, to generate questions and answers. The questions generated can be customized based on factors such as difficulty level, topic, and learning objectives. This can help ensure that the generated questions are relevant, accurate, and effective in assessing student learning. Additionally, automatic question paper generation can also help to ensure that the questions are unbiased and free from errors, thereby providing students with a fair and reliable assessment experience. The proposed model aims at taking input from the teachers in form of subjective keywords, RBT levels to be achieved and the competency between keywords to generate simple and composite questions which further can be randomized to obtain pool of questions.**

Index Terms—About four key words or phrases in alphabetical order, separated by commas.
Introduction

Educational tests are one of the primary tools used to assess the students' performance. The short answer type questions and essay type questions requires the students to write their answers in short sentences. The evaluation of the short answers is done based on sentence similarity, which is defined as sentences that have similar meaning with different words. In the past few years, considerable amount of research has been done in automatic grading of short answers. Several attempts have been made to automatically grade the answers to a short-answer question.

Systems for automating the assessment of textual answers have been available commercially since the mid 1990's. From the very beginning, various methods of educations have been proposed to make learning easier and more effective. The growth and development in the internet and the web technologies has led to the availability of information anywhere and anytime and to anyone. This has greatly influenced every existing system.

The explosive advancement in the field of Artificial Intelligence, Expert Systems and Natural Language Processing provides a platform in which an effective system for the automation of scoring the content can be done efficiently. The main objective of the proposed work is to explore and investigate the feasibility & performance of a scoring logic that would consider every unigram obtained by pre-processing the textual short answer, to form the answer automatically.

The efficiency and effectiveness of the proposed scoring logic implemented on a system will be measured against the comparison with agreement rate with the human evaluators and the performance of the other systems that are implemented. The proposed model grades the short textual answer given by students' by weighing and comparing the unigrams that were obtained while pre-processing the answers with the unigrams obtained after pre-processing the model answer set by the subject expert.

In today's modern, ambitious world, an exam plays a vital role in checking the educational improvement of students, and the technology of the information era is now substituted through the productive application of the technology. Any product which can correctly reduce time and power consumption is accepted and preferred. So, producing software from knowledge is a crucial task to do. In all the academic courses that reject a variety of tests, the instructor intends to create important documents in accordance with the guidelines and assessments of the autonomic university. It is much more challenging to deal with all the course features for teachers and avoid duplicating questions from subsequent estimates.

There is no systematic process, and for this reason, this problem's paper quality is predicted for individual teachers and qualifications. The truth that there is a shortage of experienced teachers makes the situation even worse for specifying courses, semesters, syllabus, and patterns. At times, all these factors might also deteriorate the quality of the question paper. The researcher says a good questionnaire is the right combination of subjects (questions) guided by various parameters: cognitive level, difficulty, and distribution of scores on the questionnaire. Creating a good questionnaire that contains many questions related to gaining knowledge about the purpose of a course in terms of content and cognitive level is a difficult task. So, we are presenting an Automatic Question Paper Generator System. which could reduce time intake by replacing the traditional approach of question paper

generation.

The system is designed such that it has provisions to enter and edit data suitable to any educational organization with complete freedom. Automatic test paper generation refers to questions selected from the question bank and automatically generates different kinds of papers that meet the requirements of teaching, so it is a typical solution process of the constraint satisfaction problem (CSP). The evolution of traditional and existing Question Paper Generation systems and the need for an automated system is unraveled.

I. CONTEXT

Automatic paper generation is used in a variety of contexts, including academic research, journalism, and content creation. In the academic context, automatic paper generation can be used to save time and effort in writing and publishing research papers. For example, researchers can use automatic paper generation to generate initial drafts of papers, which can then be reviewed, edited, and improved upon by human authors. In journalism, automatic paper generation can be used to produce news articles, reports, and other written content quickly and efficiently. In content creation, automatic paper generation can be used to generate blog posts, product descriptions, and other types of written content for websites and other online platforms. The goal of automatic paper generation is to increase efficiency and productivity while still maintaining high standards of quality and accuracy.

II. MOTIVATION

The motivation behind an automatic question paper generator is to save time and effort in creating question papers, especially in educational settings where large number of question papers are required on a regular basis. It can also reduce human error and ensure consistency in question difficulty and format. Additionally, the use of such a tool can facilitate the creation of customized question papers based on specific criteria such as difficulty level, subject, and topic. Additionally, it can help in generating papers with a greater level of fairness and diversity, as it reduces the possibility of human biases in the selection of questions. Furthermore, it can also provide options for customization and flexibility, ensuring that the generated paper fits the specific requirements of the exam. Automatic question paper generation is a process of using computer algorithms and software to create exams or tests. The goal is to generate high-quality, relevant questions that can be used in place of manual question paper preparation. This method can save time, reduce the risk of human error, and provide more efficient assessment.

Some of the common techniques used in automated question paper generation include natural language processing, knowledge representation and reasoning, and machine learning. These techniques can be used to generate questions based on specific topics or learning objectives, as well as to create questions that adapt to individual student needs and abilities.

Benefits of automated question paper generation include increased efficiency, reduced time spent on question preparation, reduced costs associated with manual question preparation, and improved assessment quality. Additionally, this method can provide greater flexibility and customization, allowing educators to easily create and modify tests to meet their specific needs.

Despite these benefits, there are also some challenges associated with automated question paper generation, including the need for high-quality training data, the difficulty of ensuring the fairness and validity of generated questions, and the potential for generating questions that lack creativity or originality.

III. LITERATURE **SURVEY**

Question Generator is a tool that uses machine learning to generate questions based on a provided text. It is designed to automate the process of question paper preparation by generating questions from a given text or set of texts. The tool uses advanced algorithms to analyze the text and identify key concepts, then uses this information to generate questions based on these concepts. The questions can be multiple choice, true/false, or open-ended, and can be tailored to meet specific learning objectives or assessment goals.

Question Generator can save educators time and effort in preparing questions, while also providing more flexibility and customization options compared to manual question preparation. Additionally, the tool can help to reduce the risk of human error, improve the quality and relevance of generated questions, and provide a more efficient and cost-effective assessment solution. However, it's important to note that the quality of the generated questions can depend on the quality of the training data used to develop the machine learning model, and there may be limitations to the fairness and validity of generated questions. As with any automated tool, it's important to carefully review and evaluate generated questions to ensure that they meet the desired learning objectives and assessment goals.

There are various automated systems available for question paper generation, based on the platform the system is integrated in they can be grouped as listed below.

AI-powered platforms: These platforms use artificial intelligence and machine learning algorithms to generate questions based on specific topics or learning objectives.

Exam software: Exam software provides an easy-to-use interface for creating and managing exams, including the generation of questions based on pre-defined templates or custom settings.

Question banks: These databases contain many pre-written questions that can be used to generate exams. The questions can be filtered based on specific topics or learning objectives.

Cloud-based solutions: These solutions allow for the creation, management, and distribution of exams over the internet, making it possible to generate exams from anywhere with an internet connection.

Learning management systems (LMS): Some LMSs have built-in question paper generation capabilities, allowing educators to create exams and assessments as part of their overall course management process.

These systems vary in terms of their features, user interface, and cost, so it's important to research and compare the different options to find the one that best meets your needs. Additionally, it's important to consider factors such as the quality and reliability of the generated questions, the level of customization and flexibility offered, and the overall cost and efficiency of the system.

ExamPLANNER: A cloud-based solution that allows educators to generate and manage exams, quizzes, and other assessments.

Description: ExamPLANNER is a comprehensive exam management tool that provides a range of features for generating, storing, and administering exams.

Stats: ExamPLANNER has a user-friendly interface and is available on a subscription basis.

Pros:

- Easy to use and navigate
- Offers a variety of question types
- Can be used to create exams, quizzes, and other assessments
- Provides efficient and cost-effective exam management

Cons:

- May have limited customization options
- May require an internet connection

eQuestionPaper: A web-based platform that enables users to create and manage exams, quizzes, and other types of assessments.

Description: eQuestionPaper is a web-based platform that provides a range of features for exam management and question paper generation.

Stats: eQuestionPaper is available on a subscription basis and has a user-friendly interface.

Pros:

- Easy to use and navigate
- Offers a variety of question types
- Can be used to create exams, quizzes, and other assessments
- Provides efficient and cost-effective exam management

Cons:

- May have limited customization options
- May require an internet connection

Question Bank: A cloud-based solution that provides a library of pre-generated questions for educators to use in creating assessments.

Description: Question Bank is a cloud-based solution that provides a library of pre-generated questions for educators to use in creating assessments.

Stats: Question Bank is available on a subscription basis and has a user-friendly interface.

Pros:

- Offers a large library of pre-generated questions
- Can be used to create exams, quizzes, and other assessments
- Provides efficient and cost-effective exam management
- Can save time compared to manual question preparation

Cons:

- May have limited customization options
- May require an internet connection

AutoExam: A question paper generation software that utilizes machine learning and natural language processing to generate questions based on specific topics or learning objectives.

Description: AutoExam is a software that uses advanced algorithms to generate exam questions based on user-specified topics or learning objectives.

Stats: AutoExam is available on a subscription or one-time purchase basis and has a user-friendly interface.

Pros:

- Can generate high-quality and relevant questions
- Can be used to create exams, quizzes, and other assessments
- Provides efficient and cost-effective exam management
- Can save time compared to manual question preparation

Cons:

- May have limited customization options
- May require an internet connection

QuillBot Exam Generator: A cloud-based platform that uses natural language processing to generate exam questions based on user-specified topics.

Description: QuillBot Exam Generator is a cloud-based platform that uses natural language processing to generate exam questions based on user-specified topics.

Stats: QuillBot Exam Generator is available on a subscription basis and has a user-friendly interface.

Pros:

- Can generate high-quality and relevant questions
- Can be used to create exams, quizzes, and other assessments
- Provides efficient and cost-effective exam management
- Can save time compared to manual question

Here is a list of systems focused on engineering question paper generation:

TestGen: A software that provides a library of engineering questions and enables users to generate custom exams and quizzes.

Description: TestGen is a software that provides a library of engineering questions and enables users to generate custom exams and quizzes.

Stats: TestGen is available on a one-time purchase basis and has a user-friendly interface.

Pros:

- Offers a large library of engineering questions
- Can be used to create exams, quizzes, and other assessments
- Provides efficient exam management
- Can save time compared to manual question preparation

Cons:

- May have limited customization options
- May require an internet connection

eEngineeringExam: A web-based platform that provides a library of engineering questions and enables users to generate custom exams and quizzes.

Description: eEngineeringExam is a web-based platform that provides a library of engineering questions and enables users to generate custom exams and quizzes.

Stats: eEngineeringExam is available on a subscription basis and has a user-friendly interface.

Pros:

- Offers a large library of engineering questions
- Can be used to create exams, quizzes, and other assessments
- Provides efficient exam management
- Can save time compared to manual question preparation

Cons:

- May have limited customization options
- May require an internet connection

IV. LITERATURE SURVEY

Various work has been done to automate the question generation and with The explosive advancement in the field of Artificial Intelligence, Expert Systems and Natural Language Processing provides a platform in which an effective system for the automation of scoring the content can be done efficiently.

♦"A Survey of Automated Question Generation Approaches and Systems" by Omid Mohamadinejad and W. Lewis Johnson, published in the Journal of Educational Technology Development and Exchange in 2018.

♦"Automated Question Generation for Online Learning: A Literature Review" by Wei-Ting Hsu, Yin-Leng Theng, and Sin-Wai Chan, published in the International Journal of Emerging Technologies in Learning in 2016.

♦"Automated Question Generation for Educational Assessment: A Review" by B. Y. Lee, Y. K. Tan, and B. H. Chia, published in the Journal of Educational Technology Development and Exchange in 2013.

♦"Automated Question Generation in E-Learning: A Review" by K. A. Mani and P. S. Kumar, published in the International Journal of Emerging Technologies in Learning in 2012.

♦"A Survey of Automated Question Generation Techniques" by H. Zhang, X. Hu, and J. Liu, published in the International Journal of Artificial Intelligence in Education in 2011.

♦"Automated Question Paper Generation Using Ontology-Based Approach" by B. Akila and R. Kavitha. This paper proposes an approach to automated question paper generation using an ontology-based model to represent domain knowledge.

♦"Automated Question Paper Generation using Natural Language Processing" by S. Sharma and A. Gupta. This paper describes a system that uses natural language processing techniques to automatically generate question papers.

♦"Design and Implementation of an Automated Question Paper Generation System" by P. Nandhini and R. Karthikeyan. This paper presents a system that uses rule-based algorithms to generate question papers based on user inputs.

♦"A Review of Automated Question Paper Generation Techniques" by A. Singh and S. Singh. This paper provides an overview of different automated question paper generation techniques, including rule-based approaches, machine learning approaches, and natural language processing techniques.

♦"Automated Question Generation using Semantic Networks" by S. Maheswari and R. Nallusamy. This paper proposes an approach to automated question generation using semantic networks to represent domain knowledge.

Overall, the literature on automated question paper generators suggests that they have the potential to be a useful tool for educators and instructors, but that further research is needed to improve the quality and effectiveness of these systems.These papers provide an overview of the state of the art in automated question generation and may provide valuable insights into different approaches and systems.

V. LIMITATIONS OF EXISTING SYSTEMS

Traditional question paper generation methods have several limitations, including:

►Time-consuming: The manual process of selecting, organizing and arranging questions is time-consuming and labour-intensive.

►Human error: The possibility of human error and biases in the selection of questions, leading to unfair and imbalanced examination papers.

►Limited diversity: The manual selection process often results in a limited diversity of questions, making it difficult to test a wide range of student abilities.

►Lack of customization: The manual process does not provide options for customization, making it difficult to fit the specific requirements of an exam.

►Inefficient: The manual process is often inefficient, leading to a higher likelihood of errors and inconsistencies in the examination paper.

VI. Need for Automated Question Paper Generation

The need for an automatic question paper generator arises from the need to simplify and streamline the process of creating examination papers. Some of the key benefits include:

►Time-saving: The manual process of creating examination papers can be time-consuming and labour-intensive. An automatic question paper generator eliminates the need for manual selection and arrangement of questions, saving time and effort.

►Increased fairness and diversity: An automatic question paper generator reduces the possibility of human biases and error in selecting questions, thereby increasing fairness and diversity in the examination paper.

►Customization: An automatic question paper generator provides options for customization, allowing the user to specify the type and number of questions, difficulty level, and other criteria, ensuring that the generated paper fits the specific requirements of the exam.

►Improved accuracy: An automatic question paper generator reduces the possibility of human error and ensures that the generated paper adheres to specified criteria, improving the overall accuracy of the examination paper.

VII. Development & Deployment

AQPG is a system developed with the objective of being versatile with provisions to suite the requirement of any educational organization with complete freedom. To achieve this, the system design is grounded on different evaluation levels built on the basic Blooms Taxonomy Learning Levels. The levels defined may vary according to the requirement of the varied educational institutions. Being developed in an engineering institution we have defined levels that would be apt and serve all the engineering institutions.

Based on the Learning Levels defined in the bloom's taxonomy, we are provided with a metric level at which the outcome is obtained. While the Blooms' taxonomy provides us with the basic metric it can be combined to form different metrics of measuring the outcomes achieved. In the context of an automatic question paper generator, the cognitive and sub-cognitive levels can be defined as follows:

Cognitive Level: The cognitive level refers to the level of thinking and understanding required to answer a question. In the case of an automatic question paper generator, this level can be used to classify the difficulty of the questions generated. For example, questions that require basic recall or recognition of information may be at a lower cognitive level, while questions that require higher order thinking skills such as analysis, synthesis, and evaluation may be at a higher cognitive level.

In the system designed we have defined Cognitive levels based on the graduate attributes and the subjects that are offered in the engineering curriculum. To ensure that we have questions evaluating students on every level of the Bloom's Taxonomy and to maintain the consistency of the weightage given to the modules and chapters in the syllabus we split the cognitive levels to different levels described below:

Foundation: Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers

Comprehension: Construct meaning from instructional messages, including oral, written, and graphic communication by organizing of facts and ideas comparing, translating, interpreting, giving, descriptions, and stating main ideas.

Application: Solve problems to new and complex situations by applying the acquired knowledge, facts, techniques, and rules with out-of-the box thinking in different ways.

Analytical: Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.

Sub-Cognitive Level: The sub-cognitive level refers to the level of mental processing that is required to answer a question. This level is more granular than the cognitive level and can be used to further refine the difficulty of the questions generated. For example, questions that require simple matching or identification of information may be at a lower sub-cognitive level, while questions that require complex reasoning or problem-solving may be considered to be at a higher sub-cognitive level.

Sub-cognitive levels with relevance to the field of engineering were defined and structured to ensure that the student' reasoning ability and intellect is developed and measured. The sub-cognitive levels defined gave the means to measure the aspect of the outcomes defined is attained and thus ensuring continuous improvement and change in the syllabus and bridging the gap between the curriculum and the industry. The different sub-cognitive levels defined are as shown below:

Engineering Aspect: The questions in this sub-cognitive level would measure if the graduate attributes and the outcomes of the course relevant to the Fundamental engineering concepts.

Industry Aspect: The questions framed under this type would evaluate the student on their understanding of the latest trends in the industry and the concurrent skills practiced in the industry.

Research Aspect: The questions categorized under this type would evaluate the student's ability to frame research relevant problems and propose suitable solutions.

Technology Aspect: These questions categorized under this type is intended to evaluate the students based on the technologies that fall under the specified subject domain and ensure ease of use.

By considering the varied levels upon which the questions are generated, the automatic question paper generator creates a balance in the toughness and ensures appropriately challenging set of questions for

a given topic or subject is framed.

Map-Reduce w.r.t BT: Mapping of the levels defined above to the Blooms Taxonomy levels is to ensure that the questions generated are mapped to relevant learning levels and are framed to ensure that the attainment of the subjects are measurable and aligned to the outcome based education model. This is done by mapping of relevant keywords under every Blooms Taxonomy level to the Sub-Cognitive Levels that is defined. This is done to map, refine and to reduce the combinations of keywords that is used to frame a question and gives us with a resulting better mapped and structured question paper.

Sub – Cognitive Levels	R	U	A	AN	E	C
ENGG. ASPECT	DEFINE	EXPLAIN	SHOW	IDENTIFY	DESCRIBE	DRAW
	STATE	ILLUSTRATE	CLASSIFY	DIFFERIENTIATE	SELECT	RE-WRITE
	LIST	DERIVE	CHOOSE		EXPLAIN	ARRANGE
	DRAW	DESCRIBE	APPLY			REVISE
		DISTINGUISH	SOLVE			CREATE

Sub – Cognitive Levels	R	U	A	AN	E	C
INDUSTRY ASPECT	RECALL	GIVE EXAMPLE	COMPUTE	ANALYZE	ESTIMATE	INTEGRATE
	OUTLINE	COMPREHEND	REVIEW		ASSESS	DEVELOP
	WRITE	EXPLAIN	CALCULATE			
			ILLUSTRATE			

fig 1: -Map-reduce for cognitive and sub-cognitive levels

Proposed Model: With the scope of generating a question paper for the engineering subjects we in this paper propose a model that would combine the above discussed cognitive and sub-cognitive levels and map the same to the keywords of the relevant subject and the

♦ **Input:** The user (Teacher) will input the subjective keywords and make selection for respective bloom taxonomy learning levels. The teacher will also provide with particulars about the paper viz marks, distribution, and other demographic information.

♦**Processing:** The designed system will concatenate the inputs given by the user in context to the learning levels, cognitive levels and sub-cognitive level as mentioned. The map-reduce algorithm enlists the relevant action verb to add to the significance of the framed questions

♦**Output:** After the particulars are fed and processed the paper is generated in the said format. The question paper generated has a fair mapping of all modules and a significant trade off between learning levels and the subjective topics

Proposed Model

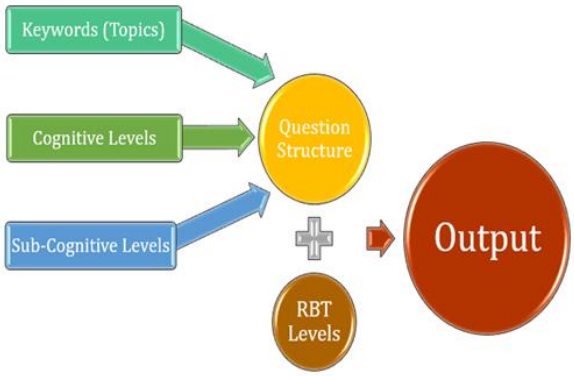
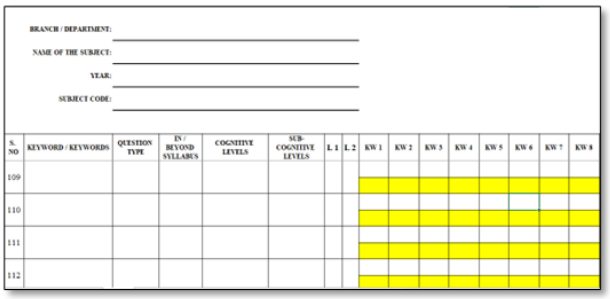


fig 2: -Block Diagram of Proposed Model

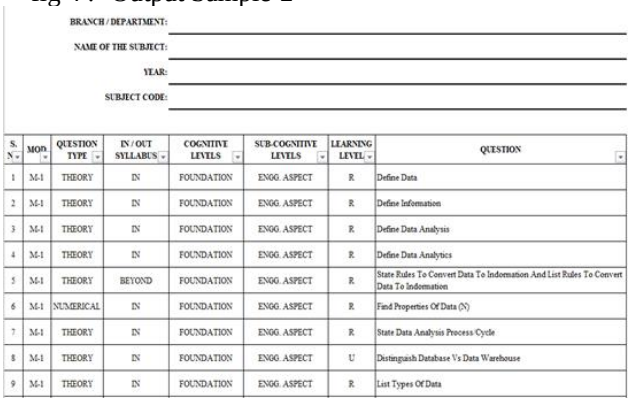

BRANCH / DEPARTMENT:
NAME OF THE SUBJECT:
YEAR:
SUBJECT CODE:

S. NO	KEYWORD / KEYWORDS	QUESTION TYPE	IN / BEYOND SYLLABUS	COGNITIVE LEVELS	SUB-COGNITIVE LEVELS	L 1	L 2	KW 1	KW 2	KW 3	KW 4	KW 5	KW 6	KW 7	KW 8
109															
110															
111															
112															

fig 3 : -Output Sample-1

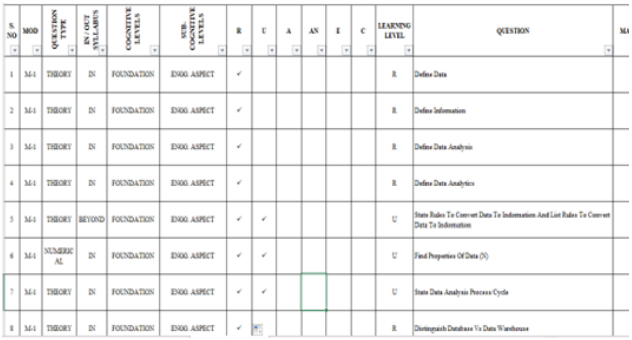
S. NO	KEYWORD / KEYWORDS	MODULE	QUESTION TYPE	IN / BEYOND SYLLABUS	COGNITIVE LEVELS	SUB-COGNITIVE LEVELS	L 1	L 2	KW 1	KW 2	KW 3	KW 4	KW 5	KW 6	KW 7	KW 8
1	Data	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R		DEFINE	STATE	LIST	DRAW	0	0	0	0
									1							
2	Information	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R		DEFINE	STATE	LIST	DRAW	0	0	0	0
									1							
3	Data Analysis	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R		DEFINE	STATE	LIST	DRAW	0	0	0	0
									1							
4	Data Analytics	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R		DEFINE	STATE	LIST	DRAW	0	0	0	0
									1							
5	Rules to Convert Data to Indomation	M-1	THEORY	BEYOND	FOUNDATION	ENGG. ASPECT	R		DEFINE	STATE	LIST	DRAW	0	0	0	0
										1	1					
6	Properties of Data (N)	M-1	NUMERICAL	IN	FOUNDATION	ENGG. ASPECT	R		FIND	0	0	0	0	0	0	0
									1							
7	Data Analysis process/Cycle	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R		DEFINE	STATE	LIST	DRAW	0	0	0	0
										1						
8	Database vs data warehouse	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	U		EXPLAIN	ILLUSTRATE	DERIVE	DESCRIBE	DISTINGUISH	0	0	0
													1			

fig 4 : -Output Sample-2


BRANCH / DEPARTMENT:
NAME OF THE SUBJECT:
YEAR:
SUBJECT CODE:

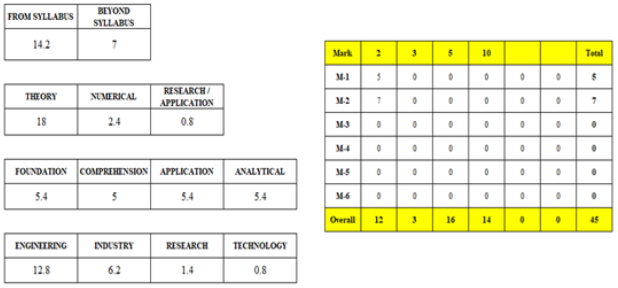
S. N	MOD	QUESTION TYPE	IN / OUT SYLLABUS	COGNITIVE LEVELS	SUB-COGNITIVE LEVELS	LEARNING LEVEL	QUESTION
1	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R	Define Data
2	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R	Define Information
3	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R	Define Data Analysis
4	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R	Define Data Analytics
5	M-1	THEORY	BEYOND	FOUNDATION	ENGG. ASPECT	R	State Rules To Convert Data To Indomation And List Rules To Convert Data To Indomation
6	M-1	NUMERICAL	IN	FOUNDATION	ENGG. ASPECT	R	Find Properties Of Data (N)
7	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R	State Data Analysis Process/Cycle
8	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	U	Distinguish Database Vs Data Warehouse
9	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	R	List Types Of Data

fig 5: -Output Sample-3



S. NO	MOD	QUESTION TYPE	IN / OUT SYLLABUS	COGNITIVE LEVELS	BTL COGNITIVE LEVELS	R	U	A	AN	E	C	LEARNING LEVEL	QUESTION	MA
1	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	✓						R	Define Data	
2	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	✓						R	Define Information	
3	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	✓						R	Define Data Analysis	
4	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	✓						R	Define Data Analytics	
5	M-1	THEORY	BEYOND	FOUNDATION	ENGG. ASPECT	✓	✓					U	State Rules To Convert Data To Information And List Rules To Convert Data To Information	
6	M-1	NUMERICAL	IN	FOUNDATION	ENGG. ASPECT	✓	✓					U	Find Properties Of Data (N)	
7	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	✓	✓					U	State Data Analysis Process Cycle	
8	M-1	THEORY	IN	FOUNDATION	ENGG. ASPECT	✓	✓					R	Distinguish Database Vs Data Warehouse	

fig 6: -Output Sample-4



FROM SYLLABUS	BEYOND SYLLABUS
14.2	7

THEORY	NUMERICAL	RESEARCH / APPLICATION
18	2.4	0.8

FOUNDATION	COMPREHENSION	APPLICATION	ANALYTICAL
5.4	5	5.4	5.4

ENGINEERING	INDUSTRY	RESEARCH	TECHNOLOGY
12.8	6.2	1.4	0.8

Mark	2	3	5	10			Total
M-1	5	0	0	0	0	0	5
M-2	7	0	0	0	0	0	7
M-3	0	0	0	0	0	0	0
M-4	0	0	0	0	0	0	0
M-5	0	0	0	0	0	0	0
M-6	0	0	0	0	0	0	0
Overall	12	3	16	14	0	0	45

fig 7: -Analysis of Question Paper

VIII. CONCLUSION

The proposed Automatic question paper generator is a software tool that uses subjective keyword and bloom taxonomy learning levels to automatically generate question papers for assessments or exams. The use of such a tool can save a significant amount of time and effort for teachers and educational institutions, as well as provide a standardized and objective way of generating questions.

There are several advantages of using an automatic question paper generator. Firstly, it can ensure that the questions are well-balanced and cover a range of topics and difficulty levels. Secondly, it can reduce the potential for bias or subjectivity in question selection. Thirdly, it can save teachers and educational institutions time and effort in creating question papers. However, there are also some limitations and potential drawbacks of using automatic question paper generators. For example, these tools may not be able to generate questions that are tailored to the specific needs or learning objectives of a particular course or group of students. Additionally, there is a risk that the generated questions may not be of high quality or relevance, and may require further editing or revision by teachers.

Overall, while automatic question paper generators have the potential to be a useful tool for teachers and educational institutions, it is important to carefully evaluate their effectiveness and suitability for a particular context before using them

IX. FUTURE SCOPE

The future scope of automated question paper generation is vast and promising, as advancements in artificial intelligence and natural language processing continue to improve the capabilities of these systems. Some potential areas of growth and development for automated question paper generators include:

Personalization: As AI technologies continue to develop, automated question paper generators could become more personalized to individual students, taking into account their learning styles, strengths, and weaknesses.

Adaptive testing: Adaptive testing is a technique that tailors the difficulty of questions to the ability level of the test-taker, and automated question paper generators could be used to create adaptive tests that adjust the difficulty of questions based on the test-taker's responses.

Integration with learning management systems: Automated question paper generators could be integrated with learning management systems, allowing educators to easily create and administer tests online.

Multi-modal question generation: With the development of multimedia technologies, automated question paper generators could potentially generate questions that include multimedia components such as images, videos, and audio.

Natural language understanding: Natural language processing techniques could be used to enhance the ability of automated question paper generators to understand and generate questions in more natural, human-like language.

Overall, the future scope of automated question paper generation is vast and promising, with the potential to transform the way educators create and administer tests, and to improve the overall learning experience for students

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Mobile Apps And Financial Decision Making

Manas Agrawal,Pranav Raorane,Keval Waghate

Abstract- **We exploit the release of a mobile application for a financial aggregation platform to analyse how technology adoption changes consumer financial decision making. We will use individual, transaction-level data from a financial aggregation platform. The platform allows users to link all their checking, savings, and credit card accounts, and view all spending, income transactions, and account balances in one place. A considerable fraction of adults uses this service and the user population appears to be representative of the overall population. The app reduced the cost of accessing personal financial information, and we find that this led to a drop in non-sufficient fund fees. Because of the manner in which these fees are incurred, this represents an unambiguous welfare improvement for users of the platform. The leading explanation for this result appears to be mistake avoidance due to easier access to information.**

I. INTRODUCTION:

In today's fast-paced and constantly evolving financial landscape, mobile apps provide individuals and businesses with the ability to monitor their finances and make informed decisions, at any time and from anywhere. This not only saves time but also reduces the complexity and stress associated with financial decision making.

In addition to providing basic financial management tools, many mobile apps offer advanced features such as real-time market updates, automated investment portfolios, and even access to professional financial advisors. These innovative solutions can help users stay ahead of the curve and make well-informed financial decisions that align with their goals and preferences.

Another benefit of mobile apps is that they provide a wealth of educational resources to help users improve their financial literacy and understanding of various financial concepts and products. This empowers users to make better decisions and take control of their finances, leading to greater financial security and independence.

Overall, the availability of mobile apps has made financial decision making more accessible, convenient, and effective for individuals and businesses alike. Whether you are looking to manage your daily finances, invest for the future, or achieve financial stability, there is a mobile app that can help.

II. Methodology:

To learn about financial growth and usage of mobile application we studied various case studies which can help to analyse the finical decision via mobile application.

Online payment has seen significant growth in India over the past few years, driven by factors such as increasing internet penetration, the proliferation of smartphones, and the government's push towards a cashless economy.

III. Implementation:

The ubiquity of mobile phones and availability of apps has changed the way people take financial decisions in India. Mobile apps provide convenient access to financial services and give users control over their financial decisions.

The Indian government has actively encouraged mobile based financial services as part of its 'Digital India' initiative. As of 2020, there are more than 500 mobile apps offering different types of financial services, ranging from banking services to stock trading. These apps have become popular among users due to their convenience and user-friendly features. Users can also compare various products and services to make a better financial decision.

Government initiatives such as 'Digital India' have also encouraged the use of mobile apps for financial decision making. The government has initiated several programs to encourage people to use mobile apps and digital banking services. This includes educating people about digital banking services and providing incentives for using mobile banking services.

IV. Data and Summary Analytics:

The launch of the Unified Payments Interface (UPI) in 2016 has been one of the main factors in the expansion of online payments in India. With the help of a mobile device and UPI, consumers can instantly transfer money across bank accounts. It has gained a lot of consumer and business support and is now the most extensively used digital payment option in India.

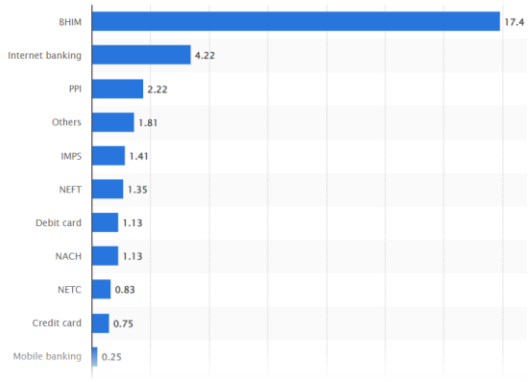
Along with debit and credit cards, other common online payment options in India include e-wallets like Paytm, PhonePe, and Google Pay. Due to their practicality and use, these payment options have become more and more popular.

The COVID-19 pandemic has also speed up the adoption of online payment in India as more people have opted to avoid physical touch by using digital payment methods.

In India, there were 4.7 billion total digital payment transactions in December 2020, up from 3.6 billion in the same month the year before, according to a study by the Reserve Bank of India. Also, from INR 15.2 trillion (about USD 206 billion) in December 2019 to

INR 31.4 trillion (around USD 425 billion) in December 2020, the overall value of digital payment transactions grew.

Volume of digital transactions in India in financial year 2023, by mode*(in billions)*



V. Conclusion:

Overall, the availability of mobile apps has made financial decision making more accessible, convenient, and effective for individuals and businesses alike. Whether you are looking to manage your daily finances, invest for the future, or achieve financial stability, there is a mobile app that can help. Apps help users to make wise decisions about their overall financial health. They can also be used as a tool for research and discovery, providing users with detailed information about investments, markets, and trends. This makes the process of financial decision making much faster and more efficient. In this way, mobile apps can provide a comprehensive view of the financial landscape, giving users the tools they need to make smart decisions.

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Cybersecurity- Incident Response and Disaster Recovery Planning

Vedant Pathak, Piyush Kumar,Ujjwal Thakur

Abstract- **This technical research paper explores thecritical aspects of cybersecurity incident response and disaster recovery planning. The paper delves into the various types of cybersecurity incidents, their potential impact, and the steps involved inresponding to them. It also discusses the importance of having a disaster recovery plan in place, which involves identifying critical systems, data, and applications, and defining procedures for restoring them in the event of a disruption. The paper highlights the key components of a successful incident response plan, including risk assessment, incident identification, containment, analysis, and recovery. The authors provide insights into the current trends and best practices in the field of cybersecurity incident response and disaster recovery planning, along with recommendations for organizations looking to improve their preparedness in these critical areas. Ultimately, the paper emphasizes the importance of having a comprehensive and well-defined incident response and disaster recovery plan in place, as it can significantly mitigate the impact of cybersecurity incidents and ensure business continuity.**

Keywords- Machine Learning, Deep Learning Convolutional Neural Networks, Computer Vision, Sign Language.

INTRODUCTION

In today's digital age, cybersecurity incidents have become a significant threat to organizations of all sizes and industries. With the increasing sophistication of cyberattacks and the growing reliance on technology, the potential impact of these incidents can be severe, ranging from financial losses to reputational damage and legal liabilities. As a result, it is critical for organizations to have a well-defined incident response and disaster recovery plan in place to minimize the impact of such incidents and ensure business continuity.

This technical research paper aims to provide an in-depth analysis of incident response and disaster recovery planning in the context of cybersecurity. The paper explores the various types of cybersecurity incidents, their potential impact on organizations, and the critical steps involved in responding to them. The authors also discuss the importance of having a disaster recovery plan in place, which involves identifying critical systems, data, and applications, and defining procedures for restoring them in the event of a disruption.

The paper further highlights the key components of a successful incident response plan, including risk assessment, incident identification, containment, analysis, and recovery. It provides insights into the current trends and best practices in the field of incident response and disaster recovery planning, along with practical recommendations fororganizations looking to improve their preparednessin these critical areas.

LITERATURE SURVEY

In recent years, there has been an increasing focus on incident response and disaster recovery planningin the field of cybersecurity. Numerous studies have highlighted the importance of having a well-defined incident response plan to minimize the impact of cybersecurity incidents and ensure business continuity. For instance, a study by Ponemon Institute (2019) found that organizations with a mature incident response plan in place were able to detect and contain cybersecurity incidents more quickly, resulting in lower costs and faster recoverytimes.

Similarly, research by the Disaster Recovery Preparedness Council (2018) emphasized the need for organizations to have a disaster recovery plan inplace to ensure the continuity of critical business functions in the event of a disruption. The study found that organizations with a well-defined disaster recovery plan were able to recover from disruptions more quickly and with fewer negative consequences than those without a plan.

In addition, various industry frameworks, such as the National Institute of Standards and Technology (NIST) Cybersecurity Framework and the Payment Card Industry Data Security Standard (PCI DSS), have highlighted the importance of incident response and disaster recovery planning as critical components of a comprehensive cybersecurity strategy.

I- VISION AND GOALS

The vision and goals of this technical research paperon incident response and disaster recovery planning for cybersecurity are to provide insights into the critical aspects of incident response and disaster recovery planning, including their impact on organizations, the key components of a successful plan, and best practices for implementation. The paper aims to highlight the importance of proactive planning and preparedness in minimizing the impact of cybersecurity incidents and ensuring business continuity. Ultimately, the goal of this paper is to provide practical recommendations and insights that can help organizations improve their incidentresponse and disaster recovery capabilities and mitigate the risks associated with cyber threats..

II- METHODOLOGY

The methodology for this technical research paper on incident response and disaster recovery planning for cybersecurity involves a comprehensive review of the existing literature on the topic. The review is based on a systematic search of relevant academic journals, industry reports, and other authoritative sources. The search is conducted using keywords related to incident response and disaster recovery planning, cybersecurity incidents, risk assessment, and business continuity.

The sources identified through the search are evaluated based on their relevance, quality, and applicability to the topic. The data extracted from the sources are analyzed using a qualitative approach to identify key themes, concepts, and best practices related to incident response and disaster recovery planning.

The research also involves case studies of organizations that have implemented successful Bincident response and disaster recovery plans. These case studies provide valuable insights into the practical application of incident response and disaster recovery planning, including the challenges faced and the strategies employed to overcome them.

III- LIMITATIONS

There are several limitations to this technical research paper on incident response and disaster recovery planning for cybersecurity. One of the primary limitations is the scope of the study. While the paper provides a comprehensive review of the literature and includes case studies and expert interviews, it cannot cover every aspect of incident response and disaster recovery planning. There may be specific nuances or approaches that are not covered in this paper.

Another limitation is the potential for bias in the sources used. The sources identified through the systematic search may not provide a complete picture of incident response and disaster recovery planning, and there may be variations in the quality and applicability of the sources.

Furthermore, the research is based on current knowledge and practices in incident response and disaster recovery planning, which may evolve over time. New threats, emerging technologies, and changing regulatory requirements may require organizations to adjust their incident response and disaster recovery plans to ensure continued effectiveness.

Finally, the research is limited to the information that is publicly available. Some organizations may have proprietary information related to their incident response and disaster recovery plans, which may notbe accessible to the public.

There are several limitations to this technical research paper on incident response and disaster recovery planning for cybersecurity. One of the primary limitations is the scope of the study. While the paper provides a comprehensive review of the literature and includes case studies and expert interviews, it cannot cover every aspect of incident response and disaster recovery planning. There may be specific nuances or approaches that are not covered in this paper.

IV- CONCLUSION

In conclusion, this technical research paper has highlighted the importance of incident response and disaster recovery planning in the field ofcybersecurity. The paper provides a comprehensive

review of the literature, including case studies and expert interviews, to identify key themes, concepts, and best practices related to incident response and disaster recovery planning.

The paper emphasizes the need for organizations to take a proactive approach to cybersecurity by developing and implementing robust incident response and disaster recovery plans. Such plans can help organizations minimize the impact of cybersecurity incidents and ensure business continuity.

While there are limitations to this research, including the scope of the study and the potential for bias in the sources used, the paper provides valuable insights into incident response and disaster recovery planning for cybersecurity. The findings of this research can be used by organizations to improve their incident response and disaster recovery capabilities and mitigate the risks associated with cyber threats.

Overall, incident response and disaster recovery planning are critical components of a comprehensive cybersecurity strategy. Organizations that invest in developing and implementing robust incident response and disaster recovery plans are better positioned to detect and contain cybersecurity incidents, minimize the impact of such incidents, and ensure business continuity.

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Digital Sensor Representation in Real-Time Applications Using a Hybrid Approach

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Abstract- **We propose a hybrid approach for peripheral device emulation of sensors on hardware platforms as well as hardware virtualization platforms. The proposed approach stems from challenges faced in IoT (Internet of Things) application development, namely, hardware selection and evaluation, software development for the hardware under consideration, and reliable reproducibility of application tests. The hybrid approach provides strong support for all development phases of IoT products and system development in the absence of physical peripheral sensor hardware. We also present an event-driven software architecture for different components and a modular workflow for implementing the emulator. Within the approach, a peripheral device emulator is conceivable by using the event-driven software architecture and modular workflow. Finally, we introduce the term Simulatable Datasheet, which is realizable by configuring the emulator as per technical documentation like datasheets or application notes. The Simulatable Datasheet provides an interactive interface to improve decision-making during the product development phase. The Simulatable Datasheet thus relaxes the need for hardware availability and eases testing scenarios during IoT real and non-real-time application development without modification in the firmware. Additionally, these datasheets can reduce efforts for hardware and software integration and enable faster debugging, which in turn reduces the overall time to deploy IoT applications in various fields.**

Keywords— Internet of Things (IoT), emulation, simulation, peripheral device emulation, simulatable datasheet, sensors.

I. INTRODUCTION

The IoT has significant potential in enhancing and influencing growth in many sectors such as manufacturing, health, consumer electronics, education, to name a few. Bringing the IoT to sector-specific components opens up the possibility for data-driven decision strategy in business using ubiquitous information obtained from a plethora of heterogeneous devices and systems [1], thus instigating many public and proprietary organizations to invest their resources in IoT research, system development, platforms, and frameworks. A few aspects addressed by these frameworks and platforms are effective utilization of limited hardware resources, interoperability at software, hardware and system-level, scalability, flexibility, real-time and deterministic behavior at application level [1,2,3]. These aspects make IoT solutions challenging in terms of design, development, and testing. Typical IoT solutions involve multi-level, complex architectures stemming from firmware to the high-level application [1]. Thus, the typical IoT development leans towards an agile software development approach where development and testing are performed incrementally [4].

Text-dependent recognition is when the text for enrolment and recognition must be the same. Individuals present a predefined password or "prompted phrase" that is programmed into the system in a text dependent voice recognition system, which can increase performance, especially with cooperative users. Prompts might be generic or specific to each speaker. Text-agnostic technologies don't compare what was spoken at the time of registration and recognition. In circumstances where the speaker is not cooperative, the text independent system has no prior knowledge of the presenter's phrase and is far more adaptable. There are two main uses of speaker recognition: verification and authentication. Verification or authentication occurs when a speaker claims to be of a particular identity and the voice is used to validate that claim.

1.1 challenges

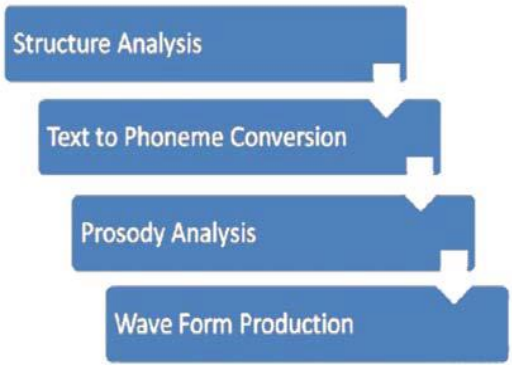

Fig. 1. Speech Synthesis [2]

The speaker's voice is recorded during enrolment, and a number of features are extracted to create a data set or template. In the second phase, a voice sample or utterance is compared to a template that has already been constructed. In identification systems, the utterance is compared to several templates to determine the best match, but in verification systems, the utterance is compared to a single template specific to the speaker being verified. Verification is faster than identification because of the process involved. We offer machine learning techniques for speaker recognition, in which the extracted feature values are used to train selected ML algorithms, and the learned model is then utilised to recognise a given speaker.

Concatenating fragments of recorded speech kept in a database can be used to create synthesised speech. The size of the stored speech units varies by system; a system that stores phones or diphones has the greatest output range, but may lack clarity. A simple solution could be to remove the barrier to contact. A simple option could be to use spoken language that a computer can understand to bridge the communication gap. Although significant progress has been achieved in this field, such systems still face issues like as limited vocabulary or complex syntax, as well as the difficulty of retraining the system in varied situations for different speakers.

The storing of full words or sentences allows for high-quality output in specific situations. Alternatively, a

synthesiser can create totally synthetic voice output by incorporating a model of the vocal tract and other human voice features. TTS (text-to-speech) is an assistive device that reads digital text out loud. It's also known as read-aloud technology. TTS may translate words on a computer or other digital device into audio with the click of a button or the touch of a finger. A simple solution could be to remove the barrier to contact. A simple option could be to use spoken language that a computer can understand to bridge the communication gap.

The detection of emotion in speech is particularly beneficial for applications that demand natural human–machine interaction, such as web videos and computer demonstration apps, because the system's reaction to the user is dependent on sensed emotion. Voice (e.g., "call home"), call routing (e.g., "I'd like to make a collect call"), home appliance control, keyword search (e.g., locating a podcast where specific words are spoken), basic data entry (e.g., entering a credit card number), formal document preparation (e.g., creating a radiology report), and defining organisms (usually called direct voice input, where specific words are spoken) are all examples of speech recognition.

The ability of the brain to utilise and understand visual information is referred to as visual processing. The conversion of light energy into a meaningful image is a complicated process aided by a variety of brain regions and higher-level cognitive processes. Advances in speech- and visual-processing systems have permitted significant research and progress in the areas of human–computer interfaces, biometric applications, security and surveillance, and, most recently, computational behavioural analysis. Although standard machine learning and evolutionary calculations have enhanced Information System for decades to address complex pattern recognition problems, these methods have limitations when dealing with natural data or images in raw data formats. Before deploying machine learning models to extract representative features from raw data or images, a number of computational procedures are used.

1) Terminology for Speech Recognition:

Speech recognition is a technique that allows a device to capture the words uttered into a microphone by a human. These words are then analysed by speech recognition, with the system eventually producing recognised words. The speech recognition method is divided into several parts, each of which is detailed in detail in the following sections [6]. Speech translation is significant because it allows speakers from all over the world to communicate in their native tongues, eliminating the language barrier in global commerce and cross-cultural interactions. The achievement of universal voice translation would be of enormous scientific, cultural, and economic significance for humanity. Our project eliminates the language barrier, allowing people to communicate in their preferred language. The ability to hear the spoken word is a desirable condition in the speech recognition process. The recognition engine takes into account all of a person's words, but in practise, the efficiency of the speech recognition engine is determined by a number of factors. Terminology, concurrent users, and noisy settings are the primary variables that are counted as dependent variables for a speech recognition engine.

2) Speech Recognition Process

Translation is the process of conveying meaning from one language (the source) to another (the target). Speech synthesis is employed primarily for two reasons. Dictation, first and foremost, is the conversion of spoken words into text via speech processing, and device control, second, is the development of software that allows a person to operate numerous voice apps [3]. Through microphone input, the PC sound card generates the matching digital representation of incoming sounds. Digitization is the process of converting an analogue signal to a digital format. Quantization is described as the procedure of approximating a continuous set of values. Sampling converts a continuous signal into a discrete signal.

Attention models are neural network input processing strategies that allow the network to focus on specific features of complex input one by one until the entire dataset has been categorised. The idea is to break down difficult activities into smaller, sequentially processed areas of attention. In broad strokes, an attention model is a function that maps a query and a "s set" of key–value pairs to an output, with the query, keys, values, and final output all being vectors. The result is a weighted sum of the values, with the weight assigned to each value determined by the query's compatibility function with the relevant key–value pair.

3) Neural Machine Translation:

This machine translation technique is used in artificial neural networks to forecast the probability of a set of phrases, which is commonly done in a single integrated model that models full sentences. In recent years, neural network technology has been employed to tackle problems in a variety of ways. In the natural speech processing area, the use of neural machine translation (NMT) is a example of this.

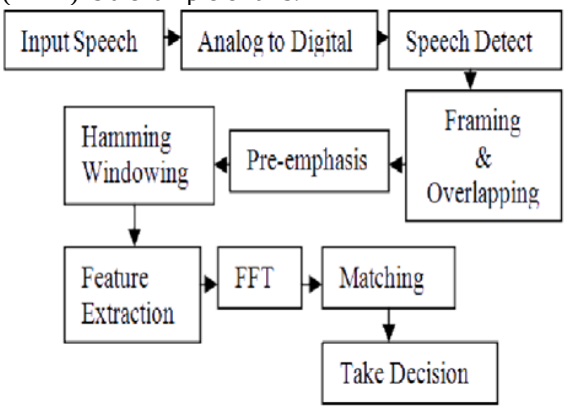

Fig. 2. Recognition Process

The missing translation is a phenomenon in which text that was there in the source is absent in terms of context or word translation. The use of a neural network to learn a mathematical model for NMT is known as neural machine translation. The methodology's main advantage is that it allows a single framework to be trained directly on both the source and destination text, eliminating the need for a statistical machine learning pipeline of complex systems [5].

- **Linked Words or Connected Speech**: Linked words or connected speech are identical to independent speech, and they make separate utterances except for minor lags between them.
- **Continuous Speech:** Also known as computer dictation, continuous speech allows the user to talk nearly naturally.
- **spontaneous speech:** At its most basic level, spontaneous speech can be defined as speech that sounds natural and is not rehearsed. Random speech capabilities of an ASR device should be able to accept a variety of natural speech qualities, such as phrases that run together, "ums" and "ahs," and even mild stutters.

In most cases, machine translation models entire phrases by using an artificial neural network to predict a series of terms. Typically, it uses an artificial neural network to anticipate the sequence of words to model full sentences in a single integrated model. A recurrent neural network is typically used to model word sequences at first (RNN). Unlike traditional phrase-based translation, which uses numerous small subcomponents that must be tweaked separately, neural machine translation uses a single, large neural network to read a phrase and output the correct translation. Because just one model is required for translation, neural machine translation via end-to-end systems is referred to as a neural machine translation system.

Today, translation is more common and accessible than it has ever been. Organizations with greater budgets may engage a translation company or independent professional translators to handle all of their translation needs; organizations with smaller budgets, or dealing with subjects unfamiliar to many translators, may combine the services of professional translators.

II. Literature Review

According to Mehmet Berkehan Akçay et al. [1], neural networks are primarily used in industrial control and robotics applications. Recent advances in neural networks have aided successful IS implementations in almost every aspect of human life, including intelligent travel, intelligent diagnosis and health monitoring for precision medicine, robotics and home appliance automation, virtual online support, e-marketing, weather forecasting, and natural disaster management, among others.

G. Tsontzos et al. [2] highlighted how feelings help us understand each other better, and a natural extension of this understanding is to include computers. Speech recognition is becoming a part of our daily lives, thanks to smart mobile gadgets that can take and reply to voice instructions with synthesised speech. Speech emotion recognition (SER) could be utilised to allow machines to identify our feelings.

T. Taleb et al. [7] were prompted by the realisation that these requirements set stricter limits on the amount of progress that may be accomplished when utilising HMMs in voice recognition. New modelling approaches that explicitly model time are being studied in an attempt to increase robustness, particularly under noisy settings, and this study was partially sponsored by the EU-IST FP6 HIWIRE research project. The

use of spatial similarities, such as dynamic linear models (LDM), in voice recognition was first proposed.

Learning speech, according to Vincius Maran et al. [6], is a dynamic system in which the infant's processing of phonemes is defined by continuities and discontinuities on the way to advanced creation of ambient language segments and structures.

Y. Wu et al. [3] noted that discriminative testing has been used for speech recognition for many years now. The few organizations that have had the resources to implement discriminatory instructions for large-scale speech recognition assignments have mostly used the full shared information system in recent years (MMI). Instead, in the extension of the studies first presented, we reflect on the minimum classification error (MCE) paradigm for discriminatory instruction.

Peng et al. [4] stated that identification of speakers refers to identifying people by their voice. This technology is increasingly adopted and used as a kind of biometrics for its ease of use and non-interactivity, and soon became a research hotspot in the field of biometrics.

Shah Nawazuddin and Sinha [10] emphasized how the work presented was an extension of current acoustic model interpolation-based fast adaption methodologies. In these methods, the basis (model) weights are determined using an iterative procedure based on the maximum likelihood (ML) criterion.

There are various ways to understand feelings from expressiveness, according to Varghese et al. [5]. Many attempts have been made to use voice information to identify states. Some crucial voice function vectors have been chosen, in which utterance level statistics are measured, in order to interpret feelings.

A long-term goal, according to D.J. Atha et al. [9], is the invention of an automatic real-time translating system that uses voice as the source. Recent advancements in computational translation science, on the other hand, increase the likelihood of widespread implementation in the near future.

T. Lalith Kumar et al. suggested a speaker-dependent voice recognition system based on MLP and RNN in 2009 [11]. As a feature vector, linear prediction coefficients were utilized. The recognition accuracies of MLP are better than RNN, according to the accuracy levels attained during testing. We discovered that Mel frequency cepstral coefficients, linear predictive coefficients, linear predictive cepstral coefficients, linear spectral frequency, formants, and pitch have all been employed to characterize the speaker's voice [7].

A novel feature vector is proposed in this paper. Formant frequencies are the vocal tract's resonance frequencies, which vary depending on the speaker. Furthermore, fundamental frequency is an important feature of speech that establishes the signal's periodicity.

It has a low value for adult male speakers and a high value for female and child speakers. The fundamental frequency works reasonably well for speaker recognition when speech utterances are properly picked so that all of the frames in an utterance are voiced [16].

III. Proposed Method

The work in this study is based on the flowchart below. According to the speech working model. The models shown before contain millions of parameters from which the instruction corpus must be learned. Additional information, such as text that is closely related to the speech we are about to translate [7], is used when it is suitable. This text can be written in either the source or target language, or both.

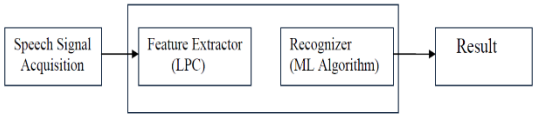

Fig. 3. Speaker Recognition

Future development will reach billions of smart phone users for the most complex intelligent systems focused on deep learning. There is a lengthy list of vision and voice technologies that can increasingly simplify and assist the visual and auditory processing of humans to a greater scale and consistency, from sensation and emotion detection to the development of self-driving autonomous transport systems. This paper serves scholars, clinicians, technology creators, and consumers as an exemplary analysis of emerging technologies in many fields, such as behavioural science, psychology, transportation, and medicine.

IV. Results

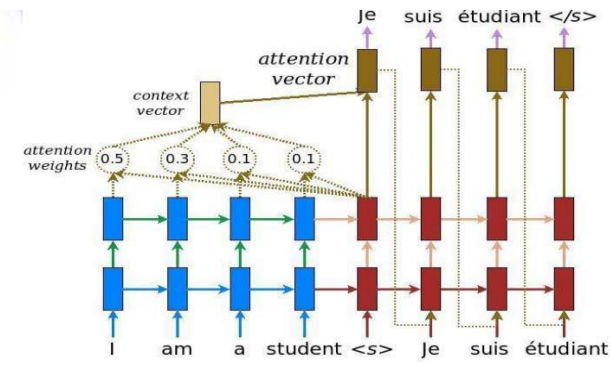

Fig. 4. The Attention Model

The use of multimodal vector sources of information and functionality was used to present speech detection with real-time predictive voice translation device optimization. The manner in which external information input is employed to strengthen the system's correctness, allowing a substantial improvement, when compared to natural processes, is the central production and dedication of this study. In addition, a new effort was launched and explored from an analytical approach while keeping realistic. According to our discussions and plans, the technology we desire transforms Hindi to English and vice versa.

4.1 Initial Test

The encoder–decoder model constraint of attention is presented to encrypt the input sequence to a single fixed length vector from which each output time stage is decoded. Focus is recommended as an approach for both aligning and interpreting long sequences, and this difficulty is thought to be more of a concern. The attention model creates a context vector that is filtered independently for each output time step, rather than storing the input sequence into a single fixed-context vector. The approach is extended to a machine translation problem, as it was to the encoder–decoder text, and GRU units are used instead of LSTM memory cells [9].

Facilitated communication (FC), or supported typing, is a scientifically discredited technique that attempts to aid communication by people with autism or other communication disabilities, and who are non-verbal. The facilitator guides the disabled person's arm or hand, and attempts to help them type on a keyboard or other device.

The calculations applied are:
FC= Totally Connected Layer (Dense)
Output EO=Encoder
H = Concealed State
X=Entry into the Decoder
And with the pseudo-code:

FC (tanh (FC(EO) + FC(H))) score =Weights for focus = SoftMax (score, axis = 1).

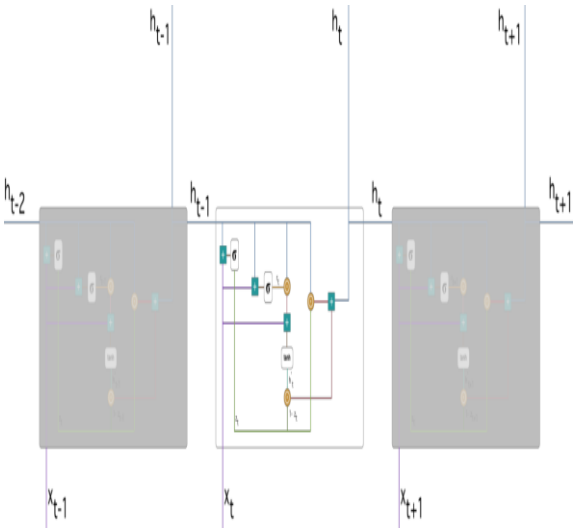

Fig. 5. First Translation from English to Hindi

It is implemented on the last axis by default, but we want to implement it on the first axis here, as the score form is as follows: batch size, max length, secret size. The length of our input is Max length. Since we are attempting to assign a weight to each input, it is important to add SoftMax on that axis. Context vector = sum (weights of focus * EO, axis = 1). The same explanation as above applies for an axis selection of 1. Embedding output = The input is transferred through an embedding layer to the decoder. Integrated vector = concept (embedding output, context vector).

4.2 Translate

The assessment function is similar to the teaching loop, with the exception that we do not put any pressure on teachers. The input to the decoder, as well as the hidden state and encoder output, are its past predictions at each time point. Predicting the final token as the model predicts is not a good idea. For each step-in time, keep track of the attention weights. A translator is a computer software that transforms one language to another using a programming language processor. It translates a program written in source code to machine code. During translation, it detects and identifies errors. It converts a high-level language program into a machine language program that can be understood by the central processing unit (CPU). It also checks for programme errors.

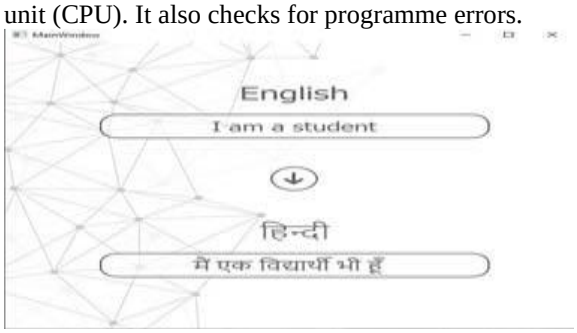

Fig. 6. Second Translation from English to Hindi

Fig. 7. Third Translation from English to Hindi

V. Conclusion

Speech recognition applications have become increasingly more complicated and precise during the last few years. This study delves into the most recent advances in intelligent vision and speech algorithms, as well as their applications on the most popular smart phones and embedded platforms, as well as their limits. Despite the enormous increases in success and efficacy made possible by deep learning algorithms, training the machine with other information sources, which is the framework, contributes significantly to the class subject.

VI. Future Scope

This work can be examined in greater detail in order to improve and add new features to the project, and it can be improved further. The new programme does not support a broad vocabulary in order to collect a larger number of samples and maximise productivity [10]. The current edition of the programme only protects a few parts of the notepad, but more places can be protected, and efforts will be made in this direction.

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Digital Sensor Representation in Real-Time Applications Using a Hybrid Approach

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Abstract- **We propose a hybrid approach for peripheral device emulation of sensors on hardware platforms as well as hardware virtualization platforms. The proposed approach stems from challenges faced in IoT (Internet of Things) application development, namely, hardware selection and evaluation, software development for the hardware under consideration, and reliable reproducibility of application tests. The hybrid approach provides strong support for all development phases of IoT products and system development in the absence of physical peripheral sensor hardware. We also present an event-driven software architecture for different components and a modular workflow for implementing the emulator. Within the approach, a peripheral device emulator is conceivable by using the event-driven software architecture and modular workflow. Finally, we introduce the term Simulatable Datasheet, which is realizable by configuring the emulator as per technical documentation like datasheets or application notes. The Simulatable Datasheet provides an interactive interface to improve decision-making during the product development phase. The Simulatable Datasheet thus relaxes the need for hardware availability and eases testing scenarios during IoT real and non-real-time application development without modification in the firmware. Additionally, these datasheets can reduce efforts for hardware and software integration and enable faster debugging, which in turn reduces the overall time to deploy IoT applications in various fields.**

Keywords— Internet of Things (IoT), emulation, simulation, peripheral device emulation, simulatable datasheet, sensors.

I. INTRODUCTION

The IoT has significant potential in enhancing and influencing growth in many sectors such as manufacturing, health, consumer electronics, education, to name a few. Bringing the IoT to sector-specific components opens up the possibility for data-driven decision strategy in business using ubiquitous information obtained from a plethora of heterogeneous devices and systems [1], thus instigating many public and proprietary organizations to invest their resources in IoT research, system development, platforms, and frameworks. A few aspects addressed by these frameworks and platforms are effective utilization of limited hardware resources, interoperability at software, hardware and system-level, scalability, flexibility, real-time and deterministic behavior at application level [1,2,3]. These aspects make IoT solutions challenging in terms of design, development, and testing. Typical IoT solutions involve multi-level, complex architectures stemming from firmware to the high-level application [1]. Thus, the typical IoT development leans towards an agile software development approach where development and testing are performed incrementally [4].

Text-dependent recognition is when the text for enrolment and recognition must be the same. Individuals present a predefined password or "prompted phrase" that is programmed into the system in a text dependent voice recognition system, which can increase performance, especially with cooperative users. Prompts might be generic or specific to each speaker. Text-agnostic technologies don't compare what was spoken at the time of registration and recognition. In circumstances where the speaker is not cooperative, the text independent system has no prior knowledge of the presenter's phrase and is far more adaptable. There are two main uses of speaker recognition: verification and authentication. Verification or authentication occurs when a speaker claims to be of a particular identity and the voice is used to validate that claim.

1.1 challenges

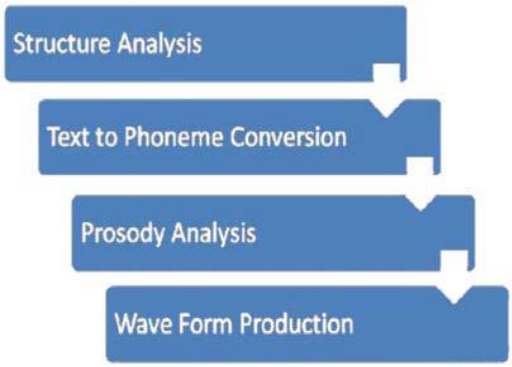

Fig. 1. Speech Synthesis [2]

The speaker's voice is recorded during enrolment, and a number of features are extracted to create a data set or template. In the second phase, a voice sample or utterance is compared to a template that has already been constructed. In identification systems, the utterance is compared to several templates to determine the best match, but in verification systems, the utterance is compared to a single template specific to the speaker being verified. Verification is faster than identification because of the process involved. We offer machine learning techniques for speaker recognition, in which the extracted feature values are used to train selected ML algorithms, and the learned model is then utilised to recognise a given speaker.

Concatenating fragments of recorded speech kept in a database can be used to create synthesised speech. The size of the stored speech units varies by system; a system that stores phones or diphones has the greatest output range, but may lack clarity. A simple solution could be to remove the barrier to contact. A simple option could be to use spoken language that a computer can understand to bridge the communication gap. Although significant progress has been achieved in this field, such systems still face issues like as limited vocabulary or complex syntax, as well as the difficulty of retraining the system in varied situations for different speakers.

The storing of full words or sentences allows for high-quality output in specific situations. Alternatively, a

synthesiser can create totally synthetic voice output by incorporating a model of the vocal tract and other human voice features. TTS (text-to-speech) is an assistive device that reads digital text out loud. It's also known as read-aloud technology. TTS may translate words on a computer or other digital device into audio with the click of a button or the touch of a finger. A simple solution could be to remove the barrier to contact. A simple option could be to use spoken language that a computer can understand to bridge the communication gap.

The detection of emotion in speech is particularly beneficial for applications that demand natural human–machine interaction, such as web videos and computer demonstration apps, because the system's reaction to the user is dependent on sensed emotion. Voice (e.g., "call home"), call routing (e.g., "I'd like to make a collect call"), home appliance control, keyword search (e.g., locating a podcast where specific words are spoken), basic data entry (e.g., entering a credit card number), formal document preparation (e.g., creating a radiology report), and defining organisms (usually called direct voice input, where specific words are spoken) are all examples of speech recognition.

The ability of the brain to utilise and understand visual information is referred to as visual processing. The conversion of light energy into a meaningful image is a complicated process aided by a variety of brain regions and higher-level cognitive processes. Advances in speech- and visual-processing systems have permitted significant research and progress in the areas of human–computer interfaces, biometric applications, security and surveillance, and, most recently, computational behavioural analysis. Although standard machine learning and evolutionary calculations have enhanced Information System for decades to address complex pattern recognition problems, these methods have limitations when dealing with natural data or images in raw data formats. Before deploying machine learning models to extract representative features from raw data or images, a number of computational procedures are used.

1) Terminology for Speech Recognition:

Speech recognition is a technique that allows a device to capture the words uttered into a microphone by a human. These words are then analysed by speech recognition, with the system eventually producing recognised words. The speech recognition method is divided into several parts, each of which is detailed in detail in the following sections [6]. Speech translation is significant because it allows speakers from all over the world to communicate in their native tongues, eliminating the language barrier in global commerce and cross-cultural interactions. The achievement of universal voice translation would be of enormous scientific, cultural, and economic significance for humanity. Our project eliminates the language barrier, allowing people to communicate in their preferred language. The ability to hear the spoken word is a desirable condition in the speech recognition process. The recognition engine takes into account all of a person's words, but in practise, the efficiency of the speech recognition engine is determined by a number of factors. Terminology, concurrent users, and noisy settings are the primary variables that are counted as dependent variables for a speech recognition engine.

2) Speech Recognition Process

Translation is the process of conveying meaning from one language (the source) to another (the target). Speech synthesis is employed primarily for two reasons. Dictation, first and foremost, is the conversion of spoken words into text via speech processing, and device control, second, is the development of software that allows a person to operate numerous voice apps [3]. Through microphone input, the PC sound card generates the matching digital representation of incoming sounds. Digitization is the process of converting an analogue signal to a digital format. Quantization is described as the procedure of approximating a continuous set of values. Sampling converts a continuous signal into a discrete signal.

Attention models are neural network input processing strategies that allow the network to focus on specific features of complex input one by one until the entire dataset has been categorised. The idea is to break down difficult activities into smaller, sequentially processed areas of attention. In broad strokes, an attention model is a function that maps a query and a "s set" of key–value pairs to an output, with the query, keys, values, and final output all being vectors. The result is a weighted sum of the values, with the weight assigned to each value determined by the query's compatibility function with the relevant key–value pair.

3) Neural Machine Translation:

This machine translation technique is used in artificial neural networks to forecast the probability of a set of phrases, which is commonly done in a single integrated model that models full sentences. In recent years, neural network technology has been employed to tackle problems in a variety of ways. In the natural speech processing area, the use of neural machine translation (NMT) is a example of this.

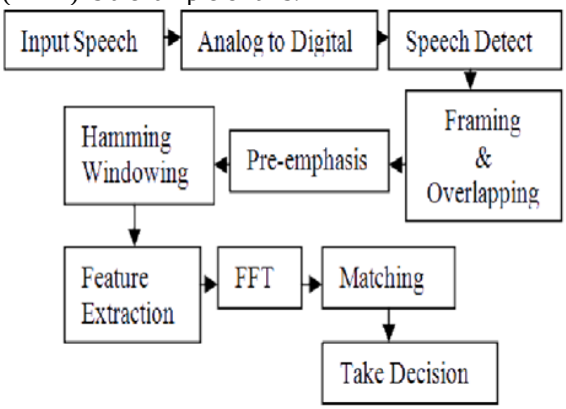

Fig. 2. Recognition Process

The missing translation is a phenomenon in which text that was there in the source is absent in terms of context or word translation. The use of a neural network to learn a mathematical model for NMT is known as neural machine translation. The methodology's main advantage is that it allows a single framework to be trained directly on both the source and destination text, eliminating the need for a statistical machine learning pipeline of complex systems [5].

- **Linked Words or Connected Speech**: Linked words or connected speech are identical to independent speech, and they make separate utterances except for minor lags between them.
- **Continuous Speech:** Also known as computer dictation, continuous speech allows the user to talk nearly naturally.
- **spontaneous speech:** At its most basic level, spontaneous speech can be defined as speech that sounds natural and is not rehearsed. Random speech capabilities of an ASR device should be able to accept a variety of natural speech qualities, such as phrases that run together, "ums" and "ahs," and even mild stutters.

In most cases, machine translation models entire phrases by using an artificial neural network to predict a series of terms. Typically, it uses an artificial neural network to anticipate the sequence of words to model full sentences in a single integrated model. A recurrent neural network is typically used to model word sequences at first (RNN). Unlike traditional phrase-based translation, which uses numerous small subcomponents that must be tweaked separately, neural machine translation uses a single, large neural network to read a phrase and output the correct translation. Because just one model is required for translation, neural machine translation via end-to-end systems is referred to as a neural machine translation system.

Today, translation is more common and accessible than it has ever been. Organizations with greater budgets may engage a translation company or independent professional translators to handle all of their translation needs; organizations with smaller budgets, or dealing with subjects unfamiliar to many translators, may combine the services of professional translators.

II. Literature Review

According to Mehmet Berkehan Akçay et al. [1], neural networks are primarily used in industrial control and robotics applications. Recent advances in neural networks have aided successful IS implementations in almost every aspect of human life, including intelligent travel, intelligent diagnosis and health monitoring for precision medicine, robotics and home appliance automation, virtual online support, e-marketing, weather forecasting, and natural disaster management, among others.

G. Tsontzos et al. [2] highlighted how feelings help us understand each other better, and a natural extension of this understanding is to include computers. Speech recognition is becoming a part of our daily lives, thanks to smart mobile gadgets that can take and reply to voice instructions with synthesised speech. Speech emotion recognition (SER) could be utilised to allow machines to identify our feelings.

T. Taleb et al. [7] were prompted by the realisation that these requirements set stricter limits on the amount of progress that may be accomplished when utilising HMMs in voice recognition. New modelling approaches that explicitly model time are being studied in an attempt to increase robustness, particularly under noisy settings, and this study was partially sponsored by the EU-IST FP6 HIWIRE research project. The

use of spatial similarities, such as dynamic linear models (LDM), in voice recognition was first proposed.

Learning speech, according to Vincius Maran et al. [6], is a dynamic system in which the infant's processing of phonemes is defined by continuities and discontinuities on the way to advanced creation of ambient language segments and structures.

Y. Wu et al. [3] noted that discriminative testing has been used for speech recognition for many years now. The few organizations that have had the resources to implement discriminatory instructions for large-scale speech recognition assignments have mostly used the full shared information system in recent years (MMI). Instead, in the extension of the studies first presented, we reflect on the minimum classification error (MCE) paradigm for discriminatory instruction.

Peng et al. [4] stated that identification of speakers refers to identifying people by their voice. This technology is increasingly adopted and used as a kind of biometrics for its ease of use and non-interactivity, and soon became a research hotspot in the field of biometrics.

Shah Nawazuddin and Sinha [10] emphasized how the work presented was an extension of current acoustic model interpolation-based fast adaption methodologies. In these methods, the basis (model) weights are determined using an iterative procedure based on the maximum likelihood (ML) criterion.

There are various ways to understand feelings from expressiveness, according to Varghese et al. [5]. Many attempts have been made to use voice information to identify states. Some crucial voice function vectors have been chosen, in which utterance level statistics are measured, in order to interpret feelings.

A long-term goal, according to D.J. Atha et al. [9], is the invention of an automatic real-time translating system that uses voice as the source. Recent advancements in computational translation science, on the other hand, increase the likelihood of widespread implementation in the near future.

T. Lalith Kumar et al. suggested a speaker-dependent voice recognition system based on MLP and RNN in 2009 [11]. As a feature vector, linear prediction coefficients were utilized. The recognition accuracies of MLP are better than RNN, according to the accuracy levels attained during testing. We discovered that Mel frequency cepstral coefficients, linear predictive coefficients, linear predictive cepstral coefficients, linear spectral frequency, formants, and pitch have all been employed to characterize the speaker's voice [7].

A novel feature vector is proposed in this paper. Formant frequencies are the vocal tract's resonance frequencies, which vary depending on the speaker. Furthermore, fundamental frequency is an important feature of speech that establishes the signal's periodicity.

It has a low value for adult male speakers and a high value for female and child speakers. The fundamental frequency works reasonably well for speaker recognition when speech utterances are properly picked so that all of the frames in an utterance are voiced [16].

III. Proposed Method

The work in this study is based on the flowchart below. According to the speech working model. The models shown before contain millions of parameters from which the instruction corpus must be learned. Additional information, such as text that is closely related to the speech we are about to translate [7], is used when it is suitable. This text can be written in either the source or target language, or both.

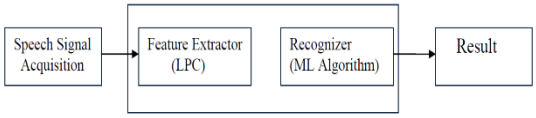

Fig. 3. Speaker Recognition

Future development will reach billions of smart phone users for the most complex intelligent systems focused on deep learning. There is a lengthy list of vision and voice technologies that can increasingly simplify and assist the visual and auditory processing of humans to a greater scale and consistency, from sensation and emotion detection to the development of self-driving autonomous transport systems. This paper serves scholars, clinicians, technology creators, and consumers as an exemplary analysis of emerging technologies in many fields, such as behavioural science, psychology, transportation, and medicine.

IV. Results

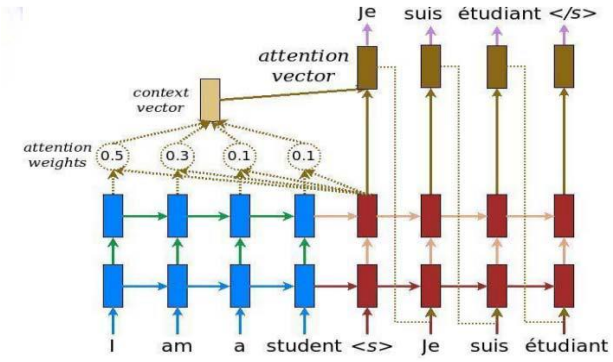

Fig. 4. The Attention Model

The use of multimodal vector sources of information and functionality was used to present speech detection with real-time predictive voice translation device optimization. The manner in which external information input is employed to strengthen the system's correctness, allowing a substantial improvement, when compared to natural processes, is the central production and dedication of this study. In addition, a new effort was launched and explored from an analytical approach while keeping realistic. According to our discussions and plans, the technology we desire transforms Hindi to English and vice versa.

4.1 Initial Test

The encoder–decoder model constraint of attention is presented to encrypt the input sequence to a single fixed length vector from which each output time stage is decoded. Focus is recommended as an approach for both aligning and interpreting long sequences, and this difficulty is thought to be more of a concern. The attention model creates a context vector that is filtered independently for each output time step, rather than storing the input sequence into a single fixed-context vector. The approach is extended to a machine translation problem, as it was to the encoder–decoder text, and GRU units are used instead of LSTM memory cells [9].

Facilitated communication (FC), or supported typing, is a scientifically discredited technique that attempts to aid communication by people with autism or other communication disabilities, and who are non-verbal. The facilitator guides the disabled person's arm or hand, and attempts to help them type on a keyboard or other device.

The calculations applied are:
FC= Totally Connected Layer (Dense)
Output EO=Encoder
H = Concealed State
X=Entry into the Decoder
And with the pseudo-code:

FC (tanh (FC(EO) + FC(H))) score =Weights for focus = SoftMax (score, axis = 1).

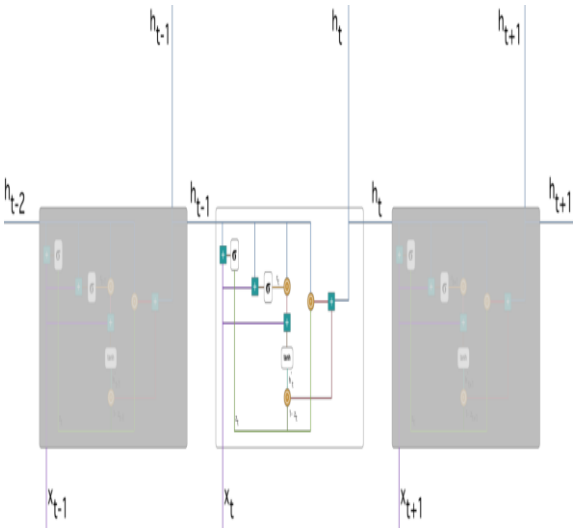

Fig. 5. First Translation from English to Hindi

It is implemented on the last axis by default, but we want to implement it on the first axis here, as the score form is as follows: batch size, max length, secret size. The length of our input is Max length. Since we are attempting to assign a weight to each input, it is important to add SoftMax on that axis. Context vector = sum (weights of focus * EO, axis = 1). The same explanation as above applies for an axis selection of 1. Embedding output = The input is transferred through an embedding layer to the decoder. Integrated vector = concept (embedding output, context vector).

4.2 Translate

The assessment function is similar to the teaching loop, with the exception that we do not put any pressure on teachers. The input to the decoder, as well as the hidden state and encoder output, are its past predictions at each time point. Predicting the final token as the model predicts is not a good idea. For each step-in time, keep track of the attention weights. A translator is a computer software that transforms one language to another using a programming language processor. It translates a program written in source code to machine code. During translation, it detects and identifies errors. It converts a high-level language program into a machine language program that can be understood by the central processing unit (CPU). It also checks for programme errors.

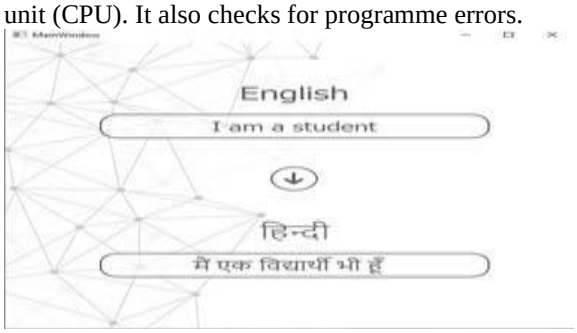

Fig. 6. Second Translation from English to Hindi

Fig. 7. Third Translation from English to Hindi

V. Conclusion

Speech recognition applications have become increasingly more complicated and precise during the last few years. This study delves into the most recent advances in intelligent vision and speech algorithms, as well as their applications on the most popular smart phones and embedded platforms, as well as their limits. Despite the enormous increases in success and efficacy made possible by deep learning algorithms, training the machine with other information sources, which is the framework, contributes significantly to the class subject.

VI. Future Scope

This work can be examined in greater detail in order to improve and add new features to the project, and it can be improved further. The new programme does not support a broad vocabulary in order to collect a larger number of samples and maximise productivity [10]. The current edition of the programme only protects a few parts of the notepad, but more places can be protected, and efforts will be made in this direction.

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Deep learning approach for vehicle number plate recognition system with image enhancement technique

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Abstract— **The number of automobiles and trucks on the road is continually rising, particularlyin direct connection to the emergence of the industrial revolution and the expansion of the economy. Because of the proliferation of motor vehicles, there is a greater potential for the violation of traffic laws, which in turn increases the risk of both unintended collisions and criminal activity on the road. In order to address these problems, a sophisticated traffic monitoring system is required. The intelligent technology has the ability to significantly contribute to traffic management via the recognition of licence plates. As part of this work, we use convolutional neural networks (CNNs) based Alexnet and MobileNetV2 framework, a subset of the deep learning technology known as convolutional neural networks, to build a system forthe automatic identification and recognition of licence plates. We also propose to improve both the frameworks by applying image enhancement techniques. Both the detection and identificationof licence plates are integral parts of this system. A digital camera is used to capture the imageof the vehicle during the detection phase. The Alexnet and MobileNetV2 framework then isolates only the licence plate from the whole image. After the licence plate number region has been *removed, the low-resolution image is converted into a high-quality one by a process called super resolution. The convolutional layer of a CNN is used in conjunction with a super resolution technique to restore the original image's pixel quality. To separate the characters of a licence plate number, we employ a bounding box method. Features are extracted and labelled using the CNN technique during the recognition stage.***

***Keywords*— CNN, Alexnet, MobileNetV2, recognition, detection, convolutional.**

I. INTRODUCTION

Manually directing and monitoring traffic in an urban environment with an increasing number of vehicles is not only challenging, but also time-consuming, costly, and prone to mistake. It could even be impossible sometimes. As a result, research on automatic licence plate recognition reliable means to identify a specific car, ALR has several practical uses. Traffic management, ticketing offenders, speed estimate, self- driving cars, and surveillance are just However, distributed solar power plants have several operational and maintenance challenges due to their small size, dispersed deployment, and high component density. The main challenges are as follows: There is no mature and effective operation maintenance system. The power inspection is labor-intensive but ineffective; the fault alarm's fault identification capability is poor, frequently necessitating secondary identification by personnel; locating damaged parts is difficult, lengthening the operation and maintenance cycle and increasing labor costs; the power loss analysis is insufficient, leaving the operation and maintenance without guidance; and there is no mature and productive operation maintenance system.

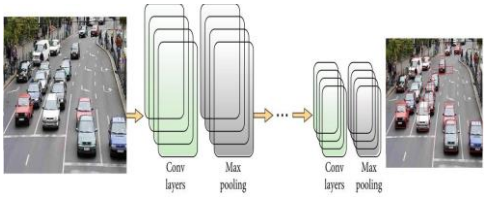
According to projections, photovoltaic (PV) problems such as soiling, shading, deterioration, and short circuit faultsreduce solar array power efficiency by 22.34% to 27.58%. Several machine learning (ML) methods have been used to study the detection of solar defects, with most contemporaryalgorithms depending on a deep neural network solution.

vast network of surveillance cameras has been installed throughout the country's towns, roads, and highways, as well as at its borders, parking lots, and other secure locations, to keep track of vehicles with greater accuracy[2]. Pictures taken by these cameras of passing vehicles aremonitored continuously. It is difficult to find automobiles and identify licence plates without firstprocessing and analysing these photos.

Image processing and machine learning are needed to create a system that can identify vehicles and pull out further information, such as licence plate numbers[3]. The speed and reliability of licence plate recognition systems are closely related to the quality of the images used to make the recognitions. Environmental and climatic conditions such as light projection angle, light intensity, rain, fog, dust, humidity, darkness, glare, occlusion, precipitation, tilt, and blurriness may all have an impact on the quality of the collected images[4].

Detecting vehicle number plates in an efficient manner has been approached from a number of different angles. In order to improve the speed at which this step is completed as well as its overall efficiency, "denoising" and "quality-enhancing preprocessing" operations are carried out. The next step involves positioning the plates shown in the image that has been provided[5-9]. Recent research on plate identification has led to the categorization of existing approaches into the following five main groups: edge-based methods, color-based methods, texture-analysismethods, methods based on image global properties, and hybrid methods. In every one of these domains, machine vision and image processing have been implemented in a variety of guises [10-16]. The segmentation of the plate comes next in this procedure. The binary form is used in the first stage of processing the picture

of the observed plate. The methods of morphology [17], the linked component analysis algorithm [18], and histogram-based methodologies are then used in order to extract the character-related components. This stage is troublesome since the majority of binarization algorithms can only provide adequate results on plates that are completely free of spots. When these procedures are carried out on plates that are not clean, considerable portionsof the information are discarded. To be more exact, the sections of the plate that are designated as character parts are not always always labelled as character parts, and vice versa[19].



II. LITERATURE SURVEY:

Using Hough Lines and Matching Template Models,[20] created a complete licence plate identification and recognition system with a primary emphasis on Hough Transformation. The canny detector was used to perform the investigation, and the accuracy rate for the extraction of vehicle licence plates was 95.67 percent. New Extreme Learning Method (ELM) recognition software was created[21]. The Thai licence plate was used for the purposes of preprocessing and extracting features by using the ELM classifier and the Histogram of oriented Gradients (HOG). With an accuracy of 91.26 percent, the system was able to detect licence plates that included both the identification number of the automobile registration as well as the province. In their vast network of surveillance cameras has been installed throughout the country's towns, roads, and highways, as well as at its borders, parking lots, and other secure locations, to keep track of vehicles with greater accuracy[2]. Pictures taken by these cameras of passing vehicles aremonitored continuously. It is difficult to find automobiles and identify licence plates without first processing and analysing these photos.

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a. Vehicle Detection:

Real-time applications benefit from beginning with vehicle detection for a higher detection rate. When searching for a plate, traditional deep learning-based algorithms often examine the whole image. The current method is time-consuming due to the fact that plates make up such a minute percentage of a frame. To save time analysing

Real-time applications benefit from beginning with vehicle detection for a higher detection rate. When searching for a plate, traditional deep learning-based algorithms often examine the whole image. The current method is time-consuming due to the fact that plates make up such a minute percentage of a frame. To save time analysing irrelevant areas of the picture, the suggested technique begins with vehicle detection. Taking this measure saves time and effort by reducing the number of repetitions required to complete the procedure. Multiple convolutional

a. network extracts high-level Vehicle Detection:

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III. PROPOSED METHODOLOGY

When there are a large number of plates present in the frame that is being processed, the majorityof techniques for plate identification are unable to detect all of the plates. This renders these approaches inapplicable for use non real-time scenarios, when there may be a large number of plates in each frame and the amount of time available for reaction may be restricted. In order to solve this problem, the suggested method Alexnet and MobileNetV2, which boosts the processing performance to a level that enables real-time licence plate identification. The initial step of the proposed strategy is the detection of automobiles. After that, based on the architectureof deep learning, plates are first recognised, and then the text of the plates is extracted using a deep network that consists of both convolutional layers and recurrent layers. This process takes place in two stages. The solution that has been suggested is an end-to-end system that can concurrently detect cars and licence plates and identify the plates. The many stages of this process are broken down into their respective parts below**.**

a. Steps of Number plate recognition:

First, the ANPR camera takes still photos or movies that include one or more licence plates. Thismay be done either individually or in groups (video stream or photo). It is feasible to utilise ANPR at any time of the day because to the widespread usage of infrared illumination, which enables cameras to read the licence plates of passing vehicles even after the sun has set.

Detect and crop number plate: In the picture, the licence plate was found using machine learning and computer vision techniques. This was followed by the number plate being cropped. Thereare a variety of approaches, each of which varies considerably from the others in terms of the amount of computer resources required, level of complexity, amount of time required, and degree of precision. Using object detection to identify the cars first and then locating the licence plate inside the bounding boxes generated is a frequent approach. In most cases, this may be accomplished by searching for regions of contrast between the backdrop and the numberplate. Following the successful recognition of the licence plate, the image is further cropped and normalised (sharpened, distorted, and enhanced).

The next step is to apply OCR software to the identified plate region in order to retrieve the licence plate number in text format. This allows the number to be extracted and read. The OCR

software may be customised to work with a variety of character sets, which enables the ANPR system to be used in several countries without modification. The output of an ANPR system is normally the number of the licence plate, often accompanied by the area or nation.

Use the information from the licence plate Once the information has been transformed into plain text format, the licence plate number of the vehicle is saved in a database so that it may be integrated with other IT systems. The licence plate may be compared to a database of registered plates, whitelist and blacklist databases, or both

The constructed convolutional network extracts high-level characteristics for use in vehicledetection. The suggested technique really utilises a combination of high-level data retrieved by a convolutional and recurrent network and low-level features in the main convolutional layer to identify automobiles. In addition, many layers are used to extract distinct features from input photos. Features are retrieved with varying degrees of precision between layers due to the varying sizes of the kernels used. This aids in having pictures rich in detail, allowing for the extraction of useful and distinguishing elements. As shown in Figure 1, the proposed design includes components for identifying the presence of vehicles.

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Alexnet features eight layers with trainable parameters. There are a total of five layers in the model, with Relu

activation used in all except the final output layer. The first two levels makeuse of max pooling, followed by three fully connected layers.

Researchers discovered that by using the relu as an activation function, training durations might be cut by as much as a factor of six. Because of their usage of dropout layers, their model wasnot overfit. In addition, the Imagenet dataset is used for training the model. Almost 14 million photos from 1,000 different types may be found in the Imagenet collection.

IV. III MobileNetV2 Model

MobileNetV2 is an attempt to design a convolutional neural network that can function effectively on mobile devices. It is predicated on a backwards residual structure, with the bottleneck layers acting as the links between the residual layers. A source of non-linearity is filtered out in the intermediate expansion layer by use of light-weight depthwise convolutions applied to features. To summarise, MobileNetV2's architecture is made up of a 32-filter fully convolutional first layer, followed by 19 layers of residual bottlenecks.

Because of its generic design, MobileNetV2 may be used to a wide variety of scenarios. It has a wide range of input layer sizes and width factors to choose from. As a result, the inference cost for mobile devices may be lowered by using a model with a different width. MobileNetV2 is almost identical to the original, except that it makes use of inverted residual blocks and bottlenecking characteristics. When compared to the original MobileNet, it has a much less number of parameters. MobileNets accept inputs of any size above 32x32, and the performance improves with bigger images.

V. CONCLUSION

Five convolutional layers, three max-pooling layers, two fully connected layers, and one Softmax layer made up MobileNetV2. Convolutional filters and the nonlinear activation functionReLU were used in each convolutional layer. Maximum pooling was accomplished with the aid of the pooling layers. There were 96 filters in the first

Although the findings are encouraging, training the most advanced deep learning algorithms is data intensive and requires large annotated data sets. It is often required to at least partly re-collect these enormous datasets since they could be unique for each PV solar installation and location. The expense of collecting and labeling such enormous datasets is high. In this study, we develop and demonstrate a novel fault identification method that requires significantly fewer labeled training samples. This method uses a family of more recent semi-supervised positive unlabeled learning approaches, which, to our knowledge, Conclusion

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Fault Recognition in Solar Panels using Machine Learning Algorithms

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Abstract— **The growing use of solar panels worldwide highlights the need to detect defects in systems based on solar panels. A machine-learning model was developed in this work using past solar panel power output (kWh) and weather information to forecast the future power output of a solar panel system. Researchers might establish if the technology was inefficient by comparing the expected and actual power outputs. Consequently, the system may find all problems if assessed over two weeks while simulating a collapse. These results demonstrate how a machine learning algorithm can replicate a solar panel system's anticipated output and determine if it generates the appropriate amount of power. Adding more meteorological data, improving the quality of the current meteorological data, and training the machine learning model on new data are some approaches for strengthening the system.**

Keywords—GB, KNN, Machine learning, Solar panel, SVM

I. INTRODUCTION

Countries all around the globe have developed an interest in energy-related issues since the turn of the twenty-first century. On the one hand, owing to the sharp rise in demand for chemical fuels like oil, coal, and natural gas, people are beginning to consider resource issues when planning for future sustainable development. On the other hand, the global community is paying more and more attention to how human activity affects climate change. Distributed photovoltaics (DPT), a new energy technology, may be utilized to meet energy needs while reducing greenhouse gas emissions and improving power supply reliability. The distributed photovoltaic power plant is a possible essential solution to the world's energy issues.

However, distributed solar power plants have several operational and maintenance challenges due to their small size, dispersed deployment, and high component density. The main challenges are as follows: There is no mature and effective operation maintenance system. The power inspection is labor-intensive but ineffective; the fault alarm's fault identification capability is poor, frequently necessitating secondary identification by personnel; locating damaged parts is difficult, lengthening the operation and maintenance cycle and increasing labor costs; the power loss analysis is insufficient, leaving the operation and maintenance without guidance; and there is no mature and productive operation maintenance system.

According to projections, photovoltaic (PV) problems such as soiling, shading, deterioration, and short circuit faults reduce solar array power efficiency by 22.34% to 27.58%. Several machine learning (ML) methods have been used to study the detection of solar defects, with most contemporary algorithms depending on a deep neural network solution.

Although the findings are encouraging, training the most advanced deep learning algorithms is data intensive and requires large annotated data sets. It is often required to at least partly re-collect these enormous datasets since they could be unique for each PV solar installation and location. The expense of collecting and labeling such enormous datasets is high. In this study, we develop and demonstrate a novel fault identification method that requires significantly fewer labeled training samples. This method uses a family of more recent semi-supervised positive unlabeled learning approaches, which, to our knowledge, have never been used for PV fault detection. Some labeled data is included in standard semi-supervised learning systems, but more unlabeled input is used to enhance the models. Semi- supervised algorithms have lately been utilized to identify PV failures for the above causes. However, as the production and usage of solar panels develop, it is essential to understand how they deteriorate so that proper action may be taken before they fail. Failure to recognize this degradation may result in several problems, including diminished solar panel performance and, in severe cases, catastrophic failure [1]. As solar panels become more sophisticated in their production and usage, it is critical to understand how they age so that appropriate action may be taken before they fail. Failure to notice this deterioration may lead to several issues, including a decline in solar panel efficiency and, in rare situations, a fatal failure [1].

Photovoltaic (PV) modules, usually referred to as solar panels, have shown exponential growth in usage worldwide during the last ten years [2]. The weather [3, dirt on the panels [4, etc.]] dramatically impacts how well a PV module system performs. The owner does not influence some of the natural factors that impact the PV modules' energy production, such as the sun's angle, clouds, and other weather-related difficulties. A property owner may stop many kinds of reductions in energy output. These were incidents when a PV module failed, and leaves covered the panels or other similar occurrences. This study aimed to develop a software-based solar system fault detection system to recognize such reductions.

Significant performance decreases, or defects, in a PV system were discovered using the historical energy output of the system and climate data. Near the PV system, meteorological data is gathered geographically and historically. In this study, the power output of a PV system will be referred to as energy output and measured in kWh over a predetermined time frame (for example, an hour). Afterward, a machine-learning model was created to predict the anticipated power production of a PV system using the

power output and meteorological data. The fault detection system compares the anticipated or forecast power output to the actual power generation to determine if the PV system is malfunctioning. Because this kind of fault

detection system may be used remotely, locating and diagnosing a defective PV system will be simple. As a result, necessary upkeep or repairs could be finished quicker, producing more energy.

The objective was to use machine learning to build a fault detection system to find defects in PV systems using historical power output and meteorological data. Three factors, however—the degree of power decrease, the threshold, and the time horizon—affect the system's detecting range. When tested over two weeks after the generation of a failure (a 50% loss in power output), the fault detection system was shown to be capable of identifying all problems. On the other hand, reducing the number of mistakes simulated, the time horizon, or the threshold may have a detrimental effect on the result.

In this research, we presented a machine learning-based method for defect identification in solar panels. The system would determine whether or not the solar panel is defective based on its parameters. To categorize the solar parameters in this system, we want to employ SVM, KNN, and Gradient Boosting (GB) algorithms. The machine learning algorithm uses the parameters of the solar panel.

II. LITERATURE SURVEY

Researchers Radu Platon et al. [1] have created machine learning methods to detect inaccurate data. A solar plant's daily mean power consumption was predicted using machine learning regression approaches by researchers Jacques Martel, Radu Platon, Norris Woodruff, and Tak Y. Chau. The system they used could be implemented without needing additional hardware. To predict future readings, it just looks at historical data reading records. As a result, cost- effectiveness rises while supporting evaluations of the profitability of solar farms and preventive maintenance.

S.M. Patil et al. [2] refer to the online visualization of solar energy use as renewable energy. The Raspberry Pi and flask frameworks are used for this monitoring. Intelligent monitoring shows how much renewable energy is used each day. This helps the user examine energy consumption, the impacts of employing renewable energy sources, and power- related concerns.

An innovative method of defect detection and classification within the sensor node is presented by Ali Al- Dahoud [3]. The node contains the proposed fuzzy logic controller-based classifier. The WSN nodes have the correct sensors for the most frequent problems with solar panels. The distribution of nodes has been modeled, and work has been done to build a node with appropriate sensors that take processing fault priority into account. The main simulation results support rapid fault identification with little data processing and transfer.

Patrick Juvet Gnetchejo et al. [4] recommended a simple and dependable multivariate statistical analysis method for identifying and diagnosing PV system flaws. This approach is based on the kernel principal component analysis methodology, which examines and assesses the variance

between these data. It uses the vast amount of data gathered about a PV system that is now in use or readily available on most modern inverters. This research distinguishes the six operational states of a PV system: regular operation, shorted panels, open circuit panels, partly shaded panels, serial resistance drop, and MPPT error. It combines the Hotelling statistic and SPE index, which are connected by Rolle's theorem (T2). Two hundred samples with different flaws have been created at irradiances ranging from 50 to 500 w/m2. Series resistance degradation accuracy was 64%, partial shading accuracy was 91.11%, and open circuit, short circuit, and MPPT error accuracy was 100%. The various outcomes produced first from a Matlab-Simulink model and later from an existing system with 18 modules show how beneficial and effective the suggested approaches are.

V. S. B. Kurukuru et al. [5] provide thermography and machine learning-based PV module fault classification. An altered form of texture feature analysis is used to examine the properties of different thermal images taken from damaged panels. An artificial neural network classifier is trained to build the defect classifier using the collected characteristics. The developed technique demonstrated a training efficiency of 93.4% and a testing efficiency of 91.7% compared to conventional classification methodologies.

Vishal R. Shinde et al. [6] are looking for possible data faults in a solar energy facility. Failures in solar power plants may cost an organization money, which is why they are such an issue. To find these data problems, the system continually examines and assesses the feed from the solar data recorder and any other pertinent information accessible on the plant site. Numerous factors, such as inverter failure, cable damage, and tree shade, might result in data mistakes. This system detects data inaccuracies using machine learning and alerts the user. Additionally, users can prevent or reduce any system damage thanks to this.

Barun Basnet et al. [7] offer an intelligent fault diagnosis approach to recognize and classify defects in PV systems. Over the winter, numerous datasets representing fault and normal states are obtained under varied climatic conditions for experimental verification. The gathered datasets are standardized and preprocessed using various data mining techniques before being fed to a probabilistic neural network (PNN). The PNN model will be trained using previous data to predict and classify issues before importing new data. The trained model outperformed other machine learning classification approaches regarding prediction accuracy.

According to Michael Oberdorf et al., renewable energy sources are displacing traditional power production methods using fossil fuels [8]. Today, renewable energy includes solar energy. However, power generation efficiency is still poor, calling for the implementation of reliable fault detection methods. Machine learning techniques like neural networks may be used. These networks provide predictions about the output quality based on inputs like current, voltage, temperature, and climatic data. The network must be trained on faulty and non-defective data to achieve this.

III. PROPOSED SYSTEM

Fig. 3.1 displays the suggested system's block diagram. Figure 1 shows the research project's block architecture so that the suggested work may be understood more clearly. The system's three parts are data gathering, preprocessing, and fault detection. The Data Gathering module of the system is the first one. Here, the system gathers

meteorological data and mixes it with details on a particular PV system. A different file for each PV system contains the supporting meteorological data for each data point. After that, the produced file is sent to the Data Preprocessing module. Each system module is explained in great depth below.

A. Data gathering for solar panel parameters

The solar panel fault detection dataset is created using the online dataset. You may get the dataset at https://data.mendeley.com. Laboratory experiments of PV microgrid system faults are used to collect information on grid-connected PV system failures (GPVS faults). There are 16 data files—16 ". mat" files and 16 "CSV" files detailing severe defects in the solar panels, inverters, grid anomalies, feedback sensors, and MPPT controllers, each representing a distinct scenario for the experiment. PVS-Faults data may be employed to develop, verify, and assess various fault detection, diagnosis, and classification algorithms for reactive maintenance and PV system protection. The system to crash and cease operations. There are the following columns in each data file: Time: Time in seconds, average sampling Ts=9.9989 μs.

Ipv: PV array current measurement. Vpv: PV array voltage measurement. Vdc: DC voltage measurement.

Ia, Ib, Ic: 3-Phase current measurements. Va, Vb, Vc: 3-Phase voltage measurements. Iabc: Current magnitude.

If: Current frequency Vabc: Voltage magnitude. Vf: Voltage frequency.

B. Data Preprocessing

The Data Preprocessing module is mainly in charge of two tasks. The information gathered by the Data Gathering module must first be cleansed. Cleaning data involves identifying and correcting inaccurate information. New features should be added after being created for the data set. "Constructing features" refers to repurposing already- existing features. After completing these steps, the data may now be utilized in the Fault Detection module. Normalization is a scaling method that adjusts and rescales data such that it is between the ranges of 0 and 1. They also referred to the Min-Max scaling in Eq experiments included the manual introduction of the mistakes.

$$X' = \frac{X - X_{min}}{X_{max} - X_{min}}$$

Standardization, which centers data around the mean and has a single standard deviation, is another scaling technique. As a result, the distribution's standard deviation equals one, and the attribute's mean becomes zero. It is provided by

$$X' = \frac{X - \mu}{\sigma}$$

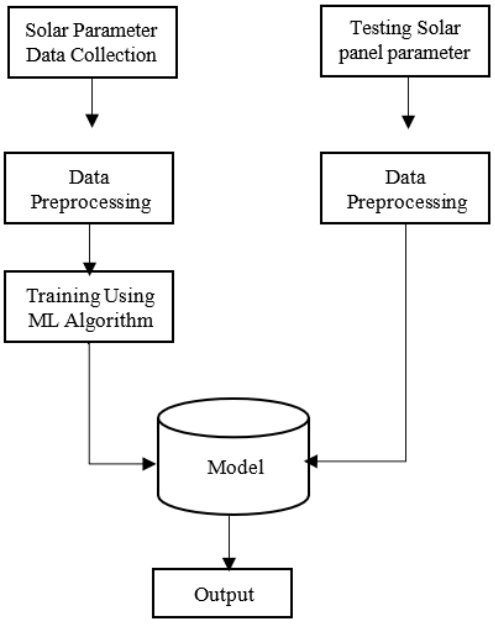

Fig. 1. Block diagram of Fault Detection AI For Solar Panels

The high-frequency data are noisy and sensitive to disturbances, temperature changes, and insolation during and between the tests, which has a detrimental influence on the detection of low-magnitude defects in the MPPT/IPPT modes. Finding the weaknesses before they cause a complete failure is a problem since serious errors might cause the

C. Training and Testing using a Machine learning model

The recommended strategy uses machine learning to address the classification problem. The decision tree (DT), K Nearest Neighbor (KNN), and Support Vector Machine (SVM) algorithms are used by the system to classify the input PV parameters as faulty or normal. The machine learning algorithm is thoroughly explained in the section that follows.

a. Support Vector Machine

The SVM algorithm was invented for the first time by Vapnik and Lerner in 1963. The SVM is a binary classifier that performs better than other classifiers. Based on supervised learning, it operates

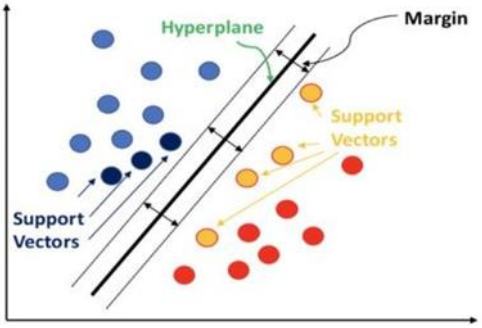

Fig. 2. Linear SVM

SVM divides the world into two groups by creating a hyper- plane in a high-dimensional feature space that may be utilized for classification. SVM is a classification method built on several kernel approaches. SVM is separated into two groups. A support Vector Machine

(SVM) is a collection of non- linear processes concerned with the morphology or form of data features.

b. K Nearest Neighbor

One of the most straightforward classification methods for supervised learning is KNN. In feature space, the goal is to find the test data that matches it most closely. We'll investigate it using Fig. 3.

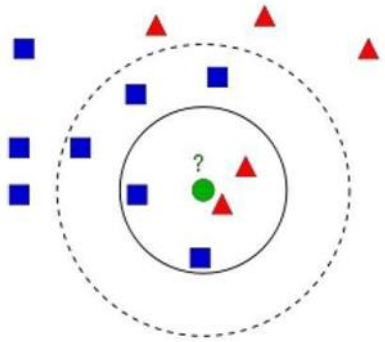

Fig. 3. KNN algorithm

The image shows two families, Blue Squares and Red Triangles. The term "class" refers to each family. On the feature space of their town map, their residences are shown. Since then, a newcomer to the neighborhood has moved in and constructed a new home symbolized by a green circle. One of these Blue/Red families should include him. Classification is the name given to that technique. What do we do? Let's use this algorithm while using KNN. Finding out who his nearest neighbors are is one strategy. It is clear from the image that the family is from the Red Triangle. Therefore, he is a part of the Red Triangle. This strategy is known as the nearest neighbor classification since it only considers the closest neighbors. There is a problem with it, however. Red Triangle may be the closest. But what if there are a lot of Blue Squares nearby? In such circumstances, Blue Squares in that region are more powerful than Red Triangles. Therefore, just checking the nearest is insufficient. Instead, we looked at the k nearest families. Then whoever constitutes the majority of them is the owner of the new guy. In our case, think about the three nearby households, or k=3. He has two Reds and one Blue (although there are two Blues close by, we only chose one since k=3). He ought to be re-added to the Red family as a result. However, what if k is assumed to be 7? He then has two Red families and five Blue families after that. Great!! He should now be a part of the Blue clan. The value of k impacts everything. What happens if k = 4 is the most amusing situation. There are two Red and two Blue neighbors nearby. It's a tie. So it makes sense to think of k as an odd number. This method is known as k-Nearest Neighbor since classification relies on k-nearest neighbors. After training, machine learning models are stored in the system. For Testing, the model that has been stored is used.

c. Gradient Boosting

One kind of machine learning boosting is gradient boosting. It is predicated on the hypothesis that the total prediction error is reduced when prior models are coupled with the most promising upcoming model. It is essential to indicate the anticipated results for the subsequent model to reduce mistakes. How are the goals selected? The degree to which modifying a case's prognosis affects the overall prediction inaccuracy determines the objective result for each instance:

- A high-value case outcome is when a prognosis for a particular instance is somewhat altered, and the degree of accuracy is considerably reduced. New model predictions that are near their goals will reduce inaccuracy.
- If a modest change to the prediction has no impact on the mistake, the case's subsequent target result is zero. There is no way to improve the accuracy of this prediction.
- This method is known as "gradient boosting" because target outcomes are determined for each instance based on the gradient of the prediction's unreliability. With each successive model, the range of potential predictions for each training instance is progressively narrowed.

IV. RESULTS

This technique uses Mendeley Data, an online source [9], to get the dataset. Information on Grid-connected PV System Faults (GPVS faults) is gathered via testing faults in a PV microgrid system in a lab. Each of the 16 data files—16 ". mat" files and 16 ".csv" files—represents a distinct scenario for the experiment and provides information on variably severe defects in the solar panels, inverters, grid anomalies, feedback sensors, and MPPT controllers. GPVS-Faults data may be used to develop, validate, and evaluate various fault detection, diagnosis, and classification algorithms for reactive maintenance and PV system protection.

The experiments included the manual introduction of the mistakes. The MPPT/IPPT modes, noisy high-frequency data, pause, and variations in temperature and insolation during and between Testing make it challenging to identify low-magnitude faults. Finding the weaknesses before they cause a complete failure is a problem since serious errors might cause the system to crash and cease operations. The example dataset is shown in Fig. 4.

The Data Preprocessing module is mainly in charge of two tasks. The information gathered by the Data Gathering module must first be cleansed. Cleaning data involves identifying and correcting inaccurate information. New features should be added after being created for the data set. "Constructing features" refers to repurposing already- existing features. After completing these steps, the data may now be utilized in the Fault Detection module. With this approach, data are normalized and standardized. The results of the preprocessing are shown in Fig. 5.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Time	Ipv	Vpv	Vdc	Ia	Ib	Ic	Va	Vb	Vc	Iabc	If	Vabc	Vf
2	2.82E-05	1.572327	101.3489	144.1406	-0.13513	0.490112	-0.35499	41.74454	-149.873	109.0646	1	50	1	50
3	0.000128	1.503265	101.4587	143.5547	-0.10828	0.510254	-0.38855	46.83151	-150.717	105.83	1	50	1	50
4	0.000228	1.492859	101.5747	143.5547	-0.1687	0.496826	-0.33484	51.07468	-152.019	102.5431	1	50	1	50
5	0.000328	1.558136	101.3123	143.2617	-0.13513	0.510254	-0.3617	55.84824	-152.585	98.14326	1	50	1	50
6	0.000428	1.631927	101.1414	143.8477	-0.20227	0.50354	-0.32142	60.05524	-152.609	94.26173	1	50	1	50
7	0.000528	1.60733	101.0132	143.8477	-0.1687	0.510254	-0.34827	64.86496	-154.152	90.27573	1	50	1	50
8	0.000628	1.500427	100.9338	143.8477	-0.23584	0.50354	-0.30799	69.5903	-154.815	86.59912	1	50	1	50
9	0.000728	1.445557	101.0437	143.8477	-0.19556	0.510254	-0.32142	74.48441	-154.851	83.19173	1	50	1	50
10	0.000828	1.51178	101.3916	143.8477	-0.26941	0.510254	-0.27442	77.47391	-154.538	78.57086	1	50	1	50
11	0.000928	1.541107	101.3123	143.5547	-0.22913	0.496826	-0.30127	81.84967	-154.948	73.76114	1	50	1	50
12	0.001028	1.524078	101.4587	143.5547	-0.29627	0.516968	-0.25428	85.8638	-155.056	69.46172	1	50	1	50
13	0.001128	1.474884	101.532	143.2617	-0.2627	0.490112	-0.27442	89.91409	-154.345	65.14221	1	50	1	50
14	0.001228	1.502319	101.532	143.5547	-0.32983	0.510254	-0.23414	93.67508	-154.152	60.90307	1	50	1	50
15	0.001328	1.487183	101.3489	143.5547	-0.28284	0.483398	-0.24085	97.83386	-152.742	55.99289	1	50	1	50
16	0.001428	1.594086	101.2817	143.8477	-0.34998	0.516968	-0.20057	101.2332	-152.597	51.43229	1	50	1	50
17	0.001528	1.525024	101.3367	143.2617	-0.29627	0.483398	-0.20057	105.9706	-151.621	46.82749	1	50	1	50
18	0.001628	1.465424	101.2756	143.8477	-0.3634	0.510254	-0.18042	109.1289	-150.379	44.32821	1	50	1	50
19	0.001728	1.528809	101.3855	143.2617	-0.30298	0.476685	-0.167	112.4197	-149.33	41.87714	1	50	1	50
20	0.001828	1.585571	101.3	143.8477	-0.38355	0.50354	-0.15357	115.132	-149.608	33.22205	1	50	1	50

Fig. 4. Fig.4. Database sample

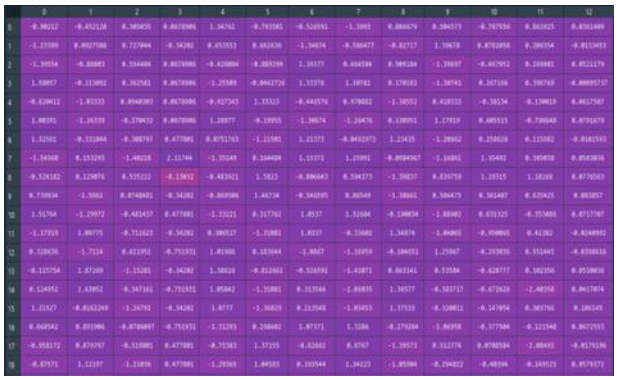

Fig. 5. Fig.5. Preprocessed Data

The training accuracy of the proposed system is tabulated in Table I.

Algorithm	*Parameters*	*Training*
SVM	Kernel = rbf	0.60875
	Kernel = poly	0.70575
	Kernel = sigmoid	0.17141666666666666
KNN	K=3	0.8936666666666667
	K=5	0.88425
	K=7	0.8766666666666667
Gradient Boosting	-	0.99525

From TABLE I, it is observed that gradient boosting and KNN algorithms performed satisfactorily. The Gradient boosting algorithm outperforms all the algorithms used for the analysis because of the ensemble methods used in the gradient boosting. It is a combination of gradient descent and the AdaBoost algorithm.

V. CONCLUSION

The research aimed to create a system that can detect PV system flaws using meteorological data and machine learning. This was accomplished by developing a PV system's anticipated output and contrasting it with its actual output. Identifying problems and breakdowns as soon as feasible is essential for the effectiveness and safety of PV systems. PV systems may have many flaws and problems. Data is utilized for training machine learning (ML)-based fault detection models, which result in exceptionally accurate predictions. However, if environmental elements are ignored, data-based problem detection algorithms for PV systems may result in incorrect projections. This method uses SVM, KNN, and GB algorithms to create an intelligent fault detection model for PV arrays that correctly classifies the defect kinds. A large dataset with various data values collected over the summer and winter seasons under varied environmental circumstances was used to train the model.

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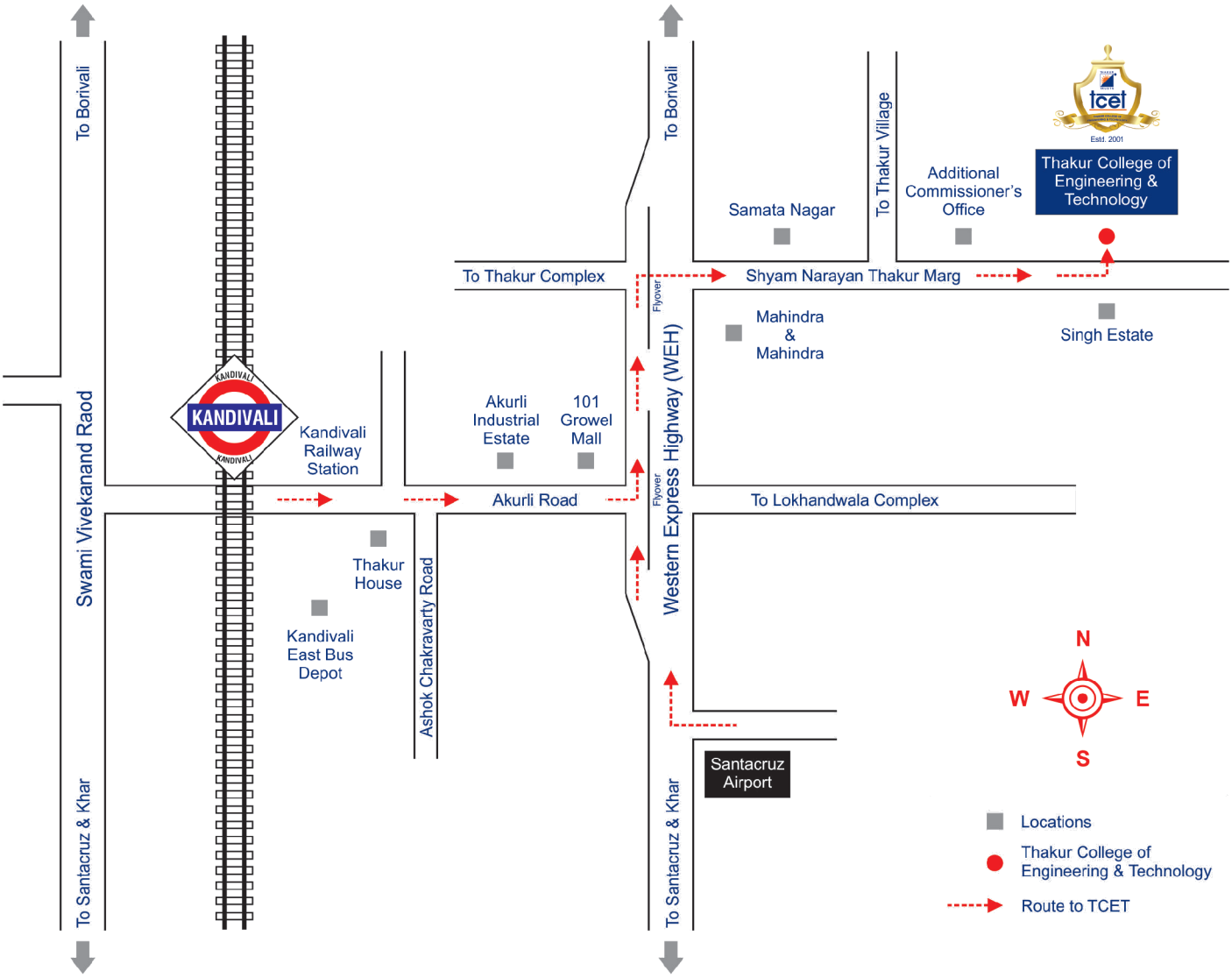
Location Plan



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